Harnessing financial innovation to strengthen disaster resilience

By Erwann Michel-Kerjan
Contents

Letter from the publisher

Dennis Chesley 01

CEO perspectives on resilience

Steve Holliday, National Grid Group (UK) 02

Systemic Resilience

Resilient Countries

Resilience: What it is and why it’s needed

Lee Howell 05

Resilient Markets

Harnessing financial innovation to strengthen disaster resilience

Erwann Michel-Kerjan 08

A new framework for disaster reduction

Carlos Castillo, Lauren Cook and Oz Ozturk 12

CEO perspectives on resilience

Shikha Sharma, Axis Bank Ltd (India) 14

The Long-Term View

Climate Change

Business-not-as-usual:
Tackling the impact of climate change on supply chain risk

Richard Gledhill, Dan Hamza-Goodacre and Lit Ping Low 15

Sustainability in PE

Creating value through responsible investment:
Are the hard and lean going soft?

Shami Nissan and Malcolm Preston 21

CEO perspectives on resilience

Seymur Tari, Turkven (Turkey) 25

Markets in Peril

Japan

Bouncing back: Two Japanese corporations’ road to resilience

David Jansen and William Macmillan 26

Egypt

Egypt: Weathering the storm

Rehab Abdelhafiz 31

United States

Picking up after Sandy: Resilience in the eye of the storm

Neil Kaufman 37

CEO perspectives on resilience

John Koustas, Danaos Corporation (Greece) 39

Resilience practices: One-year follow-up analysis on Global Risks 2012 cases

Overview 41

Case No. 1: The Seeds of Dystopia 42

Resilience in action: Tracking trends to challenge assumptions and steer the right course 45

Case No. 2: How Safe Are Our Safeguards? 46

Resilience in action: Taking advantage of windows of opportunity 49

Case No. 3: The Dark Side of Connectivity 50

Resilience in action: New behaviours for a new world 52
Harnessing financial innovation to strengthen disaster resilience

By Erwann Michel-Kerjan

As extreme loss events become almost commonplace, societies’ ability to cover the costs is coming under severe strain. Insurers may no longer be able to offer affordable cover for all and governments may not have the funds to systematically fill the breach anymore. Working closely with governments and insurers, the capital markets’ ability to develop innovative and effective alternative risk transfer (ART) mechanisms is therefore going to be crucial in creating an economically sustainable way to protect the fast growing number of exposed businesses and communities.

Conventional wisdom once held that major crises and catastrophes are low-probability events. Corporate boards and government leaders now recognise that this view is outdated.

Catastrophes have unfolded at an unprecedented rate in the past few years, be they financial crises, large-scale natural disasters, intercontinental pandemics or major terrorist attacks. We also live in an environment marked by mounting food and water scarcity, high climate variability, nuclear proliferation and cyber risks. Twenty of the 30 most costly insured catastrophes worldwide from 1970 to 2011 have occurred since 2001. With the exception of the 9/11 terrorist attacks, they were all natural disasters.

Looking ahead, the frequency of high impact events could increase still further. A combination of a growing and rapidly urbanising population, particularly in coastal cities, and the increasing frequency of disasters due to climate instability mean that companies and governments will have to learn how to better manage the risk of expected but unpredictable disastrous events. This includes developing more effective ways to proactively assess and manage extreme events before they occur, and also create the foundations for a more resilient society, if and when they do.

While risk managers certainly have an increasing role today, this new risk environment is too important to be left to risk managers alone. As a strategic matter, it must actively involve the board of directors and a nation’s top leadership.

This also presents opportunities all along the risk management cycle, from risk identification and assessment to risk reduction and financial hedging. Turning risk management into value creation in this new era of catastrophes demands new services, new types of protection, and innovative new financial solutions. A strong demand for such services and products has already emerged and is likely to significantly increase in the next five years.

But the crux of the matter remains – who pays when the cost of restitution continues to escalate. Given the space restrictions of such an article, I will focus this examination of the potential solutions opened up by recent innovations on one type of risk — natural disasters, and one aspect of risk management — financial hedging.

Erwann Michel-Kerjan teaches Value Creation at the Wharton Business School, University of Pennsylvania. He is the managing director of the Wharton Risk Management and Decision Processes Center, which – for nearly three decades – has been at the forefront of managing and financing extreme events. He is also chairman of the OECD Secretary-General Board on Financial Management of Catastrophes, collaborating with its 34 member countries on these issues. Honoured as a Young Global Leader by the World Economic Forum, he advises several multinationals, foundations and heads of state.

Why is insurability under strain?

While extreme events are not new (there have been financial crises and earthquakes before), recent events have been much more global in nature. This is the inevitable flip side of the ever-growing globalisation of social and economic activities. Twenty or 30 years ago, a large earthquake and tsunami in Japan or a massive flood in Thailand would have mainly been a Japanese or Thai issue. But today, such events affect businesses around the world, directly through disrupted global supply chains, and indirectly, for example, through an increased fear of nuclear risk. In a notable case in point, Germany – Europe’s largest economy in Europe – is planning to abandon nuclear power, which provides about 17% of its consumed energy, in response to the Fukushima disaster.

Several socioeconomic factors have had an influence on the escalating levels including rapidly increasing population, a higher degree of urbanisation and huge growth in value at risk. Take the east coast of China. We could very well see a massive typhoon hitting Hong Kong, Shanghai and then Dalian this year. The ripple effects would be worldwide and extreme. Or take the state of Florida in the US, one of the world’s hurricane peak zones, where the population increased about 600% in the past 50 years. Today in the US, a staggering $15 trillion of assets is insured in coastal counties alone from Texas to Maine. Many more people in harm’s way means more exposed assets, too. Mathematically, the same hurricane that had mild effects 50 years ago would be catastrophic today.

Furthermore, climate science teaches us that a warming planet is more likely to see more extreme climate events as well. According to NASA, nine of the ten hottest years on record have occurred since 2001, years in which we witnessed many large-scale floods, storms and droughts.

One easy solution would be to make sure people do not live and work in harm’s way, but this would be wishful thinking. There is typically a high correlation between economic activities and exposure to natural disasters (because living near the coast has obvious advantages), so such a withdrawal from vulnerable zones is just not going to happen on a sufficient scale.

Who pays?

So if increasing natural disasters are the new norm, as I recently wrote in the editorial of the review Nature recently, it begs the question of who will pay for these increased losses and how better to organise risk-sharing mechanisms before other large-scale disasters happen.

In response to these historic losses and increasing exposures, we are already witnessing a radical change in the loss sharing between public and private sectors in many countries, with governments taking a more important role in what were traditionally private insurance markets and where they exist. Insurance markets are typically heavily regulated and private insurers have already severely reduced their exposure in many high risk zones because they are not authorised by regulators to increase their premiums as they would like to.

In some cases, the government covers the resulting risks, by heavily subsidising insurance premiums. But one might wonder whether they can continue to do so and to increase their de facto financial liability in the future, as budget deficits persist and as the financial burden of their debt becomes unsustainable, economically and politically. So this is also a matter of establishing more efficient financial management strategies in countries exposed to natural catastrophes, i.e. practically, most of the world.
Alternative risk transfer instruments

Some of the most innovative and sustainable solutions to meet the challenge of providing adequate coverage against extreme events might come from the financial world, working in collaboration with governments and the insurance industry.

Some of the ART instruments to make this possible include catastrophe bonds and weather derivatives are already in place. They provide the necessary capital to support a financial safety net that helps individuals, corporations, cities, countries and international organisations adequately protect exposed assets so that they are resilient when the next catastrophe strikes.

The field of ART grew out of a series of insurance capacity crises in the 1970s through to the 1990s, which led purchasers of traditional reinsurance coverage to seek more robust ways to buy protection. Catastrophe bonds are one type of insurance-linked instrument that has significantly grown in volume in recent years and is likely to continue to grow as a market as we witness more and more costly catastrophes in the coming years.

To illustrate how these bonds work, consider an organisation (this can also be a country), ProactiveOrg, which would like to cover part of its exposure against catastrophes. To do so, it creates a dedicated company, BigCat, whose only purpose is to finance the disaster costs of ProactiveOrg. Notably, BigCat is an independent company (typically located in Bermuda or the Cayman Islands where the tax treatment is more advantageous). In that sense, BigCat is a special-purpose insurer (also called a special-purpose vehicle, or SPV) for ProactiveOrg. When the insurance contract is signed, the sponsor (ProactiveOrg) pays premiums to BigCat.

Advantage for the issuer

On the other side of the transaction (see Figure 1), SPV BigCat raises capital by issuing a catastrophe bond. The investors’ funds provided in exchange for the bond notes constitute the initial principal of the bond and will be placed in safe investments. The bond pays in the case of a triggering event, as defined by the specifications of the issued bond (for example, an earthquake of moment magnitude (Mw) 7.0 or greater in a specific city or region of the country, or a major storm with highest sustained wind speed greater than 150 km per hour in a specific location). The payout could also be indemnity triggered: Depending on the level of loss incurred by the company or government, interest on the bond or the principal, or both, is forgiven. In that case, these funds are then quickly released to ProactiveOrg to help cover part of its loss from the event. Another key advantage for a firm, municipality or country in issuing a cat bond is that the money is ready to flow in just a few days or weeks, depending on the form of trigger. By design, the capital of the bond is commonly invested in risk-free assets, such as US Treasury money market funds. As a result, there is limited credit risk.

Advantage for investors

Premiums collected from ProactiveOrg will be used to provide the investors with a high enough interest rate to compensate for a possible loss of their principal should a disaster occur. One of the main advantages for investors is that these instruments constitute a class of assets that can enhance their returns since they are not highly correlated with other financial risks (for example, fluctuations in interest rates, if the economy is in a recession or a boom).
Once viewed as an alternative source of financial protection for reinsurance and insurance companies familiar with the risks and eager to diversify their exposure, catastrophe bonds have now become another family of investment products for alternative investors, such as hedge funds, dedicated funds and also money managers, pension funds or insurance companies. Given the current low-interest rate environment and high volatility of markets, these new assets could develop even more.

Since its inception in the early 1990s, the catastrophe bond market has generated about $45 billion of cumulative issuance.5 While most of it was to cover insurers, reinsurers, other firms including Universal Studios, Disney, Electricité de France and Dominion, along with several governments (California, Florida, Turkey, Taiwan and Mexico) have now used their own cat bonds for state-run disaster insurance programmes. There are also discussions now about linking ex post risk financing with ex ante risk reduction efforts – a portion of the nominal could be invested in reducing the exposure over time, which would lower the expected loss.

Weather derivatives are another financial innovation that can be used by organisations as part of a risk management strategy to reduce risk associated with adverse events or unexpected weather conditions. The value of the asset depends on the number of hot days or rainy days in a city, for instance. This market is expanding fast too as economic returns for a lot of businesses in many countries are highly correlated with the weather (e.g. agriculture, energy and tourism) and also because the market is becoming more liquid. More countries are now investing in modern weather stations with live recording that can be used to develop these financial instruments further. In 2011, PwC estimated the total weather derivatives market to be $12 billion and growing.

**Dynamic risk solutions**

In conclusion, risk financing is a key pillar of any comprehensive strategy aimed at strengthening resilience. Designing a tailored solution based on a business or government’s needs is critical to enabling them to contend with a more volatile and uncertain world.

The continuing development of ART is therefore encouraging, demonstrating how innovation can thrive in the face of new and escalating challenges. A key benefit is the ability to extend the capacity for absorption of losses beyond insurers and governments into the capital markets.

Investors find these instruments attractive because they provide them with high enough interest rates to compensate for a possible loss of their principal and because this class of assets is not highly correlated with other financial risks, such as fluctuations in interest rates.

The coming years are set to see further innovation and collaboration. The OECD (which focuses on high-income countries) and the World Bank (which focuses on low income countries), both of which I advise on strategic development, have now established dedicated expert teams to work closer with governments around the world on these issues. Several banks, hedge funds, money managers and consulting firms now do the same for corporate clients. Disaster financing became a priority for the G20 last year and I was pleased to address the G20 on the topic. My Wharton colleagues and I, who have been working on the WEF Global Risks Report since its inception in 2006, look forward to fruitful discussions on effective resilience with world leaders at the 2013 annual meeting of the World Economic Forum in Davos as well.

---

5 Kunreuther and Michel-Kerjan. At War with the Weather. MIT Press, 416 pages.
Author

Erwann Michel-Kerjan
Wharton risk management and
decision processes center,
University of Pennsylvania -
Wharton School
erwannmk@wharton.upenn.edu
+1 (215) 573 0515

Special thanks to the following parties for their production and editorial assistance:
John Ashworth, Chris Barbee, Lisa Cockette, Ashley Hislop, Angela Lang, Sarah McQuaid, Roxana Opris,
Malcolm Preston, Alastair Rimmer, Suzanne Snowden, Tracy Fullham and Guatam Verma

www.pwc.com

PwC helps organisations and individuals create the value they’re looking for. We’re a network of firms in 158 countries with more than 180,000 people who are committed to delivering quality in assurance, tax and advisory services. Tell us what matters to you and find out more by visiting us at www.pwc.com.

This publication has been prepared for general guidance on matters of interest only, and does not constitute professional advice. You should not act upon the information contained in this publication without obtaining specific professional advice. No representation or warranty (express or implied) is given as to the accuracy or completeness of the information contained in this publication, and, to the extent permitted by law, PwC does not accept or assume any liability, responsibility or duty of care for any consequences of you or anyone else acting, or refraining to act, in reliance on the information contained in this publication or for any decision based on it.

© 2013 PwC. All rights reserved. PwC refers to the PwC network and/or one or more of its member firms, each of which is a separate legal entity. Please see www.pwc.com/structure for further details.

DT-13-0064