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Investment, Finance, and Capital Market Perspectives

Paul Clements-Hunt

The Blended Capital Group

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for

UNISDR Global Assessment Report 2013

Prepared by:

Paul Clements-Hunt,
The Blended Capital Group
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Introduction

The world is entering a period of fundamental change for finance and investment as economic power in the global economy is rebalanced, with much greater prominence for emerging economies such as the BRICs.[1] The prospect of fundamental demographic changes in the years ahead also raises serious questions about how and where concentrated pools of capital captured, notably, in the developed economies' savings structures and, increasingly, in emerging economy savings structures will be invested in coming years. Equally, the extension of financial services to those 2.8 billion people "with discretionary income who are not part of the formal financial system,"[2] as well as the evolution of financial services for those at the base of the pyramid,[3] is also a critical challenge.

The Group of 20's (G-20) stated goal of a stable, sustainable, and resilient global financial system[4] and the fundamental economic, social, and environmental roles of the investment chain and processes of financial intermediation within that system will determine how a globalized economy contributes to sustainable development. The resilience of the financial system and financial institutions to withstand major shocks caused by both man-made and natural disasters also remains a critical question for policy-makers. The financial crisis of 2007–2008 saw worldwide financial assets fall by US$16 trillion to US$178 trillion in 2008,[5] from their previous peak of US$194 trillion in 2007. The crash and subsequent severe global recession destroyed US$28.8 trillion[6] in global wealth captured in equity and real estate values by mid-2009. During one week in October 2008, it is estimated that some 20% of the "value of global retirement assets"[7] were "wiped out." These value-destroying financial and economic crises[8] have come with greater intensity and higher frequency since the "Black Monday" stock market crash of 1987, when the Dow Jones Industrial Average in the United States lost more than 22% in a day.[9] In 2011, a year that saw the largest ever economic and insurance losses associated with man-made and natural disasters, a series of earthquakes, tsunamis, floods, drought, and industrial and nuclear disasters brought greater attention to our collective need to understand the impact of different types of

1 BRIC - acronym first used by Jim O'Neill of Goldman Sachs in 2001. The four countries (Brazil, Russia, India, and China) currently account for more than 25% of the world's land area and in excess of 40% of world population. After the BRIC countries formed a political organization among themselves, they expanded to include South Africa, becoming the BRICS.
2 "Global capital markets: Entering a new era," McKinsey Global Institute, September 2009.
3 "The Fortune at the Bottom of the Pyramid," C. K. Prahalad, University of Michigan, 2002/2005.
4 G-20 Finance Ministers Communiqués in April and June 2010.
5 "Global capital markets: Entering a new era," McKinsey Global Institute, September 2009.
6 "Global capital markets: Entering a new era," McKinsey Global Institute, p. 7, September 2009.
7 "Market Forces," John Authers, *Financial Times*, FT weekend Sat 22/Sun 23 May 2010.
8 For example: the "Black Monday" market crash of 1987; the Mexican "Peso" Crisis 1994; the Asian Crisis 1997; the Russian "Ruble" Crisis 1998; the collapse of US hedge fund Long-term Capital Management (LTCM) 1998; the Dot.Com "Boom and Bust" of 1999-2000; and the market collapse catalyzed by corporate governance failures (e.g., ENRON, Worldcom, Parmalat) of 2001-2002.
9 "Exorcising Ghosts of Octobers Past," E. S. Browning, *The Wall Street Journal*, 15 October 2007.

risk—whether financial, natural, or man-made—and the systemic implications for convergence of such risks to drive greater instability.

Such risk events, with serious systemic implications, raise a fundamental question of whether or not the current financial system is "fit for purpose" to deliver a resilient, low-carbon, resource-efficient, inclusive economy capable of withstanding a broader range of risks—and, if not, what such a system should look like.

A. Context: Capital Market Growth, Converging Risks, and Financial Instability

By the end of 2010, the total value of the world's financial stock[10] reached US$212 trillion,[11] or more than three times the annual global gross domestic product (GDP), which stood at US$60 trillion at the end of that year.[12] The US$212 trillion figure, up from US$54 trillion in 1990, is more than 14 times the size of the US economy's current annual GDP.[13] The financial assets controlled by our global capital markets and the worldwide financial services community increased to 356% as a percentage of GDP in 2010,[14] from 261% in 1990.

The increasing financial depth[15] of the global economy demonstrates the fundamental importance and power of both capital markets and the international financial system during an era of globalization when liberalization, privatization, and deregulation across increasingly interconnected markets have been dominant forces.

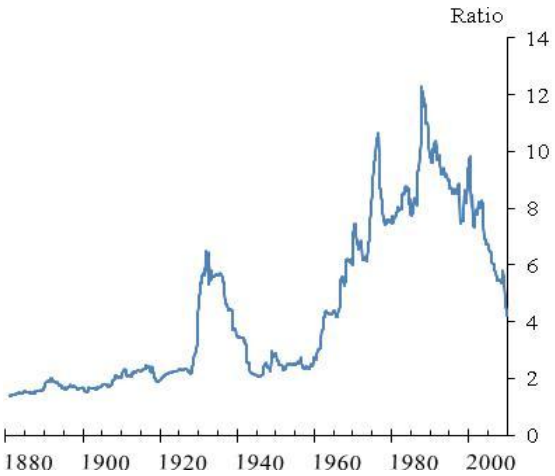
Following the global financial crash of 2007–2008 and the ensuing economic downturn, however, further evidence-based research (see Box 1, "Patience and Finance," for a notable example)[16] is needed to determine whether a mutually reinforcing convergence of new and emerging risks, intensified in a global economy where economic, social, and political boundaries are being redefined, is deepening the exposure of the financial system to risk and ongoing instability.

10 "Mapping Global Capital Markets 2011," McKinsey Global Institute, 2011 definition of global financial stock. World financial stock comprises equity market capitalization and outstanding bonds and loans.
11 Ibid.
12 Global GDP estimates, World Bank statistics.
13 World Economic Outlook, September 2011.
14 "Global capital markets: Entering a new era," McKinsey Global Institute, September 2009 (based on various sources: Federal Reserve; National Bureau of Economic Research (US); Robert Shiller; and McKinsey Global Institute Analysis).
15 Financial depth is given as a percentage. It is calculated as global debt and equity outstanding divided by global GDP, McKinsey Global Institute 2011.
16 Previous research undertaken by Andrew Haldane, Director, Financial Stability, Bank of England, from 2008–2011.

BOX 1. "PATIENCE AND FINANCE."

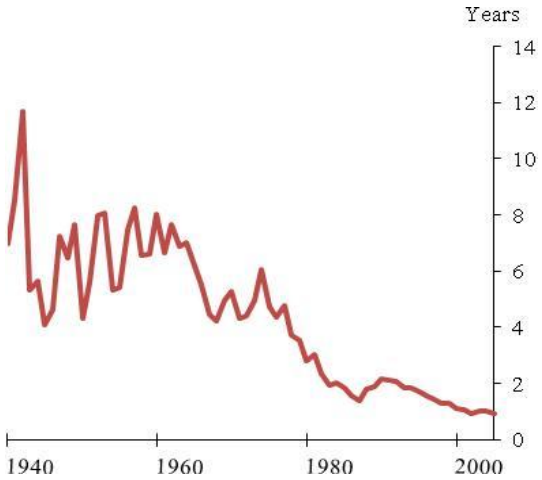
If impatience in the financial system is growing, Andrew Haldane argues in his speech, "Patience and Finance," there should be evidence of financial prices having become more volatile and divorced from fundamentals over time. As Figure 1 shows, stock prices have indeed become more volatile than fundamentals—from twice as volatile until the 1960s, to anywhere between six and ten times more volatile since 1990. Furthermore, as Figure 2 illustrates, the average holding period of shares has seen a drop from seven years in 1940, to around seven months in 2007. Impatience is mounting, according to Haldane.

Figure 1. Ratio of volatility of returns on real S&P 500 price index and its Dividend Discount Model-implied value (assumes real dividend growth rates and real discount rates equal to average values since 1923; volatility calculated as standard deviation over ten years annualized monthly returns).



Source: www.irrationalexuberance.com and Bank of England calculations.

Figure 2. New York Stock Exchange average holding period, 1940-2005**.**



Source: New York Stock Exchange.

Source of Box 1 text: "Patience and Finance," Andrew Haldane, 2010, retrieved from: http://www.bankofengland.co.uk/publications/Documents/speeches/2010/speech445.pdf, as cited in *Financial Stability and Systemic Risk: Lenses and Clocks, June 2012*, Paul Clements-Hunt, Foreword by Rt. Hon. Gordon Brown, International Institute for Sustainable Development, Winnipeg.

Importantly, new and complex questions about how future financial instability might be triggered and compounded by natural disasters—some associated with climate change, threats to our biodiversity and ecosystems, the demographics of aging populations, and the impact of chronic diseases—have not been adequately explored by financial policy-makers or the finance and investment sectors. Such an exploration of financial stability and long-term systemic risks is nascent. Also, evidence is emerging to suggest that significant pools of capital underpinning our global financial system are allocated and deployed without an adequate understanding of the interconnected nature of emerging risks, including disaster risk. Historically, the public policy frameworks in which investment policy-making and investment decision-making developed failed to set legal or regulatory requirements to fully price externalities and to account adequately for non-traditional risks such as ex-ante disaster risk. Additionally, in the major capital market jurisdictions, fiduciary law[17] governing investment market behaviour was often interpreted by investors as excluding the need to factor in environmental and social risks. As a result, much non-traditional risk was ignored, unaccounted for or, at best, mispriced by our broader markets.

Key actors along the investment chain and across financial intermediation, including the largest asset owners (sovereign wealth funds, pension funds, insurance reserves), asset managers, and a broad range of financial institutions and stock exchanges, are only now slowly awakening to the full implications of disaster risk in the changing context of a resource-constrained planet. Population growth, concentration of economic value around urban hubs, and ecosystems destruction are also introducing a broader range of potentially converging ex-ante risks to the traditional risk-reward considerations of investment and financing decisions. Certainly, the insurance and reinsurance sectors have led on deepening our collective understanding of emerging risks, although their commercial focus means their greatest efforts are geared toward developed markets, where insurance penetration is historically higher. The non-insurance-related components of the financial and capital market system are the focus of this paper.

Converging Risk in a Globalized Economy

In 2010 and 2011, the Deepwater Horizon oil spill in the Gulf of Mexico, the Great East Japan earthquake, tsunami, and nuclear crisis, and Thailand's severe floods catalyzed by Tropical Storm Nock-ten focused investor and corporate attention on disaster risk. The year 2011 saw the largest economic losses (US$370 billion) and largest insured risk losses (US$116 billion) on record.[18] By midsummer of 2012, a severe drought, the worst in 50 years, and the intense heat of a burning US summer had destroyed materially significant percentages of the country's corn and soyabean crops, contributing to the third global food price spike in five years. Also during 2012, severe floods in China and the Philippines had focused global attention once again—following the Thai floods of 2011—on urban assets at risk, city and industrial flood defences, and disaster preparedness in the face of increasingly volatile weather patterns. Through brief case studies, this paper explores the British Petroleum (BP) Gulf Oil spill, the Japanese nuclear disaster, the Thai floods and the

17 " A legal framework for the integration of environmental, social and governance issues into institutional investment," published by UNEP Finance Initiative/Freshfields Bruckhaus Deringer, October 2005.
18 Swiss Re Research and Consulting, 28 March 2012.

ongoing US drought as examples of how converging environmental, social, and governance (ESG) risks unfolding in a complex, interconnected global system can create, contribute to, and/or exacerbate disaster risk, with profound consequences for companies exposed to the risk, national economies, and the worldwide economic system.

As noted, post the 2007–2008 global financial crash, G-20 Finance Ministers[19] stated a goal of a "stable, sustainable, and resilient global financial system" fully aligned with existing social and environmental policy commitments. The future functioning of the investment chain and processes of financial intermediation will greatly determine the speed at which we transition to a financial system that delivers on such policy objectives. The G-20 position was a response to the financial crisis that saw worldwide financial assets fall to US$178 trillion in 2008[20] compared with the end 2010 figure of US$212 trillion.

Beyond the concentration of hidden banking risk that created the financial crash, the period 2007 to 2012 has brought into fine resolution the threat to financial stability, as well as economic and social development, of a wider spectrum of risks than those that are normally accounted for by the modern financial system. As noted, recent disasters have shone an intense spotlight on the threat of high impact, low frequency[21] events often seen as long-tail or fat-tail risks by mainstream investment.[22] The extent to which these fat-tail risks in the "real world" stemming from man-made or natural disasters can catalyze or exacerbate capital market fat-tail events in the "financial world" is slowly attracting more attention from market actors and regulators. Increasingly, market observers and market practitioners recognize that the dominant economic philosophy of recent decades, the Efficient Market Theory (EMT), has under-weighted fat-tail risk. The importance of EMT is that market-relevant models that have underpinned much of modern financial risk management and market trading practices use EMT as a firm quantitative foundation. One such model, important for the operation of modern financial markets, is known as Value-at-Risk (VaR) and was developed by investment bank JPMorgan in the early-mid 1990s. A November 2009 investment sector study[23] (see graphics in Appendix 1) of fat-tail risk, which explored 81 years of data of price patterns from the Standard & Poor's 500 market index, highlighted that such "…'fat tail' events occur much more frequently than would be predicted by a normal distribution curve." Former trader and author Nassim Nicholas Taleb,[24] commenting on VaR,[25] said: "VAR is charlatanism because it tries to estimate something that is not scientifically possible to estimate, namely the risks of rare events. It gives people misleading precision that could lead to the buildup of positions by hedgers. It lulls people to sleep."

Taleb's view is echoed by Prav Sambamurti of Ssaris Capital Advisors, one of the earliest commodity trading advisory firms whose very business puts it close to the real world

19 G-20 Finance Ministers Communiqués in April and June 2010.
20 "Global capital markets: Entering a new era," McKinsey Global Institute, p. 7, September 2009.
21 "The Black Swan: The Impact of the Highly Improbable," Nassim Nicholas Taleb, 2007, Random House.
22 Examples include: Deepwater Horizon oil spill (2010); Great Eastern Japan earthquake, tsunami, and ensuing nuclear event at Fukushima (2011); the Tropical Storm Nock-ten and resulting Thai floods (2011).
23 "Study of Fat-tail Risk," Cook Pine Capital, November 2008.
24 "The Black Swan," Taleb, 2007.
25 "Watch out for those fat tails," Daniel P. Collins, 19 March 2009, *Futures Magazine*, April 2009.

vagaries of volatile weather patterns and natural disasters impacting commodities. Sambamurti explains[26]: "Many of the academics out there at Harvard, Yale and MIT still subscribe to the efficient market model. But that is not the real world. There is major pushback against the efficient market hypothesis…. The fat tailed risk is out there, you don't know when it is going to hit. The smartest minds couldn't figure it out."

One financier, widely regarded as one of the founders of modern quantitative finance and whose thinking from the 1960s onward underpinned the dominant short-term trading culture of the modern system, Edward Thorpe, seemed to understand fat-tail risk as he was "cautious almost to the point of paranoia."[27] Thorpe[28] "was always concerned about out-of-the-blue events that could turn against him: an earthquake hitting Tokyo, a nuclear bomb in New York City, a meteor smashing Washington D.C." Interviews conducted for this paper amongst a range of financial and investment practitioners worldwide confirm a building view that a dominance of short-termism in capital markets, without the caution exhibited by Thorpe, coupled with misaligned incentives in our investment system, mean that fat-tail risks are often discounted at best, or ignored at worst, in pursuit of short-term gain. This trend poses a distinct and growing threat to the stability of the financial system.

This paper explores whether a future financial system, supported by a policy dynamic that prices in externalities and accounts for non-traditional ex-ante risks, can adapt to manage a broader range of new emerging risks including disaster risk. The paper probes whether a re-engineered investment chain that incentivizes disaster preparedness, adaptation to climate change, and greater resilience of vulnerable communities will serve people who are not part of the formal financial system[29] more effectively.

Work undertaken since 2003–2004[30] exploring the fiduciary [31] implications as well as the financial materiality of a range of potential emerging risks is building a case that promotes the need for greater engagement by investors and financial intermediaries along the investment chain in order to understand the nature of these risks and how to manage them. Building on this work and in preparation for GAR 2013, UNISDR has an opportunity to bring a much deeper focus on the need for a broader range of investors, financial institutions and the core organizations that comprise the inter-linked architecture of our international financial system, such as stock exchanges, to more effectively integrate disaster and emerging risks in their investment decisions.

26 Ibid.

27 "The Quants: How a New Breed of Math Whizzes Conquered Wall Street and Nearly Destroyed It," Patterson, Scott, Crown Business, 2010.

28 Ibid.

29 "The Fortune at the Bottom of the Pyramid," C. K. Prahalad, University of Michigan, 2002/2005.

30 Preparatory work for the report, "A legal framework for the integration of environmental, social and governance issues into institutional investment," published in October 2005 by UNEP Finance Initiative/ Freshfields Bruckhaus Deringer, commenced in 2004.

31 *Fiduciary:* "An individual, corporation, or association holding assets for another party, often with the legal authority and duty to make decisions regarding financial matters on behalf of the other party," see www.investorwords.com/1932/fiduciary.htm

The paper, written within the context of the Hyogo Framework for Action, will explore our emerging understanding and the key trends with respect to how different parts of our financial and capital market systems assess, manage, mitigate, and transfer both disaster risk and new emerging risks. The investor perspective on links between disaster risks, the "slow failures of creeping risks,"[32] such as climate change and resource depletion, and governance risks at both a corporate and national level, will be touched upon. The paper does not pretend to be exhaustive but rather seeks to provide a primer for further research and discussion in the context of GAR 2013.

Risk Redefined

It is clear that robust signals from the policy community, as well as legislative and regulatory drivers that reinforce the need for the financial system to account for externalities and recognize emerging risks, should be some of the most powerful drivers for change. In early 2010 the World Economic Forum suggested that "the biggest risks facing the world today may be from slow failures or creeping risks."[33] However, it is clear that our finance and capital market system, while being immediately responsive and adaptive for short-term profit-making opportunities, has an in-built structural inertia to recognize and account for long-term risk and liabilities.

It is hard to improve on the explanation for this provided in 1954 by the late economist J. K. Galbraith when, reflecting on the Great Crash of 1929, he wrote[34]:

> But now, as throughout history, financial capacity and political perspicacity are inversely correlated. Long-run salvation by men of business has never been highly regarded if it means disturbances of orderly life and convenience in the present. So inaction will be advocated in the present even though it means deep trouble in the future. Here, at least equally with communism, lies the threat to capitalism. It is what causes men who know that things are going quite wrong to say that things are fundamentally sound.

Despite Galbraith's pithy wisdom, in recent years we have seen targeted policy research bring about dramatic changes in our collective understanding of new risks, notably in climate change and, more recently, in areas such as biodiversity and ecosystems services. For example, the 2006 *Stern Review* by the UK Treasury[35] and *The Economics of Ecosystems and Biodiversity* (TEEB)[36] are works from within the policy community with particular relevance for the financial services sector in that they quantify the economic threats associated with destruction of the environmental and social value. Since 2000, the volume of work undertaken by the financial services sector itself to understand the economic and financial risks inherent in issues such as climate change, water, and ecosystems destruction

32 "Global Risks 2010: A Global Risk Network Report," executive summary, p. 6, World Economic Forum, January 2010.
33 "Global Risks 2010: A Global Risk Network Report," executive summary, p. 6, World Economic Forum, January 2010.
34 "The Great Crash 1929," J. K. Galbraith, 1954.
35 Stern Review on the Economics of Climate Change, HM Treasury/Cabinet Office, October 2006.
36 The Economics of Ecosystems and Biodiversity (TEEB), a major international initiative to make the economic case for the conservation of biodiversity and ecosystems, UNEP, 2010-2011.

have proliferated. In 2002, a group of financial institutions predicted (by 2012) an annual economic loss of US$150 billion[37] associated with natural disasters and climate change. That annual economic loss figure was surpassed in 2005 when Hurricane Katrina hit the Gulf Coast of the United States. By 2008, the same group of institutions presented a credible scenario that suggested the possibility of a US$1 trillion loss in a given year by 2040 from the impacts of climate change and natural disasters.[38] By September 2009, more than 190 financial institutions[39] representing US$13 trillion were calling for, amongst other demands, a global target for emissions reductions of between 50% and 85% by 2050, with developed country emission targets of 80% to 95% by the same year, to avoid the most serious environmental and social impacts of global warming. Much work over the past decade suggests strongly that adoption and integration by mainstream financial and capital market actors of risk assessment approaches associated with sustainable finance and responsible investments disciplines will deepen our understanding of emerging risks and will contribute to fundamental stability of the financial system itself.[40] However, those financial and investment institutions actually integrating a broader and cohesive approach to risk management across all asset classes and investment decisions through consideration of ESG factors remain the exception, not the rule.

B. Risk Management in Markets: High Impact, Increasingly Frequent Events?

The following section highlights several examples of how disasters, natural, man-made, and those with multiple causes, sometimes interconnected, appear to have direct impacts on capital markets as well on the valuations and operations of various sizes of companies. As we have seen, a relatively small group of forward-looking investors increasingly examine longer-term issues through a combined environmental, social, and governance (ESG) perspective. Poor governance at the national, capital market, and corporate levels over an extended period of time would appear to have direct correlations with various environmental and social facets of these unfolding disasters from a standpoint of both cause and effect. The broad questions these disasters raise for investor consideration include, but are not limited to, the following:

- Questions around BP's governance and environmental, health and safety culture over several decades;
- Questions around Japan's hierarchical political and management culture as well as Tokyo Electric Power's (TEPCO) track record of sub-optimal transparency with respect to nuclear safety and incidents at plant level;
- Questions around Thailand's disaster preparedness related to governance systems at the national, regional, and corporate levels, engineered to demand the right risk management questions about plant citing and flood defences/control; and

37 "Climate change and the financial services industry - Module 1: Threats and Opportunities," UNEP FI, October 2002.
38 "Declaration on climate change by the financial services sector," UNEP FI, June 2007.
39 "2009 Investor Statement on the Urgent Need for a Global Agreement on Climate Change," IIGCC, INCR, IGCC Australia/New Zealand and UNEP FI, September 2009.
40 "Financial stability and systemic risk: Lenses and clocks," UNEP Finance Initiative, International Institute for Sustainable Development (IISD), and The Blended Capital Group (TBCG), July 2012.

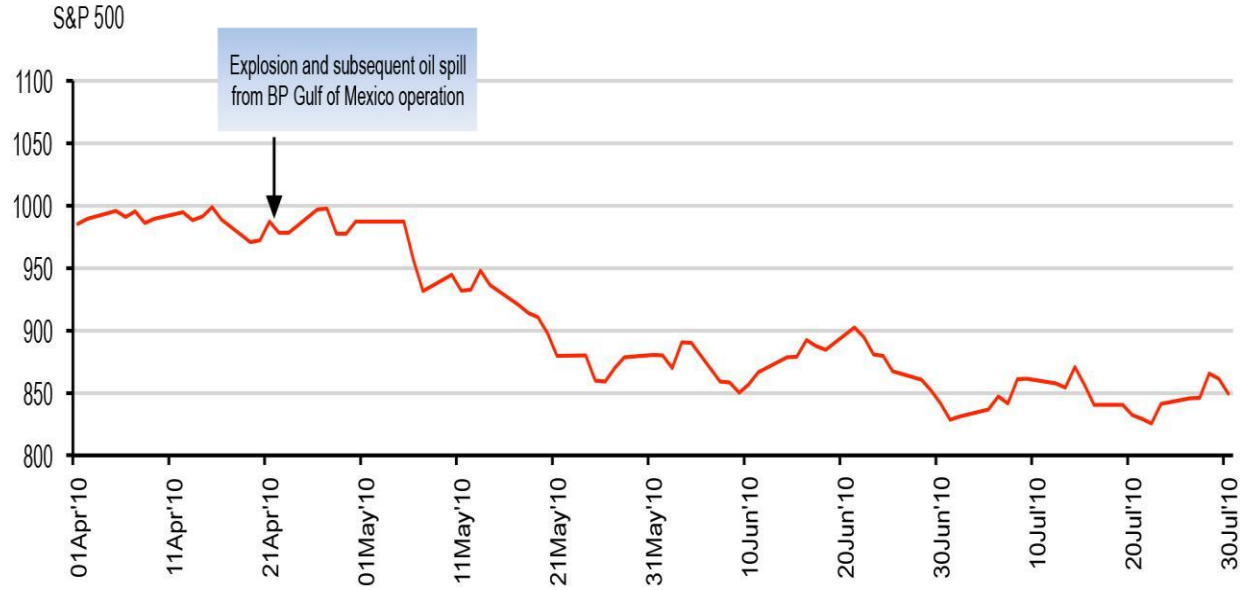
- The role of pure speculators, totally divorced from the actual use of underlying assets, in global commodity and food markets.

BP and the Gulf Oil Spill

Across the energy and extractive industries, financial services, and the investment sector, there is an increasing focus on issues related to corporate culture and corporate governance to explain a wide range of interconnected failures with severe social, economic, and environmental consequences.

One of the most well documented and forensically explored industrial accidents in history is the April 2010 BP Oil disaster in the Gulf of Mexico. Over 86 days, following a 20 April explosion at the Deepwater Horizon drilling platform that killed 11 workers, some 4.9 million barrels of oil gushed into the Gulf of Mexico before the well was sealed on 19 September 2010.[41] In the weeks following the initial catastrophe, the Standard & Poor's 500 index exhibited a steady decline (see Figure 3). More than two years later, and despite high crude oil prices, in mid-2012 BP "posted a drop in first-quarter profits as the energy giant's asset sales after its U.S. oil spill contributed to a drop in production."[42] Estimates suggest that current costs to BP stand at US$38 billion[43] while the overall cost of the spill in terms of "penalties, damages and clean up costs" may top US$80 billion.

Figure 3. The S&P 500 in the weeks following the BP Gulf of Mexico oil spill.



Source: HSBC.

41 National Commission Report to the President.

42 "BP Profit Falls As Gulf Disaster Still Casts Pall," Alexis Flynn, Dow Jones Newswire, Tuesday, 1 May 2012.

43 "BP adds $847m to Deepwater Horizon costs," *The Guardian*, 31 July 2012.

Under intense scrutiny over an extended period following the accident, some observers "blamed BP's woes on a culture of cost-cutting and out sourcing citing previous problems in The Gulf, Azerbaijan, Alaska and Texas City."[44]

There are contradictory aspects to the BP environmental, health and safety narrative in recent decades. Over the past 20 years, while becoming the leading oil and gas company promoting sustainability, BP was implicated also in some of the industry's most serious accidents. Amongst others, these included[45]:

- **1977–2011:** A history of spills and leaks, including the 2006 Prudhoe Bay oil spill, associated with the 800-mile Trans-Alaska Pipeline System (TAPS), a pipeline transporting 12% of America's oil output and owned by BP;
- **24 March 1989:** The Alyeska Pipeline Service Company, 50% owned by BP, was the most cited company named in the 200 lawsuits following the Exxon Valdez oil spill. Alyeska, a subsidiary of BP America Inc., operated the oil terminal near the accident site in Prince William Sound;
- **23 March 2005:** 15 workers killed and 170 injured after an explosion at BP's Texas City Refinery 2005;
- **7 September 2008:** Blowout of a gas-injection well after a gas leak at a facility in the Azerbaijan Sector of the Caspian Sea; and
- **20 April 2010:** BP Oil disaster in the Gulf of Mexico.

In January 2011 a report to the President of the United States, presented by a national commission,[46] visited the issue of corporate culture and also touched on the critical interface between public and private sectors: "There are recurring themes of missed warning signals, failure to share information, and a general lack of appreciation for the risks involved. In the view of the Commission, these findings highlight the importance of organizational culture and a consistent commitment to safety by industry, from the highest management levels on down. But that complacency affected government as well as industry. The Commission has documented the weaknesses and the inadequacies of the federal regulation and oversight, and made important recommendations for changes in legal authority, regulations, investments in expertise, and management."

44 "The BP Gulf Oil Spill: Failed Regulatory and Corporate Governance Systems Analysed through a Regulatory Capitalist Lens ," Patty McNicholas, Monash University, Melbourne, and Carolyn Windsor, Bond University, Queensland, Australia, 2010.

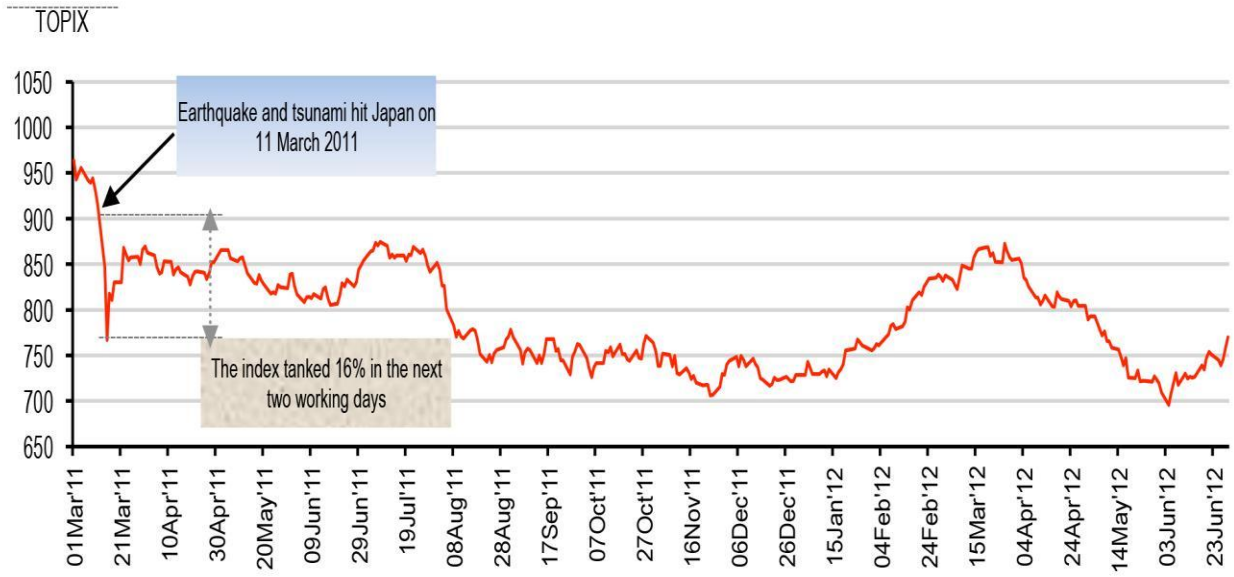
45 "BP Had Other Problems in Years Leading to Gulf Spill," Abrahm Lustgarten, ProPublica, 30 April 2010.

46 "Deep Water: The Gulf Oil Disaster and the Future of Offshore Drilling," Report to the President on the National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling, January 2011.

Tepco and Fukushima

The parallels with respect to the alleged failings of corporate culture, as well as the failure of regulators and government monitoring agencies, between the BP Gulf oil spill and the disaster that unfolded at the Tokyo Electric Power Company nuclear facility of Fukushima Dai-ichi in mid-late March 2011, following an earthquake and tsunami, are notable. Additionally, the market impacts (see Figure 4) and financial implications for Tepco, as one of Japan's largest energy concerns, were as dramatic as they had been for BP, with estimates in certain worst case scenarios for Tepco of a potential US$112 billion funding shortfall[47] during the coming decade. Reporting on its first quarter in 2011 (April-May), the company lost US$7.4 billion following the nuclear accident. To prevent a Tepco failure, the Japanese Parliament approved in August 2011 the creation of a new public agency backed by US$25 billion of taxpayer money to be paid back by the company over an extended period, but "it could be years before shareholders see dividends from what was once seen as a secure investment."[48]

Figure 4. Tokyo Price Index (TOPIX) after the earthquake, tsunami, and Fukushima nuclear disaster.



Source: HSBC.

47 "Tepco warned over $112bn funding shortfall," Jonathan Soble, Tokyo, *Financial Times*, 3 October 2011. 48 Ibid.

In early July 2012, a Japanese Parliamentary Panel published its report, compiled by a nuclear accident independent investigation commission, on the Fukushima disaster. The 641-page report stated[49]:

> The Fukushima nuclear power plant accident was the result of collusion between the government, the regulators and Tepco, and the lack of governance by said parties…. They effectively betrayed the nation's right to be safe from nuclear accidents. Therefore, we conclude that the accident was clearly 'man-made.' We believe that the root causes were the organisational and regulatory systems that supported faulty rationales for decisions and actions, rather than issues relating to the competency of any specific individual.

Thai Floods in 2011

Thailand's 2011 floods, the worst in 70 years catalyzed by Tropical Storm Nock-ten , caused an estimated US$41.6 billion of losses and saw GDP growth fall to 0.1% from a corresponding 7.8% in 2010. In addition to nearly 700 deaths countrywide, more than 1,500 industrial facilities were inundated during the floods. The short-term supply shock meant the country's exports fell by 6% compared with 2011 and imports dropped by 4.2%.[50] Of the country's 77 provinces, some 27 were still inundated in late October after the heavy rains, which started in July. More than 1.6 million hectares[51] in the country's north, northeast, and central provinces were submerged for significant periods of time.

By December 2011 the country's Office of Insurance Commission projected[52] that 928 factories would receive US$7.3 billion in insurance payouts. Companies and component manufacturers, sitting at critical nodes for a range of global industrial supply chains covering, amongst others, agro-industry, auto, electronics, and iron and steel sectors, were severely impacted, exporting shock waves around world stock markets. As the floods slowly subsided in December 2011, Intel Corporation, the world's largest chipmaker, estimated a US$1 billion drop in its fourth quarter 2011 revenue forecasts, citing a shortage of hard drives to feed its global computer sales. With Thailand providing nearly 25% of the global hard drive disc supply, as well as being a key chip manufacturer, the floods saw a range of US companies suffer declines in share prices[53] during the week of 20 October, including Dell (down 5.4%), Nvidia (down 5%) and Western Digital (down 9%) being losers. Western Digital's CEO described the Thai floods as "a disaster of unprecedented scale." Japanese auto giants Honda Motor Co. and Toyota Motor Corp. suffered severe business interruption[54] in their global supply chains and both cut profit estimates for 2011.

49 "Fukushima reactor meltdown was a man-made disaster, says official report," *The Guardian*, 5 July 2012

50 "After the floods: Thailand's long road to recovery," Pisit Leeahtam and Cynn Treesraptanagul, Chiang Mai University, 12 April 2012.

51 NOAA National Climatic Data Center, State of the Climate: Global Hazards for October 2011, published online November 2011, retrieved on 07 August 2012 from http://www.ncdc.noaa.gov/sotc/hazards/2011/10.

52 Worst Floods in 70 Years May Prompt Thai Water Futures Trade," Anuchit Nguyen, 14 December 2011, Bloomberg.com.

53 "Thailand flooding hits Dell, chip makers," Benjamin Pimentel, MarketWatch, 20 October 2011.

54 "Firms Draw Scrutiny over Thai Flood's Impact," James Hookway, *Wall Street Journal*, 3 November 2011.

Honda's Brazilian plant faced a reduction of one-third of its production capacity because of the Thai floods cutting off component supplies due to impacts on one of the company's main global manufacturing plants.

The Thai market regulators responded to the floods in several ways, which included[55]: relaxing bond regulations enabling small and medium sized manufacturers, threatened by possible lowered credit ratings or downgrades, to raise debt; promising to explore new water-related derivatives contracts to enable producing and investing companies to hedge against certain aspects of water risk including heavy rainfall and flooding; and urging that insurers paid claims within a six-month window. The Bank of Thailand also reduced the interest rate to 3% to facilitate recovery and, ultimately, the government passed three financial decrees totalling US$22.5 billion geared to "rehabilitation and long-term water management systems."[56] The government response included the prospect of enhanced flood defences around major industrial estates. Seven of the country's most important industrial zones were flooded, with that alone reducing economic growth by 2%.[57] By April 2012 some 70% of 800 factories[58] supported by the Thai Board of Investment (BoI) had restarted operations.

Figure 5 demonstrates the trend of the Stock Exchange of Thailand (SET) during year 2011's persistent flooding. By the corporate reporting season for the SET toward the end of quarter one 2012, a range of listed Thai companies were highlighting[59] the negative impacts of the floods on annual returns as well as future business prospects associated with the construction of adaptive infrastructure. These covered a range of economically important sectors and included companies such as Tata Steel (Thailand) Public Company Limited ("severe business disruption due to worst ever floods in Thailand"); Stars Microelectronics (Thailand) PCL ("damage of buildings and factories"); and Unique Engineering and Construction PCL ("severe flooding of warehouses and construction sites"). Additionally, some companies, such as Chow Steel Industries PCL, saw potential strong growth for their steel products, citing increased "investment by the government for repairing the damaged infrastructure from the flood, including water management projects for preventing floods in the short and long term."

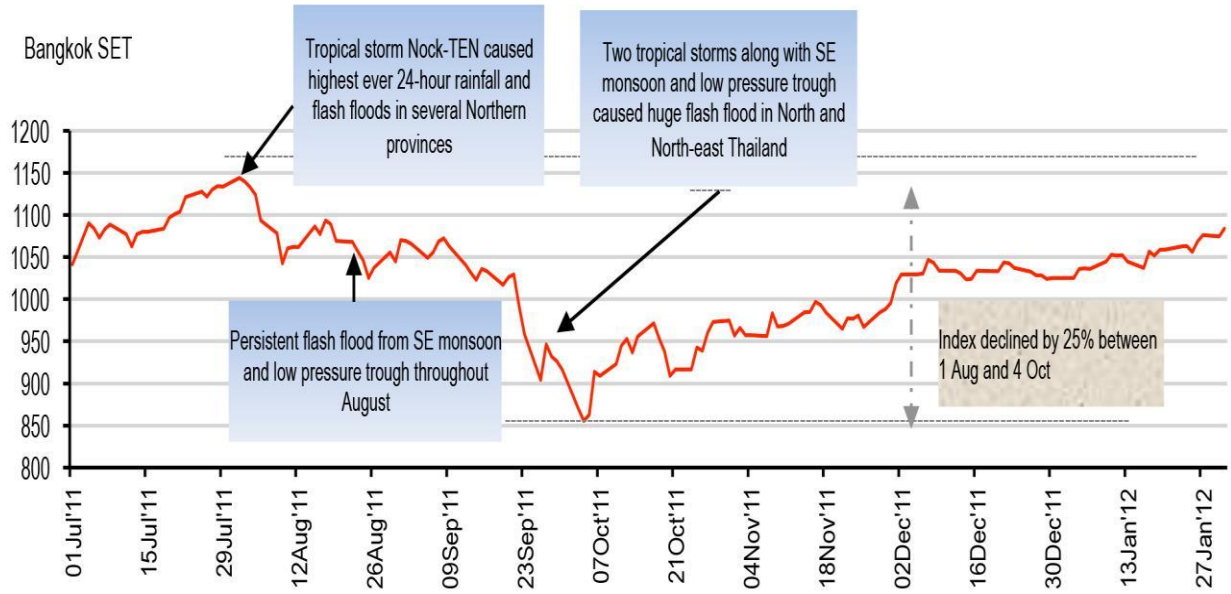
55 "Worst Floods in 70 Years May Prompt Thai Water Futures Trade," Anuchit Nguyen, Bloomberg.com, 14 December 2011.

56 "After the floods: Thailand's long road to recovery," Pisit Leeahtam and Cynn Treesraptanagul, Chiang Mai University, 12 April 2012.

57 "Firms Draw Scrutiny over Thai Flood's Impact," James Hookway, *Wall Street Journal*, 3 November 2011. 58 Thai Board of Investment statistics, July 2012.

59 Stock Exchange of Thailand web site, 8 August 2012.

Figure 5. Bangkok SET and the Thai flood events of 2011.



Source: HSBC.

Observers believe mid- to long-term damage to Thailand's reputation as a destination for Foreign Direct Investment (FDI), notably the decades-long association with Japanese manufacturing giants, may be negatively impacted by the severe flooding of 2011. In March 2012 Honda "decided to establish a US$337 million plant in Indonesia, though the company had originally intended to build it in Thailand."[60]

Box 2 discusses the extent to which climate change and deforestation have affected flooding in Thailand.

60 "After the floods: Thailand's long road to recovery," Pisit Leeahtam and Cynn Treesraptanagul, Chiang Mai University, 12 April 2012.

BOX 2. CLIMATE CHANGE, DEFORESTATION AND FLOODING.

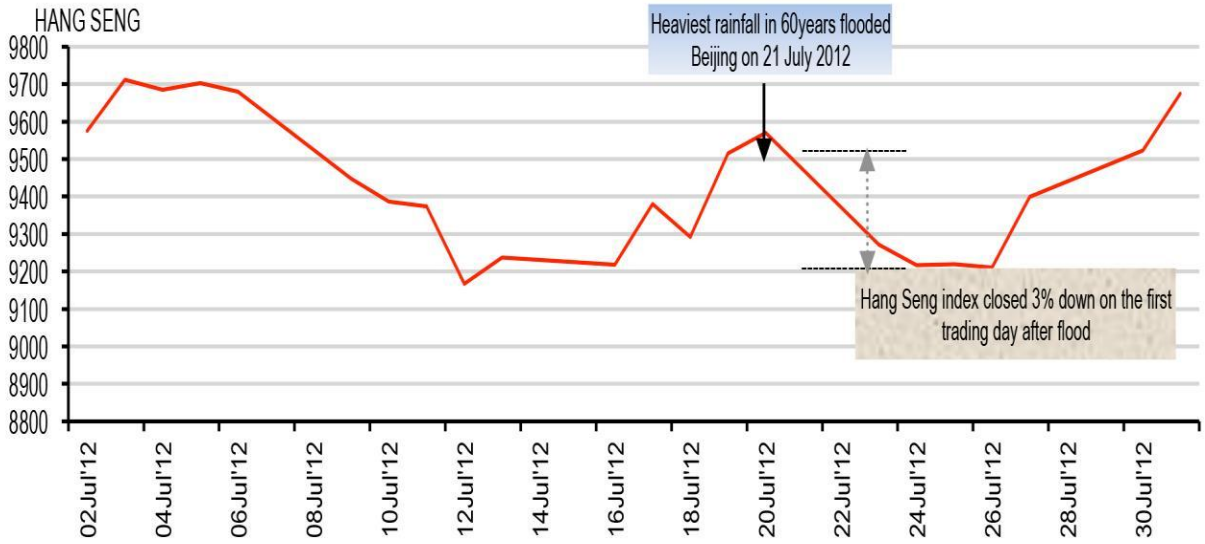
There remain significant scientific divisions over the degree to which climate change and widespread deforestation are causative factors for the type of major flooding that occurred in Thailand in 2011. Clearly, the intensity of Tropical Storm Nock-ten is aligned with certain climatic models and there is general scientific acceptance that deforestation does influence local flooding, although there is widespread disagreement surrounding its contribution to the type of major floods witnessed across the country's north, northeastern and central provinces. An October 2005 report prepared for the Food and Agriculture Organization of the United Nations (FAO) and the Center for International Forestry Research (CIFOR)[61] "finds there is no scientific evidence linking large scale flooding to deforestation." In contrast to this recent scientific thinking, the Thai government's response to a devastating 1988 flood in Southern Thailand, which killed hundreds, was to introduce a complete ban on all commercial logging that was enacted in1989. The national authority's reflex was understandable as, at that point, the conventional view that had existed for a century was that mass deforestation was directly correlated with major floods. What cannot be disputed is that Thailand, a country with a land area (511,770 km^2) almost equivalent to France (552,000 km^2), has suffered deforestation on a massive scale over the past six decades. The country was 75% forested in 1953 and that fell to a range of estimates between 16% and 22% by the early 1990s,[62] figures that did not differentiate between original old growth forest and new monoculture plantations. It is estimated that the country lost 3.1%[63] of its forest cover annually between 1976 and 1987, a period that marked the most intense period of deforestation. A combination of agricultural expansion through conversion of forest lands to cropland and timber cutting (including illegal logging) have accounted for the country's intense deforestation. Steps to address deforestation and to improve forest management were set in place slowly from the late 1980s. It would appear that a combination of the intense rains brought by Tropical Storm Nock-ten coupled with decades of sub-optimal water basin management, watershed destruction, agro-industrial expansion, industrialization, urbanization, emergence of a hard surface transport infrastructure, and a strained flood control and defence system, contributed to the 2011 floods. The scientific debate around the degree of causation and correlation between climate change, deforestation, and the severity of the floods will continue.

61 "Forests and Floods: Drowning in Fiction or Thriving on Facts?" FAO and CIFOR, October 2005.
62 Thailand National Report to the 1992 United Nations Rio Earth Summit, July 1992.
63 Barton, G. A., and B. M. Bennett, 2010, Forestry as Foreign Policy: Anglo-Siamese Relations and the Origins of Britain's Informal Empire in the Teak Forests of Northern Siam, 1883–1925 34 (1): 65-86, "Deforestation in Thailand," Wikipedia.

Beijing Flooding, June 2012

In a manner that mirrors the impact on the Stock Exchange of Thailand of that country's floods, Figure 6 shows the immediate, short-term declines in the Hang Seng Index following the severe flooding that took place in Beijing in July 2012.

Figure 6. Hang Seng and the Beijing flooding.



Source: HSBC.

US 2012 Drought and Commodity Markets

One of Wall Street's most respected investors, Jeremy Grantham of GMO, a company with US99 billion under management, wrote in his Q2 2012 quarterly letter[64] to investors: "We are five years into a severe global food crisis that is very unlikely to go away. It will threaten poor countries with increased malnutrition and starvation and even collapse. Resource squabbles and waves of food-induced migration will threaten global stability and global growth. This threat is badly underestimated by almost everybody and all institutions with the possible exception of some military establishments." Grantham's regular update to GMOs investors continued: "There will be increased weather instability, notably floods and droughts, but also steadily increasing heat. The last three years of global weather were so bad that to draw three such years randomly would have been a remote possibility. The climate is changing."

64 "Welcome to Dystopia! Entering a long-term and politically dangerous food crisis," Jeremy Grantham, *GMO Quarterly* Letter, July 2012.

Key nodes and global supply chains[65]:

In a July 2012 report published by the US Department of Agriculture, an economist states: "The weather that shapes the structure of US agricultural production, however, is changing along with world climatic conditions." The US midwest represents a key node for worldwide agricultural production with implications for global commodity supply chains. In mid-2012 the Obama Administration declared some 1,200 counties across the country as disaster areas after the worst drought and highest temperatures in more than 50 years. The situation in the United States has contributed to the "third food commodities spike" since 2007. Earlier in 2012, analysts were predicting a record harvest for the United States but, as a result of the drought and intense summer heat, these predictions collapsed and on futures markets "prices for corn, soybeans, soymeal and rapeseed have exploded to record highs."[66] In 2011 the United States grew 35% of the world's corn and soyabean crops, with 40% exported onto world markets. With a failure of the US corn and soyabean harvest, importing countries across Asia, Africa, Europe, and Latin America face uncertainty over supply and significant food price spikes (see example in Box 3). The rapid rise in US corn prices has knock-on effects globally, as farmers elsewhere switch to wheat for animal feed, thereby driving up prices for another staple.

BOX 3. FOOD PRICE SPIKE.

The UN's Food and Agricultural Organization Food Price Index (FAO Food Price Index) climbed 6% in July 2012 after three months of decline. The Index, which measures the monthly change in the international prices of a basket of food commodities, averaged 213 points, up 12 points from June. That was still well below the peak of 238 points reached in February 2011, however. The Index's sharp rebound was mostly driven by a surge in grain and sugar prices. International prices of meat and dairy products were little changed. The FAO Cereal Price Index averaged 260 points in July, up 17%, or 38 points, from June. That was 14 points below its all-time high of 274 points in April 2008.

Drought damage: The severe deterioration of maize crop prospects in the United States following extensive drought damage pushed up maize prices by almost 23% in July. International wheat quotations also surged 19% amid worsened production prospects in the Russian Federation and expectations of firm demand for wheat as feed because of tight maize supplies.

Source: Extracted from FAO website, 9 August 2012.

65 Various sources: drawn from US Department of Agriculture website and FAO website.
66 " Stuck on dry land," *Financial Times* (Analysis), 31 July 2012.

For traders across commodity and futures markets, the US drought and temperature spikes create the risk/reward dynamic that characterizes all markets. In agriculture, futures contracts (when buyers lock in a price for commodities to be delivered at a future date) have been employed by farmers way back to Babylonian times[67] and serve an essential purpose to protect producers and buyers from the vagaries of agricultural production. In globalized, interconnected financial markets, however, there is building evidence that recent developments have enabled much higher levels of speculation. Recent academic and civil society work, as well as financial market commentary,[68] suggests that the deregulation of futures trading has driven much higher levels of pure speculation in commodity futures, with potentially severe implications for food prices, poverty alleviation, and hunger. In the decade after the deregulation of futures markets accelerated in the United States and the European Union, the global average prices for wheat, corn, and rice in 2011 were 150% higher than in 2000 when adjusted for inflation. Pension funds, insurance reserves, and foundations invested a combined US$600 billion in commodity exchanges as part of increasingly popular commodities trading activities underpinning new capital investment strategies. Furthermore, the indexation of commodities markets has further enabled the world's largest investors to gain exposure to commodities markets by investing passively across whole markets. It is estimated[69] that the share of speculative trading in commodity futures markets grew from 30% to 80% by 2011.

67 "The Ascent of Money: A financial history of the World," Niall Ferguson, 2008.
68 "The Hunger-Makers," Foodwatch report, Harald Schumann, 2011.
69 Ibid.

C. All Change: Emerging Risk along the Investment Chain

At the end of the first decade of the 21st century, capital and finance is controlled and managed by a range of diverse financial and investment intermediaries across the public and private sectors. In the developed economies, vast pools of concentrated capital have grown up over decades of relative stability and prosperity post 1945 and the same pattern is now being seen in the most dynamic emerging economies. Such periods of relative stability have been interspersed by periods of, according to the financial models underpinning much capital market activity, almost unimaginable volatility that wiped out years of savings, wealth, and value. Our ability in coming decades to understand how and to what extent such concentrated pools of capital are threatened by such bouts of intense volatility, as most recently witnessed by the 2007–2008 financial crash, as well as new and emerging risks, will determine how the assets captured in these saving pools are protected and grown to drive future social and economic development.

In the past decade our knowledge of how these pools of capital evolve and the global financial flows they are associated with has deepened considerably. The financial crisis and economic downturn of 2007–2012, coupled with a realization of the importance of monitoring and tracking new risks, have intensified our need to understand how the world's financial assets are made up and how they interact. Selected snapshots from 2008 to 2011 give a feel for the pace of change of financial assets in the globalizing economy:

- Global equity markets stood at US$34 trillion in 2008, down from a peak of US$62 trillion in 2007. Some of the losses experienced by equity markets in 2007–2008 were recouped as the markets rebounded in 2009. Equity securities accounted for just US$10 trillion in 1990, highlighting the rapid growth in capital market activity in this 18-year period[70];
- Bank deposits jumped US$5 trillion[71] from 2007 to 2008 to reach US$61 trillion;
- Public and private debt securities jumped from US$77 trillion in 2007 to US$83 trillion in 2008, highlighting the increased public sector borrowing in response to the financial crisis[72];
- Trading activity on the opaque, lightly regulated Over-the-Counter (OTC) markets reached US$60 trillion annually before the crash, while turnover on the closely regulated, more transparent public market stood at just US$5 trillion[73] by comparison;

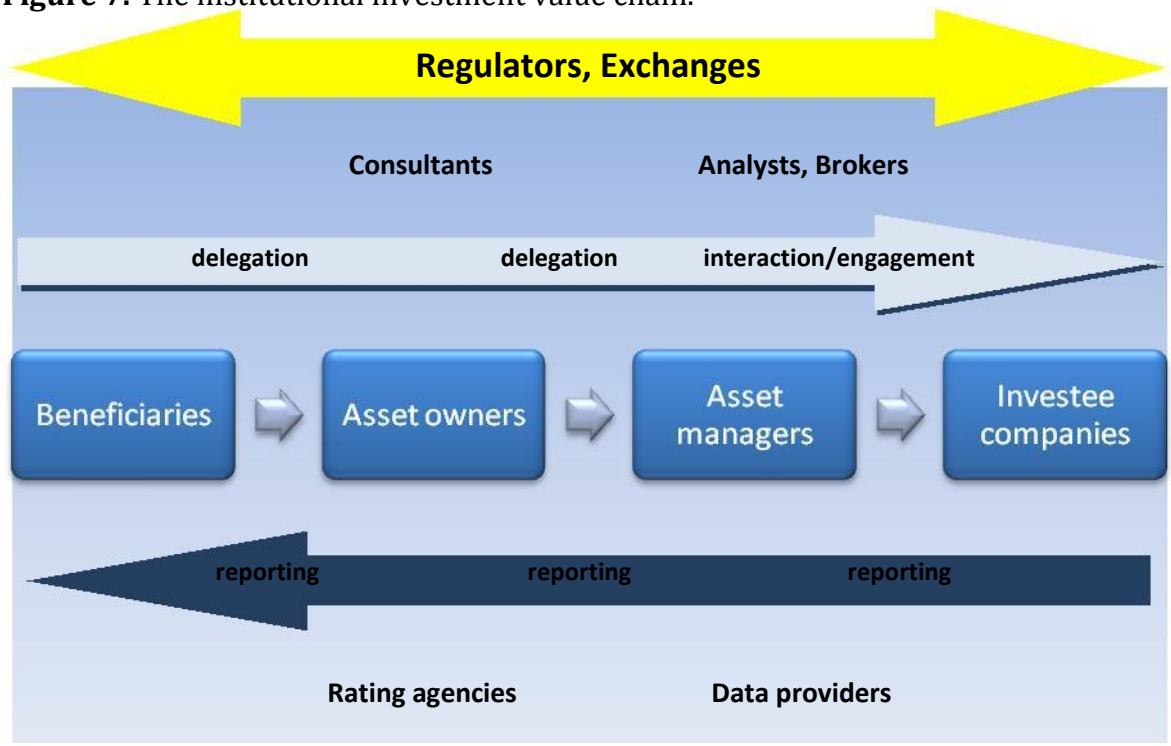
70 "Global capital markets: Entering a new era," McKinsey Global Institute, September 2009.
71 Ibid.
72 Ibid.
73 "'Dark pools of liquidity' are crossing networks that provide liquidity that is not displayed on order books. This situation is highly advantageous for institutions that wish to trade very large numbers of shares without showing their hand," in *The Day the Free Market Died*, Financial Sense University, Christopher M. Quigley, 13 May 2010, www.financialsense.com/fsu/editorials.

- In 2008, the worldwide premium volume for life and non-life insurance business combined exceeded US$4.2 trillion,[74] making insurance the largest industry in the global economy, while its global assets under management in 2007 stood at US$19.2 trillion[75];
- Sovereign Wealth Funds (SWFs) are becoming increasingly important in the international financial system. Market estimates indicate a range from $2 trillion to nearly $3 trillion of assets under SWF management in 40 countries.[76] International Monetary Fund projections show that SWF assets may increase to two- or three-fold in the medium term. Other projections indicate bigger increases[77]; and
- In 2011, the global High Net Worth community, totalling some 10 million people, controlled US$42.7 trillion in assets,[78] up from just over US$22 trillion controlled by 8 million people in 2000. The aggregated GDP[79] of the world's heavily indebted poor countries, some 40 countries with a population of 604 million people, is less than the wealth of the world's 13 richest people combined.

The structure and composition of financial and capital markets undergoes continual change, although since the late 1970s certain structural aspects of modern finance, building on a mainly post-war Anglo-American model, have settled into place and have spread globally. Figure 7 simplistically captures the flow of the investment chain whereby the ultimate beneficiaries of concentrated pools of capital (e.g., workers for pension funds; national citizens for sovereign wealth funds; premium holders for insurance reserves; and rich families or individuals for foundation-based and/or high net worth wealth) can invest, mainly through intermediaries (e.g., asset managers, banks, wealth managers, financial advisors, etc.) in different asset classes (e.g., listed equities, private equity, fixed income and bonds markets, alternative investments (e.g., hedge funds), real estate, art, wine, stamps, etc.) across a range of geographies. Essentially, what Figure 7 highlights is that in modern finance the ultimate beneficiaries of capital often delegate responsibility for their portfolio of investments through a diverse ecosystem of intermediaries to find investment choices that are aligned with the risk/reward appetite of those who own the capital. The responsibility of intermediaries is to report back to those who represent the fiduciary interests of the ultimate beneficiaries, while complying with regulatory provisions, so that the savings of the ultimate beneficiaries are held and managed responsibly by fiduciaries to protect and grow assets. Figure 8 denotes where the key pools of concentrated capital are held.

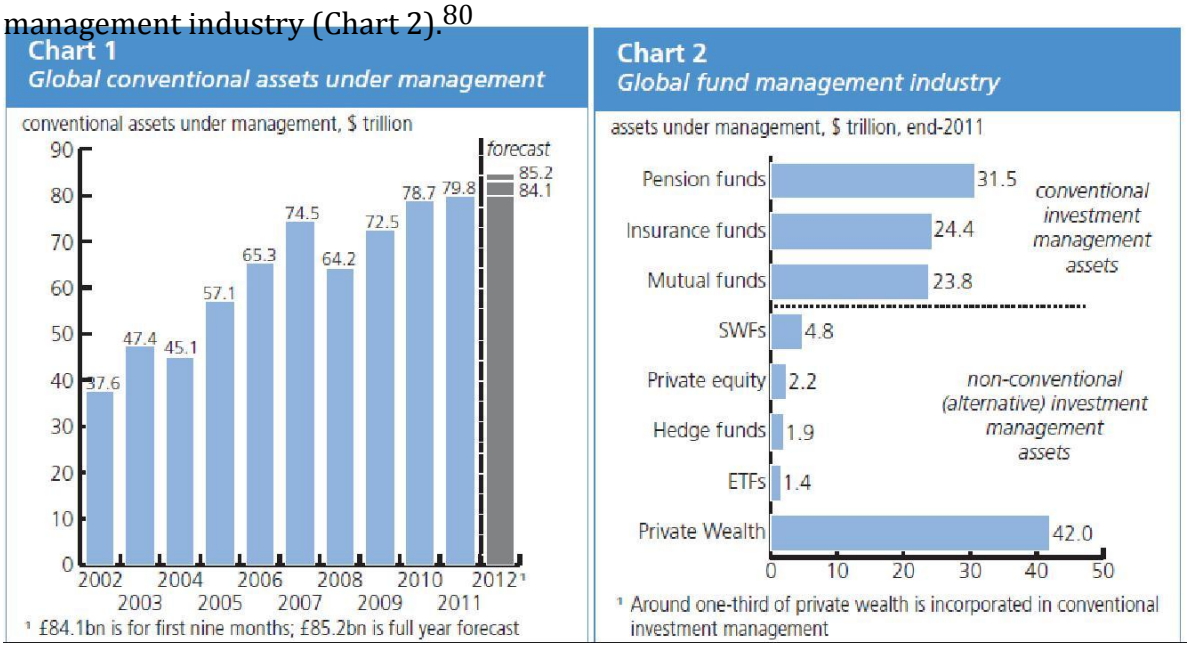
74 Sigma No. 3/2009, Swiss Re, Economic Research and Consulting Unit, 2009. 75
Fund Management 2008, International Financial Services London, 2009.
76 "Sovereign Wealth Funds – A Work Agenda," Mark Allen and Jaime Caruana, February 2008, IMF.
77 Morgan Stanley Research, "2007 projects US$12 trillion in assets for SWF by 2015 while Standard Charted projects US$13.4 trillion worth of assets over the decade."
78 "World Wealth Report," Merrill Lynch Wealth Management & Capgemini, September 2009. 79
The Lex Column, *The Financial Times*, 13 March 2010, drawn from the Forbes Rich Lists 2010.

Figure 7. The institutional investment value chain.



Source: UNEP Finance Initiative, 2010.

Figure 8. Global conventional assets under management (Chart 1) and global fund management industry (Chart 2).[80]



Source of data in charts: TheCityUK estimates.

80 TheCityUK, *Fund Management*, Financial Markets Series, November 2012, http://www.thecityuk.com/assets/Uploads/Fund-Management-2012.pdf

Reality Check

In a series of interviews[81] conducted for this paper with senior representatives of asset owner, asset management, banking, private equity, and alternative asset management, as well as policy and regulatory specialists, the overwhelming consensus was that, despite some important forward movement in thinking surrounding mid- to long-term risks since 2000, the predominance of short-termism across the financial services and investment sectors is embedded to such an extent that many material ex-ante risks, including disaster risk, are either downplayed, at best, or simply discounted as irrelevant by individuals, firms, and the overall financial system. Interviewees stressed also that those finance and investment institutions seriously integrating long-term environmental, social, and governance (ESG) risk considerations into their daily investment processes and investment decision-making are limited. The following section synthesizes the views of a range of practitioners across finance and investment with respect to integration of long-term risk issues into the investment chain.

The Financial System

- A systemic problem to address the externalities issue exists in that different parts of government and the regulatory system, notably financial policy-makers and regulators, are not effectively joined up with other parts of government;
- There is no international or intergovernmental equivalent "with teeth" of the Basel Commission on Banking Standards or a similar investment-focused body to oversee how different parts of the finance and investment system deal with ex-ante and long-term risk;
- There are some country-level highlights and best practice examples (e.g., South Africa National Planning Commission and various UK initiatives), although forward movement is piece-meal;
- As incentives are short-term in the investment and finance industry, there is no incentive whatsoever to price in externalities;
- Short-termism is just as much a political problem as it is a problem in financial markets;
- Clearly, there is a growing need at the national level for Chief Risk Officers (CRO) to provide a coherent understanding of where country risk lies;
- Recent research indicates that large, non-financial corporations are getting better at long-term thinking but remain poor at implementation. Governments and the finance sector are poor and getting worse in terms of both long-term thinking and

81 Interviews: Richard Burrett (UK), Partner, Earth Capital Partners & Former Head Global Project Finance ABN AMRO Bank; Cas Coovadia (South Africa), Managing Director Banking Association of South Africa (BASA); Mervyn King, Chair, International Integrated Reporting Committee; Dr Matthew Kiernan (Canada), CEO, Inflection Point Capital Management, alternative investment fund; Neil Philcox (Canada), Chief Investment Officers, Coast Funds; David Pitt Watson (UK), Chair Hermes Focus Fund/British Telecom Pensions System; Paul Watchman, Former Senior Partner, Freshfields Bruckhaus Deringer/Author 2005 "Freshfields Report"; Bob Welsh (Australia), former CEO of the Victori Superannuation Fund, a US$8 billion pension fund.

action;

- One of the challenges of the investment chain is the behavioural reality, which means most people find it hard to think about risk beyond a month or even a week;

Pension Funds

- The fund managers working for pension funds look at concentrated risk on a five-year time framework. If the risk is less than five years they will "hedge" but they cannot afford to cover disaster risk or systemic risk;
- Role of the trustees is to take on-board systemic risk and ex-ante risks but in reality they think primarily of replacement of income for retirees as their primary function;

Asset Management/Fund Management

- A series of global megatrends (population growth, resource depletion, climate change, ecosystems destruction, energy security, food security) means that fund managers will have to administer assets in a distinctly changed macro-economic environment in coming decades. Very few have even considered how they can adjust their models and operations to these new realities;
- There is misalignment of incentives along the investment chain that encourages asset managers across the board to focus on short-term gains;
- The fund management industry is structured to ensure there are incentives in place to be quiet about "silent and creeping risks" especially if the reward comes before the problem emerges;
- If there is a "big disaster" then everyone is protected, as all performance suffers. This brings "protection of the crowd" for asset managers;

Private Equity

- In private equity you are investing in hard assets such as individual infrastructure assets or corporate assets. Contextual analysis is undertaken to understand the risks to such assets from, e.g., water systems, ecosystems;
- Because of the limitations of contextual analysis undertaken by investors for, e.g., large infrastructure projects, there is often a gap in understanding between investors' perceptions of government planning for adaptation and resilience to deal with, e.g., flood risk and the reality;

Trading

- The rapid growth in quantitative algorithmic trading, notably high frequency trading, means that the scope for pure speculation on capital markets is gaining ground. Increasingly, traders have no connection or interest in the underlying assets they are buying and selling; and
- The shift of capital onto opaque, loosely regulated trading platforms in a manner engineered to hide investment and trading patterns propels short-termism.

D. Re-making Markets for Ex-ante and Long-term Risk

Despite the structural issues, misaligned incentives, and predominance of short-termism in modern day financial markets, a range of efforts is underway to understand how markets can be remade to more effectively account for and price ex-ante and long-term risk. In this section several of these efforts, ranging from legal considerations around the fiduciary duties of those who manage and hold money in trust to initiatives seeking to reinvent reporting and disclosure requirements, are examined. Also, the paper highlights one current initiative to bring more holistic ESG thinking into sovereign bond markets, some of the most important debt markets underpinning future socio-economic development for regions and individual countries and which are part of the US$81 trillion plus global bond markets. The examples explored are underpinned by the following questions:

- From the perspective of fiduciary law, who holds responsibility for assessing and managing ex-ante and long-term risk in a manner that, at a minimum, protects and, ideally, grows assets held in trust?
- What do markets and investors demand and how do companies report on their ex-ante and long-term risks? Is the current accounting, reporting, and disclosure model sufficient to cover broad risk?
- How do governments account for ecological and associated natural disaster risks in their sovereign bonds offerings? How might future sovereign bond markets look?

Going Out of Fashion? Legal Perspectives and Narrow Risk

For the vast majority of the period in which a formal investment industry has evolved over the past 200 years, ESG issues were not considered in the investment policy-making and decision-making processes of most mainstream investment institutions. For other ex-ante risks, such as disaster risk, a range of similar integration challenges existed for the mainstream investment community. There were two primary reasons for this omission. Firstly, externalities were simply not assessed, priced, or accounted for in traditional economic thinking and the associated investment processes that flowed from that thinking. Secondly, as the investment industry evolved, it became standard technical and legal principles of the sector that integration of ESG issues into investment processes, as well as a range of ex-ante risks, threatened to compromise the fiduciary duty of those trusted with managing funds by reducing the opportunities to maximize returns on investment for the owners of the funds. The reasoning behind this was that “reducing your investable universe” because of ESG or ex-ante considerations might undermine opportunities to generate investment returns. Certainly, there has been a long tradition of investment funds being handled on a “special basis” to respect ethical, moral, and religious considerations, but these were the exception and not the norm.

Slowly the thinking and approach of a relatively small group of forward-looking investors and institutions is changing. Notably, some institutions that are required by fiduciary duty to protect and grow assets for the long term or across generations, most prominently certain high-profile pensions funds, SWFs, and insurance reserves, all predominantly located in mature democracies, as well as some family offices that serve high net worth (individuals with US$1 million or more in cash or liquid non-property assets) and ultra-high net worth communities (individuals with US$30 million or more in cash or liquid non-property assets), have moved in recent years to understand the potential impacts on their portfolios of issues such as resource efficiency and resource scarcity, climate change, ecosystems destruction, human rights abuses in the supply chain, and a whole range of corporate and market governance related issues.

A greater focus has been given by some of the world's largest investors to the questions of fiduciary responsibility and fiduciary legal issues in the context of ESG matters (see Box 4, "Financial Materiality and Fiduciary Responsibility"). Also, these investors are paying greater attention to the new markets and investment opportunities—the reward side of the fiduciary responsibility equation—associated with emerging global trends such as the transition to a low-carbon energy infrastructure, integrated and sustainable management of natural resources (forests, fisheries, agro-industry), and industries and technologies of the future. In looking for new opportunities, investors start by developing a deeper understanding of the risks associated with them. In Box 5 and Box 6, two mini case studies highlight important changes in the evolving thinking around fiduciary legal issues and the emergence of the Universal Owner Theory (UOT). Both fiduciary issues, in terms of who is responsible for managing risk to assets, as well as the UOT, are central to efforts to bring about a broader consideration of ex-ante and longer-term risk in the financial services and investment sector.

New Responsibilities: The Emerging Fiduciary Dynamic

BOX 4. FINANCIAL MATERIALITY AND FIDUCIARY RESPONSIBILITY.[82]

In 2003, a group of asset managers,[83] collectively representing US$1.7 trillion in assets under management, asked whether the "financial materiality" of a range of environmental, social, and governance (ESG) issues traditionally overlooked or undervalued by many investment approaches should be reconsidered. This simple question then drove a process between 2003 and October 2009 that yielded three

82 KfW Symposium, UNEP FI Presentation, December 2008.
83 UNEP FI Asset Management working group.

major reports that have prompted new thinking within important parts of the investment world. In the "Materiality Series,"[84] mainstream financial analysts explored the relevance of a range of ESG issues such as climate change, occupational and public health, human labour and political rights, and both corporate trust and governance, across a range of commercial and industrial sectors (including aviation and auto industries; aerospace and defence; chemicals; food and beverage; forest products; media; non-life insurance; pharmaceuticals; property; and utilities). The Materiality Series confirmed the idea that ESG (particularly environmental and social) factors have financial relevance and are as useful in constructing a synthesis of management quality as strictly financial factors. The Materiality Series also helped lay the groundwork for the development of the Principles for Responsible Investment (PRI), now backed by more than 1,000 institutional investors representing US$30 trillion in assets. In addition to the materiality studies, parallel work was undertaken to show that the consideration of ESG issues in investment policy-making and decision-making was consistent with legal frameworks that govern the fiduciary duty of many institutional investors to act in the best interests of their beneficiaries.

The Freshfields Report: In October 2005 a landmark legal interpretation[85] covering the nine major capital market jurisdictions opened up a new potential for the world's largest institutional investors to consider ESG issues in their investment processes. In fact, the interpretation argued that the appropriate consideration of ESG issues—from both risk and rewards standpoints—was an obligation in most major capital market jurisdictions and mandated by law in some. The "Freshfields Report" greatly strengthened the case within the investment industry around the need for investors to fully integrate material ESG considerations in all aspects of their investment processes. In short, this work moved forward the discussion on the need for key market actors to integrate, account for, and price the risks associated with a broader range of externalities than had previously been the case in investment practice. The Freshfields legal interpretation was followed in 2009 by the "Fiduciary II" report,[86] which built on the initial interpretation and argued that investment advisors who do not proactively raise ESG issues for their clients open themselves to potential legal liabilities. This evolving process that sees ESG issues being embedded in the thinking around fiduciary responsibility and legal considerations goes to the very heart of many investment policy-making and decision-making processes.

84 The "Materiality Series" comprises three reports published by the UNEP Finance Initiative Asset Management working group (Mat I: "The Materiality of Social, Environmental and Governance Issues to Equity Pricing," June 2004; Mat II: "Show Me the Money: Linking ESG Issues to Corporate Value," July 2006; Mat III: "The materiality of climate change: How finance copes with the ticking clock, October 2009).

85 "A legal framework for the integration of environmental, social and governance issues into institutional investment," Freshfields Bruckhaus Deringer and UNEP FI, October 2005.

86 " Fiduciary responsibility – Legal and practical aspects of integrating environmental, social and governance issues into institutional investment," UNEP FI, June 2009.

BOX 5. THE UNIVERSAL OWNER THEORY EXPLAINED.[87]

The Universal Owner Theory (UOT) explains the contradiction in the investment system that in the short term rewards investments, where externalities—such as climate change ecosystems destructions and ignoring the rule of law—are not accounted for, to the extent that investments for all may be undermined in the long term.[88] Emerging work around the UOT is deepening our understanding and starting to quantify the economic, financial, and investment implications of externalities along the investment chain. Several examples from a joint United Nations Environment Programme Finance Initiative (UNEP FI)/UN-backed Principles for Responsible Investment (PRI) report are highlighted here:

It is estimated that the equivalent of US$6.6 trillion of damage was externalized in 2008, or 11% of the value of the global economy (US$60 trillion). Without action, the cost of (environmental and social) externalities, relative to the value of the global economy, is projected to increase by 62% from 2008 to 2050. If environmental externalities are not addressed, the damage incurred annually continues over time and accumulates.

The 3,000 listed companies analyzed generate average environmental costs amounting to US$2.2 trillion annually. They therefore account for 35% of total US$6 trillion in global environmental externality costs, while other elements of the economy, such as private companies, government, and society, contribute the remaining externalities.

The companies in the MSCI All Country World Index are associated with over US$1 trillion in environmental externality costs annually. This equates to 5.6% of the market capitalization of companies in the Index and 56% of their earnings. Environmental externalities could present a financial risk to Universal Owners invested in equity markets.

A hypothetical portfolio of investments of US$100 billion imposes external costs of US$5.6 billion per year on the economy. Assuming that typical large, diversified equity funds reflect the sector weightings of the MSCI All Country World Index, Universal Owners would be exposed to a significant proportion of externalities attributable to holdings.

87 UNEP FI and Principles for Responsible Investment joint report on the "Universal Owner Theory" based on research conducted by Trucost, forthcoming.

88 "The Rise of Fiduciary Capitalism: How institutional investors can make corporate America more democratic," Hawley, J. P. and Williams, A. T., 2000.

BOX 6. THE CASE OF THE NORWEGIAN PENSION FUND – GLOBAL.[89]

The Norwegian Pension Fund – Global, one of the largest sovereign wealth funds in the world, currently has a broad ownership in almost 8,000 companies worldwide. The Fund is largely passively invested and holds an average ownership share of 1% in each company in which it is invested. As a Universal Owner, the Pension Fund believes that it will benefit from making sure that good corporate governance and environmental and social issues are duly taken into account. Having been entrusted to manage the wealth of its end-beneficiaries, fiduciary responsibility for the Pension Fund also means taking widely shared ethical values into account. For the Pension Fund, ESG issues present regulatory, market, reputational, and operational risks and opportunities that its shareholders need to consider in order to fully understand the companies in which their capital is invested. Hence, it aims to define robust strategies for the integration of these issues across all investments, at both a strategic and a portfolio level. Its sustainability strategy is based on the below three pillars.

1. Research project—Understanding the impact of ESG risks on wealth creation: The Norwegian Ministry of Finance, acting as principal for the Fund, participated in a research project between the investment consultancy Mercer and 12 large international pension funds from Europe, North America, and Asia. Through this research consortium, the Norwegian Pension Fund increased its understanding of how the challenges of climate change may affect the financial markets and how it ought to invest in light of the Fund's vulnerability to climate risks.

2. New responsible investment program—Targeting underlying portfolios that take account of environmental impacts: The Norwegian Finance Ministry is in the process of establishing a new investment program for the Fund, which will focus on environmental investment opportunities such as climate-friendly energy, improving energy efficiency, carbon capture and storage, water technology, and the management of waste and pollution. The investments will have a clear financial objective. The principal is looking at several possible investment opportunities, such as green bonds issued by the World Bank. It is also looking at listed equities and overweighting companies with a good environmental profile using an index where the weight ascribed to the companies is affected by environmental criteria defined by the index provider. Initially, the Ministry aims at investing NOK 4 billion on the basis of environmental criteria in 2010.

(continued on next page)

89 "Financial stability & systemic risk: Lenses and clocks," UNEP FI, IISD, TBCG, June 2012.

3. Dialogue with companies: The Pension Fund's manager, Norges Bank Investment Management (NBIM), has set out its expectations on companies' climate change management. In its capacity as an investor, the Pension Fund is able to evaluate the degree to which a specific company is exposed to the risks and opportunities that arise from climate change, both in its direct operations and its supply chain. NBIM is required to consider companies' efficient adaptation to this transition, with the purpose to protect the financial assets of the Fund. NBIM expects companies to develop a well-defined climate change strategy. Similarly, NBIM has outlined a set of expectations for corporate performance on sustainable water management.

A Reporting & Disclosure Revolution: Transparency for Markets: What's Next?

Post the 2007–2008 financial crisis there is a widespread informal acknowledgement that many aspects of our capital market reporting and disclosure systems, as well as the accounting processes and standards that underpin them, are "broken." Naturally, the focus of policy and regulatory overhaul amongst financial policy-makers within the G-20, its Financial Stability Board (FSB), the Bretton Woods organizations, the European Union, and specialist bodies such as the Basel Committee on Banking Supervision (BCBS)[90] has been on the core issues of macro and micro prudential oversight of the banking and broader financial systems.

However, in parallel, a range of international efforts to hard-wire the ability of our existing systems to report, account for, and price ex-ante and long-term risk are underway also. Efforts to align these post-crash processes of high-level financial policy-making with work to embed ex-ante and long-term risk considerations in more effective reporting are pre-conceptions.

However, it should be noted that opportunities to formulate a joint conversation combining "hard" finance sector reporting issues with non-traditional "ex-ante/long-term risk" issues are emerging in the policy space. Certain banking members of the FSB's May 2012 convened Enhanced Disclosure Task Force (EDTF) are central to discussions covering both prudential oversight and broader risk issues. The EDTF's key goals are to "derive principles for enhanced and comparable disclosure by financial institutions and, secondly, to identify "leading practice risk disclosures" for end-year 2011 corporate reports."[91] EDTF, which will report in late 2012, has considerable reach with a G-20/FSB mandate to engage with, amongst others, the International Organization of Securities Commissions (IOSCO), the

90 The BCBS is convened under the auspices of the Bank for International Settlements based in the Swiss City of Basel. The origins of the BCBS date back to the collapse of a German Bank in 1974.
91 "Financial stability & systemic risk: Lenses and clocks," UNEP FI, IISD, TBCG, June 2012.

Basel Committee on Banking Supervision (BCBS), the International Association of Insurance Supervisors, the International Accounting Standards Board, the US Financial Accounting Standards Board, and the International Auditing and Assurance Standards Board.

Several significant initiatives at the intergovernmental, policy, and voluntary levels that are underway to address the management and reporting to markets of ex-ante and long-term risk more effectively include:

- In July 2010 some 40 leaders of the world's major accounting standard setters and accounting companies, joined by policy specialists and regulators, met in London to define a new framework for integrated reporting. The "pilot framework" of the International Integrated Reporting Committee (IIRC), convened by the Accounting for Sustainability (A4S) initiative of the Prince of Wales, was launched in September 2011 and is now being trialed by more 150 multinational companies worldwide;

- The European Union is forging ahead with regulation to introduce "narrative reporting," enabling companies to explain a broader set of risk issues, as well as other matters, around the future prospects and viability of the company;

- In the run up to the UN's July 2012 Rio+20 Summit in Brazil, a broad global coalition of policy groups and investors formed in order to ask governments to support a UN-backed protocol for a more demanding form of forward-looking corporate sustainability reporting that considers ex-ante and long-term risk. The coalition's demands were not met and a much watered down sustainability reporting requirement came out of the Summit agreement; and

- The Global Reporting Initiative (GRI), a body also supporting IIRC efforts, continues to make its corporate reporting format more directly relevant to the needs of investors and capital markets.

The following boxes, Box 7 and Box 8, highlight the latest thinking from the perspective of a voluntary standard setter, the IIRC, and that of an active and major investor in the markets, Aviva Investors, with respect to the need for more integrated reporting that takes into account ex-ante, long-term, and broader risk issues.

BOX 7. MERVYN KING, CHAIR OF THE INTERNATIONAL INTEGRATED REPORTING COMMITTEE (IIRC) AND CHAIR OF THE KING COMMISSION (SOUTH AFRICA), WRITES:[92]

Companies do not operate in a vacuum but in the context of the new world order. The Annual Financial statement is no longer fit for purpose—to inform the user about the sustainability of a business. The well-known one sentence on prospects for the future does not inform stakeholders, such as trustees of pension funds about long-term sustainability. A trustee cannot discharge his duty of care to his ultimate beneficiaries—the pensioners of tomorrow—on corporate reports in their current format. It must satisfy the reality of declining natural assets, increased transparency and the growing expectations of customers, suppliers, society, environmentalists, employees and regulators. Integrated Reporting meets all these needs. In short, Corporate Reporting is not what it used to be.

An Integrated Report will be a representation in clear and understandable language of the material financial and non-financial matters relevant to the business of the company and how the sustainability issues have been embedded into the strategic long term planning of the company. The reporting of such information is likely to have a profound impact on company behaviour. And, if it does not, the provision of the information can allow the user, such as investors and regulators to make an informed assessment of long-term sustained value, in a world where natural assets are being depleted faster than nature can regenerate them. If detail is wanted by the user on any financial or non-financial aspect, he or she can drill down on the company's web into the financial statement or the sustainability report.

BOX 8. STEVE WAYGOOD, CHIEF RESPONSIBILITY OFFICER, AVIVA INVESTORS, WRITES:[93]

High quality, comparable information and supporting verifiable data are the most critical commodities for well governed and smoothly functioning capital markets. Without the flow of accurate, trustworthy information and sound data, capital markets are challenged in their primary functions of allocating fairly priced capital to productive companies that are capable of sustained success and, in turn, rewarding their investors and ultimate owners. In 2012 policy and industry backed initiatives, such as the European Union's support for narrative

92 Ibid.
93 Ibid.

reporting and the Integrated Reporting work convened by the Prince of Wales Accounting for Sustainability initiative,[94] are gaining backing from a range of capital market participants. Progressive companies around the world, in an increasing number of important extractive, industrial and commercial sectors, have come to understand that long-term shareholder value is enhanced by both embedding environmental, social and governance (ESG) considerations into their long-term strategies and by fully disclosing their progress to investors. Only when investors have high quality, business relevant information at their fingertips can they truly assess one company relative to its peers and allocate capital accordingly. More generally, it is clear that one of the underlying causes of the financial crisis was the incentive structure throughout the markets. This focused too many market participants on short-term profits. They looked only so far as the next quarterly earnings, at the expense of paying attention to the longer-term fault lines that were emerging. A compounding problem was that much of the information available to investor—on executive pay, the environmental and social impact of the company, on financial structuring and business practices—was itself short-term and inadequate. It was challenging for investors to assess with any accuracy which companies were suitable candidates for their investment and which would provide them with the best long-term returns.

This lack of information eventually negatively affected the entire market. An increasing number of institutional investors, in light of the financial crash and as a result of a growing appreciation of the actual and potential value destruction stemming from a failure to account for a broader range of financially material business risks, are "calling for all stock market listing authorities to make it a listing requirement that companies, firstly, consider how responsible and sustainable their business model is, and, secondly, put a forward looking sustainability strategy to the vote at their annual general meetings (AGMs)"[95].

Ecological Risk and Sovereign Bonds

At a time of intense fiscal and political pressure post the financial crash of 2007–2008 and the ensuing economic downturn, many countries and governments, quite understandably, are reluctant to flag up how a declining national ecological stock could undermine mid- to long-term prosperity even further.

The counter argument to this is that for "first mover" countries willing to integrate such considerations into their sovereign bond offerings, essentially how countries raise long-

94 The Accounting for Sustainability initiative brings organizations together to enable environmental and social performance to be better integrated with strategy and financial performance; see http://www.accountingforsustainability.org/home

95 "Collaborative engagement proposal for more sustainable stock exchanges," a paper prepared for the Sustainable Stock Exchanges event, Xiamen, China, co-hosted by the United Nations Conference on Trade and Development (UNCTAD), the UN Global Compact (UNGC), and the PRI, a collaborative investor initiative in association with UNEP FI and UNGC, 8 September 2010.

term debt in foreign currency, they position themselves in a manner that gives long-term investors a sense that country risk is better managed through more sophisticated governance of a nation's capital market obligations.

In policy circles a broad range of international, regional, and national initiatives are underway to explore the importance of natural and ecological wealth to a country's long-term stability and socio-economic developmental prospects. One such initiative, convened by the United Nations Environment Programme Finance Initiative (UNEP FI) and the Global Footprint Network (GFN), involves "a transformational project to investigate the linkages between ecological risk and country level risk in sovereign bonds."[96] The current project is described in Box 9 and Box 10.

BOX 9. UNEP FI/GFN'S ENVIRONMENTAL RISK IN SOVEREIGN CREDITS (E-RISC) PROJECT.

"The Ecological Footprint and biocapacity trends offer a new way of interpreting the financially material threats and risks that are currently not included in country ratings, investment strategies or risk management systems. The Ecological Footprint combined with biocapacity data provide a novel opportunity to better assess the risks to investments by analyzing resource dependency, trade relationships, commodity costing and risk-stability trends. This is a two-fold project, first it aims to assess the financial materiality of ecological risks relevant for the credit risk evaluation of government bonds; secondly, it will develop a methodology to explore how credit rating agencies, investors and financial information providers can integrate ecological data into their respective models. Throughout the project a more comprehensive and risk-inclusive understanding of how to evaluate sovereign bonds will be developed. Investments risks can be decreased by gaining a better understanding of resource stability for both biocapacity creditors and national debtors. This project will enable those involved in sovereign bond markets to work towards better inclusion of financially-material environmental, social and governance (ESG) issues."[97]

BOX 10. E-RISC: PUSHING THE FRONTIER IN ENVIRONMENTAL ANALYSIS ON SOVEREIGN BONDS.

Contributed for UNISDR by: Ivo Mulder, Margot Hill, Martin Halle, and Gemma Cranston

UNEP FI and the GFN have collaborated with a number of institutional investors, asset managers and information providers to demonstrate the materiality of

96 Interview 26 July 2012, with Ivo Mulder, UNEP FI, for UNISDR Report.
97 Background material for the 17 October 2011 launch of the Ecological Bonds project.

natural resource and environmental risk to sovereign credit worthiness.

A New Risk Landscape

Although considerable progress has been made to assess and compare the financial performance of "conventional" equities with equities that embed environmental, social, and governance (ESG) issues into financial frameworks for equity performance, to date it appears that little progress has been made linking ESG materiality to fixed income investments. This is particularly true for linking environmental issues to financial performance or risk profiles of bonds. One reason for this lag could be that bonds have been considered a much safer, though less promising, and less volatile return on investment than the ownership of shares within the equities class. In addition, bonds are generally considered "passive" assets compared to equities whereby the investor actually has ownership. However, bonds are also vulnerable to systemic risks related to natural resources and are not shielded from broader environmental challenges including climate change, weather extremes, water scarcity, and ecosystem degradation. At present, though, these global environmental and resource based externalities are not systematically analyzed, valued, or priced within capital markets.

Why Sovereign Bonds?

Investors have long thought that the traditional economic indicators together with high-level environmental and political factors were sufficient to comprehensively understand country-level competitiveness and the robustness of their economies. However, we live in an ever-more environmentally and fiscally constrained world, where there is a growing need to push current frontiers in more integrated analysis of sovereign bonds. This is not only evident from the ongoing debt crisis, but also from climate change, water scarcity, food shortages, deforestation, and the many other environmental crises that we face today. While there has been increasing sophistication of governance and social analysis in relation to country credit worthiness, understanding the materiality of environmental and natural resource related risks to sovereign debt has received less attention and been less well developed.

The call for better integration of environmental and natural resource-based issues in the context of fixed income investments in general, and sovereign bonds in particular, can be seen as the manifestation of a triple squeeze that comes from: 1) the finance sector, which increasingly recognizes the need for a better understanding of systemic risks; 2) the growing uncertainty surrounding sovereign bonds; and 3) the increasing materiality of ecosystem degradation and depletion of natural resources.

Bringing Natural Resource Risks into the Sovereign Bond Equation

The E-RISC project had made a first attempt to quantify and value the natural resource risks that countries face. To that extent, the methodological framework takes a three-step approach:

1. Trends in natural resource availability and use using the Ecological Footprint and biocapacity
2. Exposure of a country to natural resource risks in relation to a country's economy
3. Financial resilience to risk to cope with adverse natural resource-related shocks

This methodology has been applied to a number of countries to assess the relevance of natural resources (which includes both ecosystem-based natural resources as well as non-renewable resources such as fossil fuels and iron ores) to a country's economy. Finally, we portray the results of the analysis in the context of the Basel III[98] and Solvency II[99] requirements for banks and insurers, respectively. The E-RISC project also looks at what Credit Ratings Agencies such as S&P and Moody's can do to adapt their sovereign ratings methodology to reflect these types of emerging risks. For that purpose, the project suggests how natural resource risks can be embedded in conventional sovereign credit ratings. Last, but not least, the project is not meant to pinpoint winners and losers in a world that is increasingly becoming resource scarce. Rather, it's meant to inform credit analysts, portfolio managers, and rating specialists that existing sovereign credit risk frameworks would benefit from including additional information on natural resources, as well as to make the case that it is in the self-interest of countries to decouple environmental degradation and natural resource use from economic growth.

E. Next Steps for UNISDR and Conclusions

There is growing scope for UNISDR to embed its agenda and concerns into the policy-making, regulatory oversight and supporting mechanisms that govern our capital markets and the broader financial services sector beyond insurance.

However, the challenges for UNISDR to introduce greater awareness and understanding of ex-ante risk, including disaster risk, into the processes that define how real-world risk is assessed, mitigated, managed, and transferred within the capital markets and financial systems are significant for a range of complex historical, political, structural, and technical reasons. Additionally, the overwhelming culture of short-termism that dominates modern financial markets, combined with incentives systems that support and maintain this near-

98 Basel III is the latest international standard generated by the Basel Commission for Banking Supervision (BCBS), of the Basel-based Bank for International Settlements (BIS), which sets capital ratio standards for banks globally determining the various levels of capital they must retain to safeguard their broader lending, credit and financing activities.
99 Solvency II is the insurance equivalent of the Basel III standard for banks and represents the solvency margin, which is the amount of regulatory capital an insurance undertaking is obliged to hold against unforeseen events.

term focus, also present obstacles if the UNISDR agenda is to be advanced within finance and capital markets in a transformational manner.

Furthermore, we are in a contradictory period for the global financial system when, as a result of the severity of the crash, widespread economic downturn, and the ensuing sovereign debt crisis that unfolded in 2011–2012, financial policy-makers are themselves focused on short-term action to stabilize a fragile system while evidence gathers around the impact of longer-term systemic risk issues to financial stability.

The following recommendations are for the consideration of UNISDR ahead of the GAR 2013 process:

- **Sensitizing financial policy-makers and major asset owners:** In a systematic manner, introduce the UNISDR agenda to a prioritized group of policy-making bodies, institutions, and initiatives where the long-term risk concerns of the largest institutional investors (e.g., pension funds, SWFs, and insurance reserves) are addressed. Such arenas and bodies, amongst others, could include: the OECD's Public and Private Pensions Committees; a wide range of institutional global/regional investor associations and initiatives [the Council for Institutional Investors (US), the UN-backed Principles for Responsible Investment (PRI), the International Corporate Governance Network (ICGN)]; and thematic initiatives for large asset owners covering, amongst others, climate change (e.g., Institutional Investors Group on Climate Change (IIGCC), ecosystems destruction (e.g., supporters of the UN's Natural Capital Declaration and investors involved in the TEEB processes), and resource scarcity (e.g., Athenaeum Project).

- **Aligning UNISDR agenda with international reporting/disclosure initiatives:** In a targeted manner, the UNISDR could engage with those key international bodies and initiatives engineering the new market-focused reporting, disclosure, transparency, and accountability architecture to ensure that the market and corporate management aspects of disaster risk, as an important element of ex-ante risk, is well represented in these processes. Post the global financial crash, there is growing international momentum behind efforts to ensure that our financial system and capital markets more effectively assess, mitigate, manage, and report on a broader range of risk issues. Naturally, the focus is on traditional financial and investor risk issues, as per the efforts of the Financial Stability Board's Enhanced Disclosure Task Force (EDTF), although in the aftermath of the high profile man-made/natural disasters in 2011–2012 there is a distinct opportunity to align the UNISDR agenda more effectively with those developing in the policy-making, accounting, and regulatory arenas where reporting and disclosure disciplines are being reinvented.

- **Exploring where fiduciary responsibility for disaster risk lies:** Introduce UNISDR's agenda to those international efforts focused on establishing where fiduciary responsibility for non-traditional risk issues lies within the

government/policy-making, capital market, investor, and financial services sectors. A critical question is "where does responsibility lie?" with respect to ensuring that investors (whether, for example, governmental, portfolio, or corporate/foreign direct investors) have sufficient understanding of systemic risk issues at the regional and national level. As UNISDR's efforts to understand and quantify disaster risk at the global, regional, and national level continues during 2013–2015, the question of fiduciary responsibility, and the division of that responsibility between public and private sector actors, will gain greater relevance, making it timely for the UNISDR agenda to be introduced in a targeted way to this evolving international discussion. Collaboration with a respected international academic institution (e.g., the London School of Economics Sustainable Finance Initiative) at the forefront of this debate could be an option for UNISDR.

- **Deepening our understanding of how the UNISDR agenda intersects with capital market and financial service risk concerns:** As this report has indicated, there is increasing evidence to correlate disaster risk with investor relevant "fat-tail" events on our increasingly interconnected global capital markets. UNISDR could deepen the research work framed by this paper to establish a clearer understanding of how disaster risk events and capital market risk events are correlated.

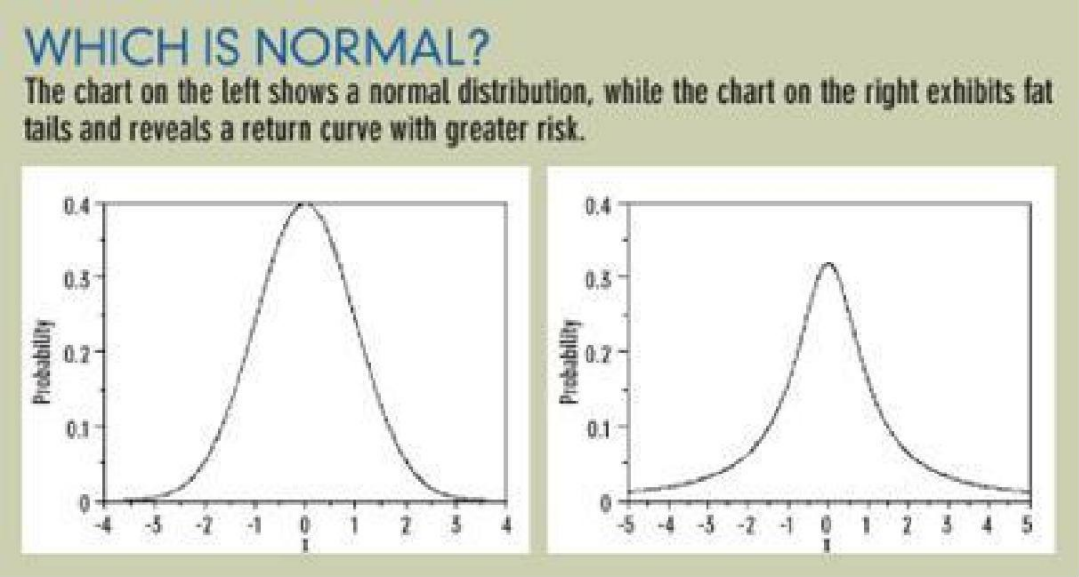
Appendix 1

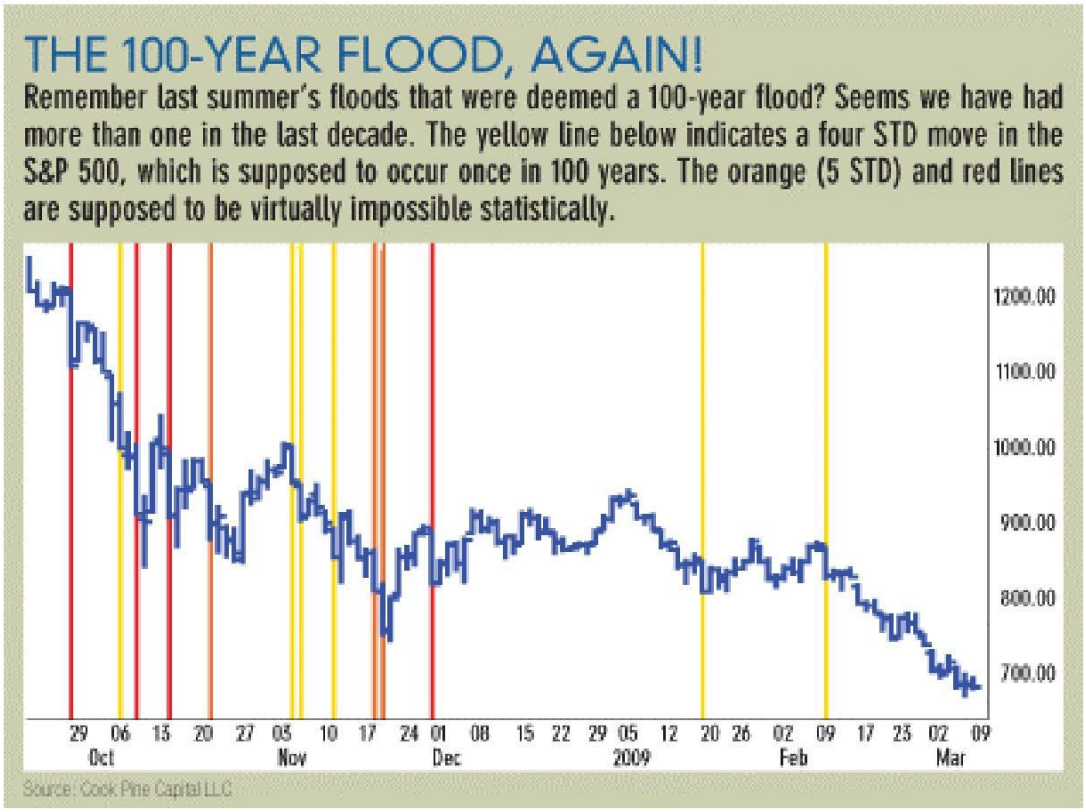
NOTE: The graphics and accompanying notes in this appendix are taken from:

"Study of Fat-tail Risk," Cook Pine Capital, November 2008

and cited in:

"Watch Out for Those Fat Tails,"
Daniel P. Collins, 19 March 2009,
***Futures Magazine*, April 2009**





Cook Pine Capital published "Study of Fat-tail Risk" in November 2008. In it they point out how an examination of 81 years of price patterns in the S&P 500 shows that these "fat-tail" events occur much more frequently than would be predicted by a normal distribution curve.

REALITY BITES

Large downward moves in the S&P have occurred much more frequently than was predicted under normal distribution of returns.

# of Standard Deviations from Mean	Actual Distribution		Normal Distribution	
	Observed	Percentage	Predicted	Percentage
+6σ	26	0.13%	0	0.00%
+5σ	13	0.06%	0	0.00%
+4σ	34	0.17%	1	0.00%
+3σ	89	0.44%	27	0.13%
+2σ	276	1.36%	435	2.14%
+1σ	1,393	6.86%	2,761	13.59%
0σ	16,603	81.71%	13,872	68.27%
-1σ	1,377	6.78%	2,761	13.59%
-2σ	325	1.60%	435	2.14%
-3σ	100	0.49%	27	0.13%
-4σ	43	0.21%	1	0.00%
-5σ	19	0.09%	0	0.00%
-6σ	21	0.10%	0	0.00%
TOTAL	20,319	100%	20,319	100%

Source: Cook Pine Capital LLC

The study states, "Whereas normal distribution of the daily return of the S&P 500 would suggest a three sigma event (three STD or -3.5% daily return) should have occurred 27 times over the last 100 years, this has occurred 100 times since 1927 (see "Reality bites," above).

The numbers, according to the study, get more shocking when looking at even larger moves. The likelihood of a four STD move (-4.7%) is one in 100 but has occurred 43 times since 1927. A five STD move (-5.8%) is supposed to be virtually impossible but has happened 40 times in the last 81 years and seven times since September 29 (see "Not again," below).

Cook Pine Capital produces custom hedge fund portfolios for high net worth investors.

NOT AGAIN

Four STD (dates in yellow) events are supposed to occur once in 100 years, five STD events (dates in orange) are even more rare and six STD events just should happen but there has been 13 instances of a negative four STD or greater since Sept 29.

10/15/2008	907.84	-9.03%	
12/1/2008	816.21	-8.93%	6+ Sigma Days
9/29/2008	1,106.39	-8.79%	
10/9/2008	909.92	-7.62%	
11/20/2008	752.44	-6.71%	
11/19/2008	806.58	-6.12%	5+ Sigma Days
10/22/2008	896.78	-6.10%	
10/7/2008	996.23	-5.74%	
1/20/2009	805.22	-5.28%	
11/5/2008	952.77	-5.27%	4+ Sigma Days
11/12/2008	852.30	-5.19%	
11/6/2008	904.88	-5.03%	
2/10/2009	827.16	-4.91%	

Source: Cook Pine Capital/eSignal