

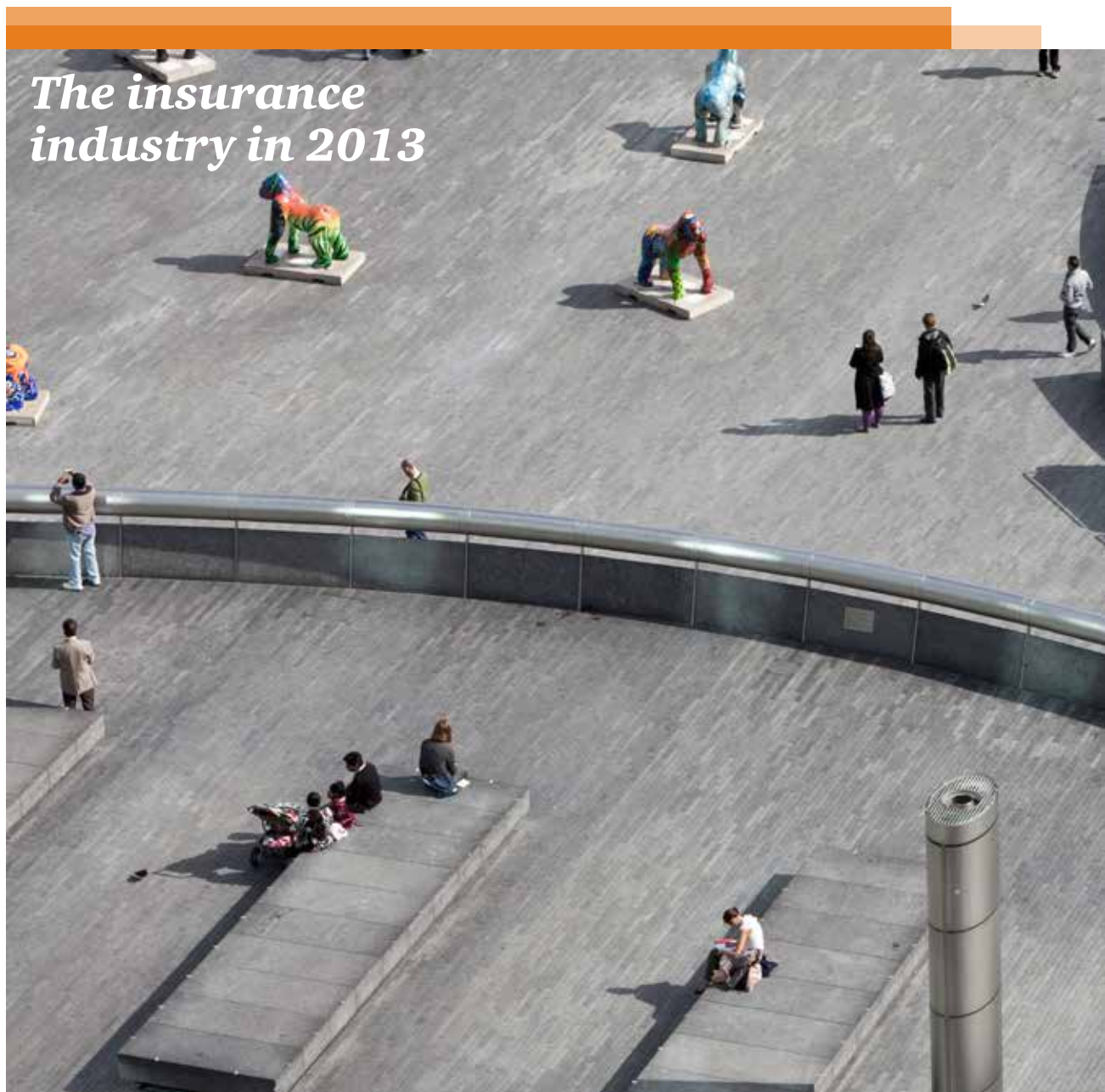
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An annual report

Risk management: A practical approach to contingent business interruption modeling and risk assessment

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The insurance industry in 2013



Risk management: A practical approach to contingent business interruption modeling and risk assessment

A volcano erupts in Iceland and cancels air travel throughout Europe and across the Atlantic for several days in 2010, causing an estimated \$2 billion in business interruption losses. An earthquake, tsunami, and nuclear disaster strike Japan in 2011, causing an estimated \$5 billion in global business interruption losses. These and many more recent natural disasters, most notably the 2011 Thai floods and last autumn's Hurricane Sandy, have resulted in significant supply chain disruptions.

Natural catastrophe (or “nat cat”) modeling effectively began in the aftermath of Hurricane Andrew, which struck Southern Florida in 1992. Since that time, both insurance companies and their insureds have had the benefit of risk models to guide decision-making on properties at-risk of nat cats such as hurricanes, earthquakes and tornadoes. Over the past twenty years, nat cat models have continued to develop and become institutionalized at insurance companies the world over.

Because they are simplifications of reality, models are not perfect. However, they do help facilitate a much more informed view of underwriting and risk management than would be available without them.

Similar to the growth of “nat cat” models following Hurricane Andrew, we believe that the insurance industry will start to focus on modeling contingent business interruption after the significant losses following the storms referenced above.

There is currently a limited amount of insurance available to cover this risk. According to the third edition of the Dictionary of Insurance Terms, the “Contingent Business Interruption Form [provides] coverage for loss in the net earnings of a business if a supplier business, subcontractor,

key customer, or manufacturer doing business with the insured business cannot continue to operate because of damage or destruction. For example, a specialty hot dog stand noted for its great buns cannot sell its product if the bakery supplier of hot dog buns burns down. In instances where a business is heavily dependent on its suppliers or subcontractors, interruption of the flow of material from the supplier usually results in a substantial loss” (p. 100).

One of the reasons for limited contingent business interruption (or “CBI”) capacity is that insurance companies do not have the benefit of a risk model that can inform CBI underwriting, pricing and risk management. The industry has recognized the need for such a model for some time but, despite several notable attempts, no-one has yet been able to produce one that adequately quantifies the dynamics of CBI risk. The reasons for this are fairly straightforward: First, nat cat models are anchored to and focused on specific regional perils such as Florida wind events or a California earthquake, etc., while a CBI model would have to be far broader in scope. For example, the supply chain effects of the Thai floods were far broader than many industrial firms and insurance companies originally anticipated.

Second, the exposures that nat cat models quantify are generally very well defined; for example, the location of a property to a peril (often segmented down to the zip code level), as well as the property’s physical dimensions and the quality of its construction, are fairly easy to discern, and thus can be subjected to intensive engineering analysis. In contrast, CBI exposures are less well-defined and therefore obfuscate classical analytical techniques such as statistical and engineering analyses.

This is not to suggest that nat cat models are in any way perfect. They are not. All models are simplifications of reality that are designed to facilitate decision-making. As a result of that simplification, they are subject to error (known practically as “model miss”). The fact that nat cat models sometimes miss the mark is effectively why property underwriting is a business rather than a science. And in that business, nat models help to facilitate a much more informed view of property underwriting and risk management than would be available without them.

Insurers have recognized the need for a CBI model for some time but no-one has yet been able to produce one that adequately quantifies the dynamics of CBI risk. However, we believe a change is at hand.

With this in mind, we believe that a promising approach to modeling CBI risk is now at hand. At its core, assessing CBI risk is a network problem as many industrial firms can have a variety of supply chains that expose them to a variety of global CBI exposures. To assess the underlying drivers (or “business physics”) of these exposures, a model employing agent-based modeling techniques, geographical information systems (GIS) and industrial supply chain information can be constructed.

Many industrial firms currently perform some form of business impact analysis (or “BIA”) to identify and assess supply chain vulnerabilities. This information can be practically incorporated into an agent-based CBI model, the output of which can quantify supply chain vulnerabilities both for specific firms and in the aggregate, irrespective of peril, including, not least, terrorist attacks. (This is significant because, as we have noted elsewhere, “Terrorists currently attack global supply chains once every four days on average.”*)

Output from the CBI model can help inform supply chain/CBI risk assessment in a manner similar to the output that helps inform nat cat risk assessment for both insurance companies and their insureds. Examples of output include:

- Numerical loss estimates of CBI risk by supply chain network; and
- Vulnerability analysis based on a computer program that serves as an “attacking force” against the supply chains, which disables certain links in a chain on a simulated basis to quantify material vulnerabilities.

An attacking force program simulates literally millions of scenarios to identify the probable maximum losses from various global supply chain disruptions, and provides information on those losses by firm and disruption. This information then can inform industrial supply chain risk decisions and insurance accumulation analyses.

Even though model-enabled CBI analysis is in its initial stages, this condition is somewhat analogous to nat cat modeling in the years immediately following Hurricane Andrew over 20 years ago. Therefore, the potential benefits of the approach exist not only in the output of the model, but also in developing the supporting processes for implementing the model. One such process is the quantification of, and possible extension of, insured BIA information in the configuration of the CBI model.

In closing, widespread adoption of a CBI model by both insurers and their insureds could result in added capacity to CBI insurance products, which would have two key benefits: First, the added capacity would help to economically mitigate CBI risks for industrial clients. And second, a broader market for CBI insurance would provide a growth opportunity for certain P&C insurance companies, which could be significant in the current low interest rate/soft pricing environment.

Implications

- Simulation-based contingent business interruption (CBI) model is applicable to both insurance companies and their clients.
- Configuration of a CBI model leverages the business impact analysis (BIA) that many industrial firms are currently conducting.
- Widespread use of the model could result in new CBI insurance products, thereby providing a P&C growth opportunity.

* Jamie Yoder, Anand Rao, and Mansoor Bajowala, Insurance 2020: Turning change into opportunity, PwC white paper, January 2012, p. 10. Note also Scott Harrington and Gregory Niehaus, Risk Management and Insurance 2nd Ed. (NY: McGraw-Hill Irwin, 2004 [1999]), p. 513.

Contingent business interruption

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