Aon Benfield

Global Insurance Market Opportunities

An in-depth perspective

AON

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Contents

Introduction

The pace of change in the global economy today is truly staggering. Change is bringing new, emerging risk types, offering new opportunities for the insurance industry. At the same time, the industry has seen an influx of non-traditional capital as well as new enabling data, technology, and analytics capabilities. Taken together, favorable developments in all three strands of the market—**demand** driven by new risks, **supply** from new capital, and **empowering data and analytics**—make the outlook for the coming decade very bright.

The 2015 tenth edition Insurance Risk Study looks at where the industry stands today, how it has changed over the last decade, and how it is likely to evolve in the coming decade. Looking at these trends, we focus on drivers of risk and demand, and on uncovering profitable growth opportunities.

Today's unique opportunity

In the last three editions of the Insurance Risk Study we have discussed three important trends: decreasing frequencies in many lines of business, securitization and alternative capital, and the impact of "big data". These trends, the first on the demand-side, the second on the supply-side, and the third within market-enabling analytics, individually represent once in a generation developments—that they are occurring together makes today's market unique. Each trend offers opportunities for the future, but also challenges for incumbents. And all three will continue, or accelerate, in the coming years with profound impacts on the industry. In the first half of this year's Study we will analyze the dynamics in each of these three areas.

One beneficial result of modern technology is that the world is becoming safer and safer. We see increased safety manifest in many different existing risk lines of insurance: automobile accident fatality rates have been decreasing in almost every country; the incidence of property fires in the US has been decreasing steadily since 1980; and workplaces are becoming ever safer. As a result, insurers have seen their staple, high-frequency, low severity lines fail to grow at the same pace as the economy in most developed nations, challenging their relevance to the economy and often producing anemic aggregate growth.

At the same time the massively interconnected nature of commerce today has created a network of new emerging risks. Emerging risks are marked by fragility and unexpected consequences that challenge traditional insurance covers. In some cases insurance has even become a bottleneck to further innovation. Risk owners are demanding new solutions for these emerging risks.

Opportunities over the next five to ten years:

- **US mortgage credit,** an opportunity for USD 6 billion in new limit per year

- **Sharing economy** creating new demand for insurers to fill coverage gaps

- **Reputation and brand,** the number one concern of global risk managers

- **Microinsurance** with a potential four billion new customers

- **Corporate liability** covers offering over USD 1 billion in limit

- **Terrorism** leveraging military-based modeling to understand risk

- **Cyber**, a headline-grabbing potential risk

The supply of capital to the insurance industry today is freer and comes from more diverse sources than ever before. New capital is interested not just in traditional property catastrophe risks, but in a full range of risk profiles. As a result, supply of risk capital is not a serious constraint within the market.

Risks today are either well established, well understood, and well managed—or emerging, complex, and undermanaged. The "middle" of risk is disappearing.

The limiting factor on growth for the industry is not on the demand side or on the supply side, it is developing a comprehensive understanding of risk: exactly the problem that big data and analytics can help to solve. Because of the confluence of new demand, plentiful supply, and ground-breaking analytics capabilities we believe the next decade offers a unique opportunity for "break-out" growth, innovation, and development within the insurance industry.

The Study's evolution

Ten years ago Hurricane Katrina made landfall in New Orleans. In its aftermath, enterprise risk management became top of mind, and our clients needed reliable risk parameters that they could incorporate into their models or use to benchmark their own internal factors. We initially published the Study to meet these needs. The first edition ran to four pages and just covered the US.

Today, insurance risk remains core to the Study and our comprehensive view of risk by line and geography starts on page 44. We now provide detailed risk parameters on **49 countries** covering more than **90 percent of global premium**. We look at motor and property for each country with further breakdowns where data is available. And we have expanded the Study from its foundation in risk management to encompass global growth, profitability, and market trends. The Study continues to be the industry's leading set of risk parameters for modeling and benchmarking underwriting risk and global profitability. All parameters are produced using a consistent methodology that we have employed since the first edition of the Study.

Beyond risk modeling, we can also provide our clients with very granular, customized market intelligence to create business plans that are realistic, fact-based, and achievable. With a global fact base and broad access to local market practitioners, we are equipped to provide insight across a spectrum of lines, products, and geographies. Inpoint, the consulting division of Aon, helps insurers and reinsurers address these challenges, from sizing market opportunities to identifying distribution channel dynamics, assessing competitor behavior, and understanding what it takes to compete and win. Our approach leverages Aon Benfield's USD 130 million annual investment in analytics, data, and modeling to help our clients grow profitably. All of our work at Aon Benfield is motivated by client questions.

We continue to be grateful to clients who have invited us to share in the task of helping them analyze their most complex business problems. Dynamic and interactive working groups always lead to innovative, and often unexpected, solutions. If you have questions or suggestions for items we could explore in future editions, please contact us through your local Aon Benfield broker or one of the contacts listed on the last page.

Five things to do today to be more relevant in five years' time

Make a serious investment in
Data & Analytics,
or **partner** with those making the investment.

Target that investment to deliver products
**relevant to your customers'
emerging risks.**

Incorporate new data into your underwriting using
**Aon Benfield's predictive
data streams project.**

Satisfy all of your customers' security needs:
**Think beyond
risk transfer products.**

**Engage customers
daily or weekly**
on their terms. Sell products in bundles that make sense
to Gen X and Millennial social media savvy users.

Global insurance premium

USD 5.0 trillion

Global insurance capital

USD 4.2 trillion

Global property casualty premium

USD 1.4 trillion

6% growth

in

global insurance capital

Global property casualty combined ratio

97%

Global property casualty **capital**

USD 1.3 trillion

1.9%

property casualty penetration

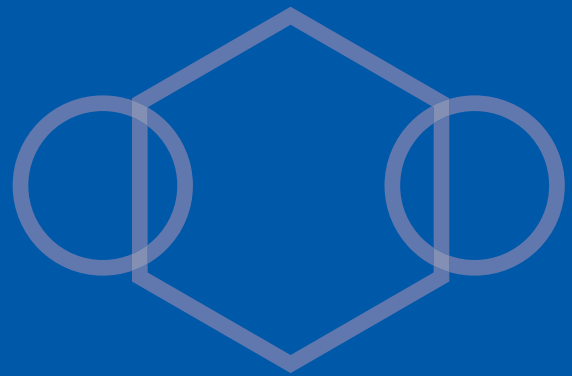**in top 50 countries**

39% growth

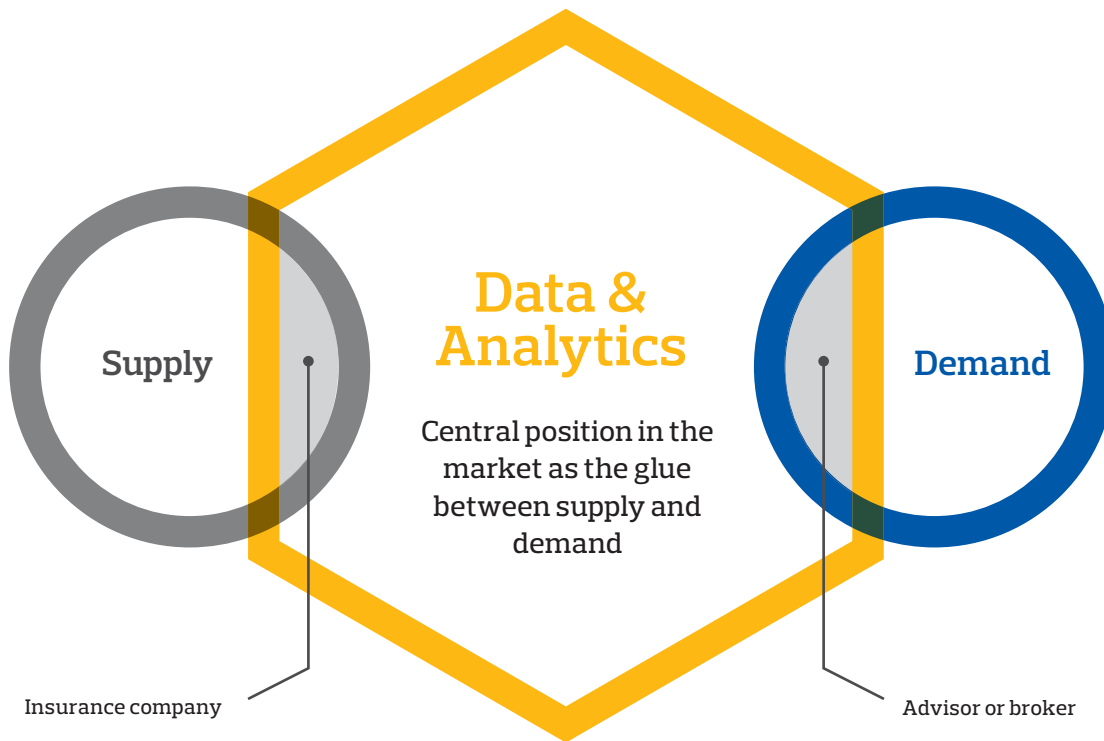if penetration increases to at least **2.5 percent**

Section 1

The Insurance Market

The Insurance Market

Three interconnected components make up the insurance market: demand from risk owners, supply from capital providers, and the data and analytics risk assessment capability needed to join the two and effect a transaction.

Supply

Data & Analytics

Central position in the market as the glue between supply and demand

Demand

Insurance company

Advisor or broker

There are two different alignments of these components in the market. When data and analytics capability are bundled with capital, we have an insurance company. When it is bundled with demand, we have an advisor or broker. The need for clear and objective advice on both the demand side—to the insurance consumer—and on the supply side—to the capital owner—increases with risk complexity. Large, homogeneous markets can rely on competition between suppliers to drive down prices for consumers, reducing the need for independent advisors. Increasingly we see this direct, or near-direct, model winning out in personal lines. At the other end of the risk scale, buyers of complex corporate covers and large reinsurance programs require analytics expertise aligned with their own objectives and they increasingly use brokers and advisors to advocate on their behalf against the sophisticated capabilities representing capital.

Lessons from the property market

The evolution of the property market over the last 25 years illustrates the critical importance of risk assessment capability. The property market has been so successful because of the near-universal adoption of sophisticated catastrophe models that have created a common "currency of risk". Used by risk owners to assess their exposure, by regulators and rating agencies to assess insurance company capital adequacy, and by investors to understand risk and return opportunities, catastrophe models sit at the core of the property insurance market. Despite some well-known shortcomings, they have transformed the property catastrophe market beyond all recognition since Hurricane Andrew in 1992.

The last two decades saw both successes and failures for catastrophe models. Broadly, hurricanes and typhoons have been modeled correctly, despite some individual model misses both high, in Europe, and low, in the US. Earthquake modeling has also been generally successful, with accurate estimates for the Chile earthquake of 2010, although the Tohoku earthquake of 2011 fell outside the anticipated range. Flood, traditionally a less well modeled peril, drove the largest surprises, with the 2011 Thailand floods standing out as a wake-up call to the industry. Of the three perils, flood is by far the most difficult to model, not just because of the need for extremely detailed location and elevation data, but also because of the interaction of the natural peril with human decision-making. The success of catastrophe models stands in marked contrast to models of risk used in finance, which were proven by the Global Financial Crisis to be woefully inadequate, and inaccurate by many orders of magnitude.

There have been two important lessons from the last two decades of catastrophe losses.

First, we have learned the need to model all perils in all geographies. Regulatory and rating agency frameworks have adapted to require companies to have their own best estimate of losses based on the most up-to-date science. A major loss from an unmodeled peril or geography is no longer acceptable to boards or regulators.

Second, as a corollary of modeling's success, risk owners and capital owners have become increasingly reliant on analytic frameworks. Models have made original risk owners increasingly comfortable with the risks they face—a comfort that in some cases has reduced the demand for traditional risk transfer products. Models have also made capital owners increasingly comfortable assuming risk, and have often lowered their reservation prices—an effect that has been particularly pronounced in property catastrophe reinsurance.

Emerging risk lines

will be the growth engine for insurers over the coming decade.

Driven by the success of models in property, insurance market players in other lines are now demanding more accurate risk quantification. As a result, risk assessment quantification, the "data and analytics" expertise we hear so much about, has assumed a far more important position in the marketplace than was the case just 10 years ago.

Looking forward, we see a bifurcation in the market between "existing risk" lines of business—the staples of personal auto, traditional liability, property, employer's liability—and newer lines of business spurred by the "emerging risk" evolving out of today's hyper-connected global economy.

Emerging risk lines will be the growth engine for insurers over the coming decade, providing coverage against perils like cyber, reputation and brand, social media, corporate liability, and risks related to the sharing economy.

In the next sections of the Study we will look at several important trends affecting demand and supply under the existing risk and emerging risk paradigms. We will then look at how analytics can—and must—provide the "glue" between supply and demand to ensure a growing, thriving insurance market over the coming decade. We believe that while data, technology, and analytics are driving many of the emerging risk perils, they simultaneously hold the promise of delivering parallel solutions through the new capabilities they enable.

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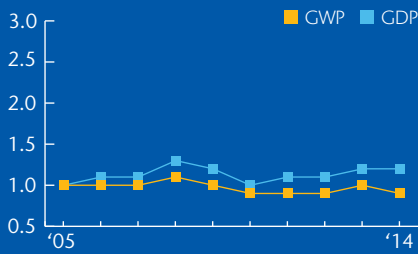
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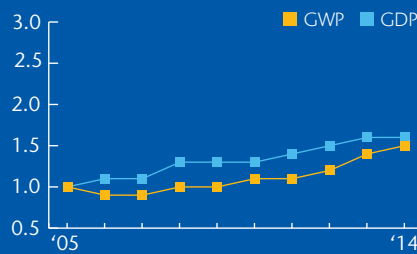
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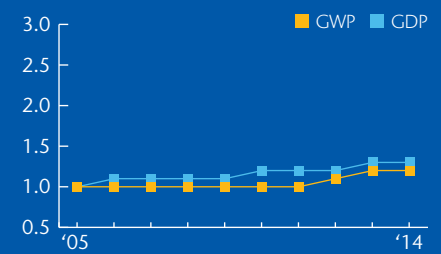
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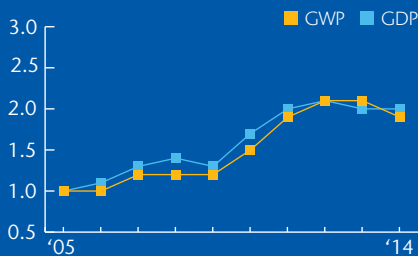
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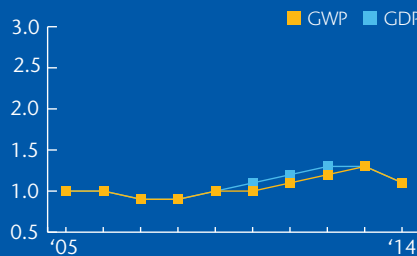
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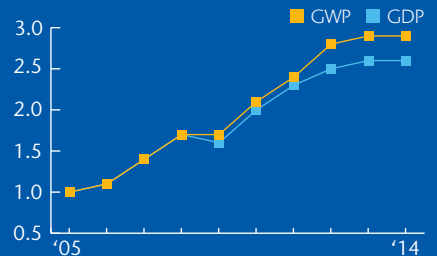
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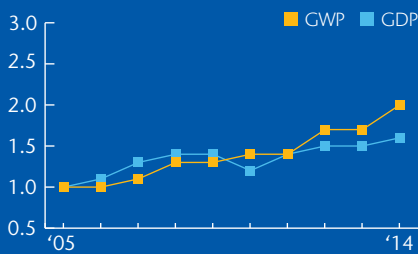
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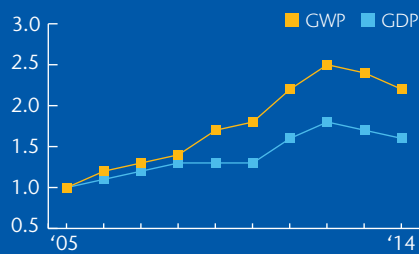
Turkey, indexed 2005 = 1.0

China, indexed 2005 = 1.0
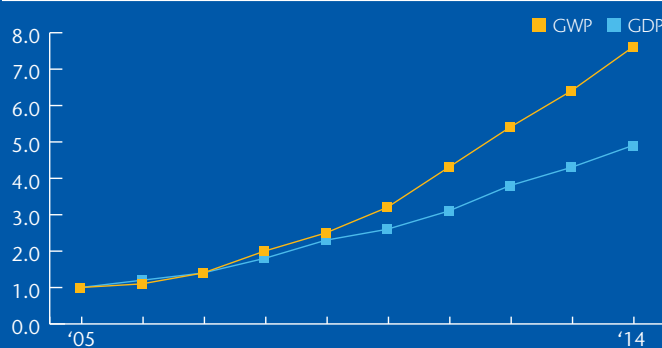
China's share
of global premium has
increased more than
five–fold
over the last decade

Insurance Relevance to the Economy

The graphs compare property casualty premium and GDP over the last ten years.
Six of the ten countries shown have achieved premium growth at or above GDP
indicating an increased relevance for the insurance sector in the economy.

Section 2

Demand
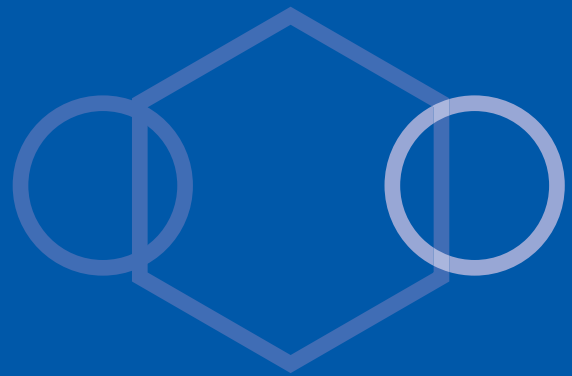
Demand: Existing Risks

A history of successful risk management dampens demand for existing risk products

Throughout its history the insurance industry has helped society become safer. Most insurance products are designed to encourage safety, prudence, and caution—for example, through loss free discounts, experience rating, and explicit credits encouraging loss prevention. Around the world, insurers offer discounts for safety features like fire and wind resistant construction.

The industry has been at the forefront of testing and understanding risk, and helping the broader economy mitigate risk since the early 1800s.

The Factory Mutual System, today known as FM Global, was founded in the US in 1835 to provide insurance to mill owners. It pioneered the use of total insured value as a coverage basis. By the 1880s they began testing automatic sprinklers and by 1910, thanks to the introduction of sprinklers, insurance for mill owners cost just 10 cents per USD 100 of coverage—74 cents less than in 1835.

Hartford Steam Boiler was founded in 1866 to ensure safety standards for the then-emerging risk of steam power.

In the late 1800s when electricity was an emerging risk, Underwriters Laboratories set out to test electrical equipment, promulgate standards, and ensure the new technology was safe and insurable.

Today the industry is actively involved in researching and setting standards for vehicle and highway safety, business and home safety, crime prevention, arson control, fraud detection and reduction, workplace safety and ergonomic design, as well as legal and judicial reform.

All of these efforts have been, and continue to be, spectacularly successful, as the graphs illustrate. Across a wide range of both first-party and third-party coverages we see declining frequencies. This is true across the globe—in the US, Europe, and Asia.

The downside for the industry is obvious: better managed risks require less insurance. The more successful we become, the less insurance we sell!

Better modeling and risk understanding can have a compounding effect. Risk has become more accurately quantified in many areas. As corporations and other risk owners come to understand risk better, their risk appetites tend to increase. This effect has been evident in larger retentions for property and casualty insurance by corporations, as well as higher retentions by insurers. It has exacerbated the growth-suppressing effects of declining frequencies.

EU country road fatalities per 100k vehicles, indexed 2000 = 100
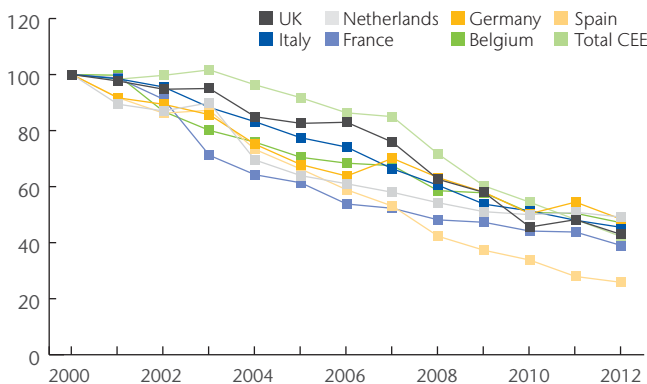
Asia road fatalities per 100k vehicles, indexed 2004 = 100
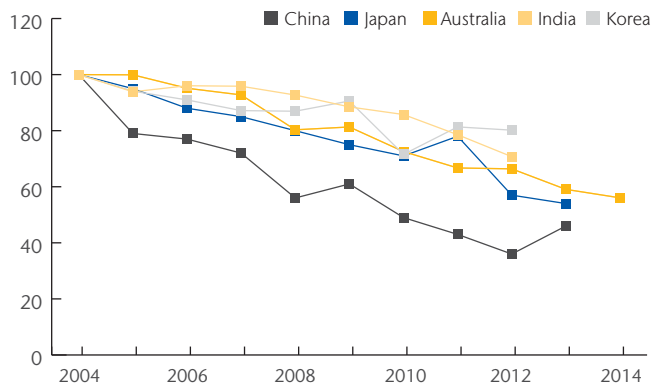
The insurance industry's focus on

risk prevention

and

safety

has been spectacularly successful.

Across many different geographies and lines, frequencies have been decreasing for many years.

US automotive liability fatalities per 100m vehicle miles traveled, indexed 1990 = 1.00
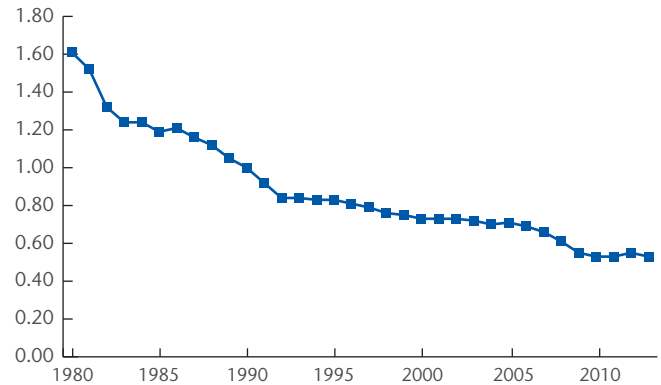
US medical professional liability payments per licensed physician, indexed 1991 = 1.00
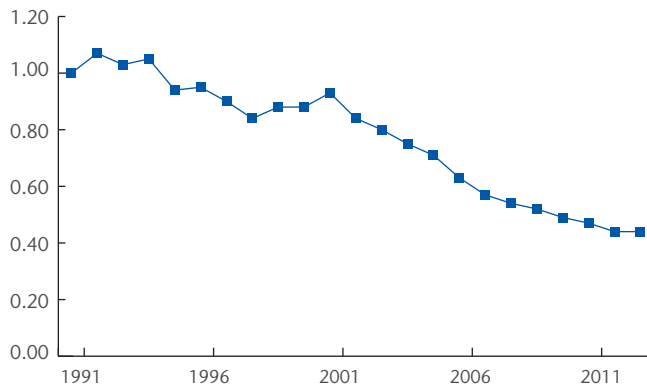
US property structure fires, indexed 1990 = 1.00
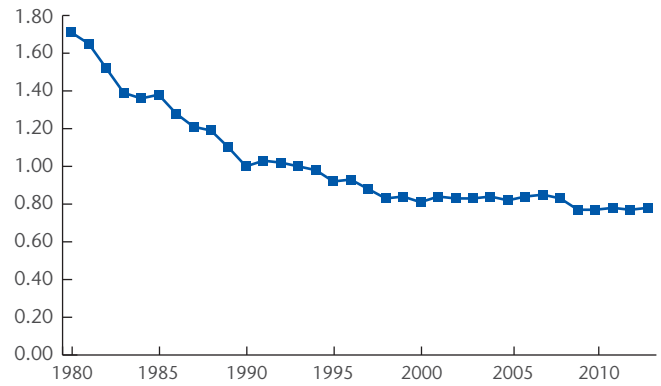
US commercial general liability multistate occurrence frequency, indexed 1990 = 1.00
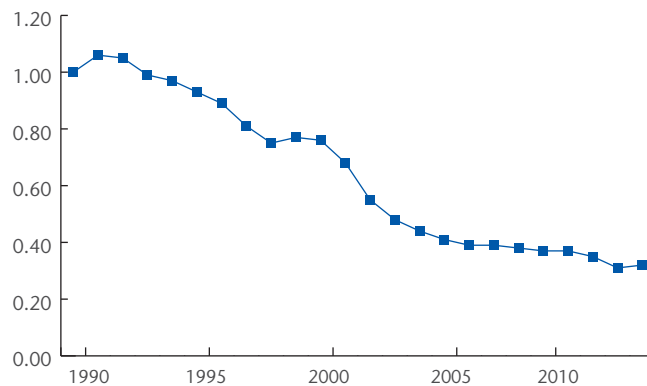
US workers compensation lost-time claim frequency, indexed 1990 = 1.00
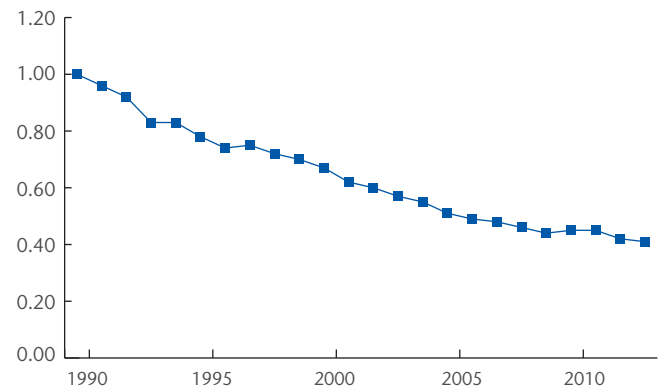
Demand: Emerging Risks

Fortunately, developments in the global economy provide a countervailing force to declining existing risk frequencies, and an opportunity for insurers through new areas of emerging risks. Aon's 2015 Global Risk Management Survey provides a window into these risks. The survey ranks more than 50 risks that are of concern to risk managers around the world. Damage to reputation or brand is the number one risk identified. And for the first time in the history of the Survey, cyber risk appears in the top 10.

Many of the newer risks identified by the Survey cover exposures that are intangible, yet nonetheless can have a considerable impact on balance sheets, income statements, and shareholder value. These risks reflect that while day-to-day systems become more reliable and less susceptible to minor disruptions, at the same time they face increased exposure to major catastrophes resulting from the intricately connected nature of the global economy.

As a result, we see that the "middle" of risk is disappearing: risks today are either well established, well understood, and well managed—or emerging, complex, and undermanaged. Today the industry has a unique opportunity to strengthen its relevance by providing solutions to these emerging risks.

The graphic arranges the 53 risks ranked by the Survey into six broad categories. Three categories, those of general business risk, social or global risks, and financial risks are not readily insurable. But 21 of the risks fall into one of three broadly insurable categories.

1. **Risks that are insurable,** with well-developed markets and high penetration. These include third party liability, property damage, weather and natural disasters, directors and officers liability, injury to workers, crime, and fidelity coverage. Even within this group, there are often opportunities to provide broader cover, or higher limits to larger insureds.

2. **Risks that are insurable but not enough insured,** for example because of inadequate limits or overly restrictive terms and conditions. This group includes many emerging risk areas, such as computer and cyber cover, failure of technology systems, supply chain coverage, and terrorism.

3. Risks that have the potential to be much more insured once certain **insurance design challenges** are overcome. The number one risk identified by risk managers, damage to brand or reputation, is a good example. A successful insurance product requires that its coverage trigger be clear and unambiguous, and that loss amounts can be objectively determined—brand and reputation risk fails both these tests. These are challenging problems, but not insurmountable ones.

To achieve long-term sustainable growth, these 21 risks are where we need to focus our efforts and resources. In almost all cases, we expect that improved availability of data and more sophisticated analytics and modeling will enable insurance solutions by delivering a generally agreed assessment of risk. Together they represent opportunities to grow through increasing the relevance of insurance in the global economy, rather than simply fighting to gain a larger slice of the shrinking existing risk pie.

We will look at many emerging areas of risk in the following sections, such as cyber risk, microinsurance, the sharing economy, mortgage credit risk, and catastrophic corporate liability.

For for first time in the history of the Survey, **cyber risk** is a top 10 risk for organizations.

1. Insurable & generally insured	2. Insurable & not enough insured	3. Insurance design challenges	General business risk	Social or global risk	Financial risk
8. Third-party liability	7. Business interruption	1. Damage to reputation or brand	2. Economic slowdown, slow recovery	29. Environmental risk	11. Commodity price risk
10. Property damage	9. Computer crime, hacking, viruses	21. Failure of disaster recovery plan	3. Regulatory or legislative changes	34. Accelerated change in market & geopolitics	12. Cash flow, liquidity risk
18. Weather, natural disasters	13. Technology failure, system failure	22. Corporate social responsibility and sustainability	4. Increasing competition	35. Aging workforce and related health issues	17. Exchange rate fluctuation
20. Directors & officers personal liability	14. Distribution or supply chain failure	25. Loss of intellectual property data	5. Failure to attract or retain top talent	36. Globalization, emerging markets	19. Capital availability, credit risk
23. Injury to workers	15. Political risk and uncertainties	46. Social media	6. Failure to innovate, meet customer needs	40. Natural resource scarcity	27. Counter party credit risk
24. Crime, theft, fraud, employee dishonesty	33. Product recall		16. Corporate governance and compliance burden	44. Pandemic risk, health crisis	37. Interest rate fluctuation
52. Kidnap and ransom, extortion	41. Terrorism or sabotage		26. Failure to implement or communicate strategy	45. Climate change	42. Asset value volatility
	47. Absenteeism		28. Merger and acquisition, restructuring		49. Share price volatility
	53. Harassment or discrimination		30. Inadequate succession planning		50. Pension scheme funding
			31. Lack of technology to support business needs		51. Sovereign debt
			32. Workforce shortage		
			38. Outsourcing. Unethical behavior (tie)		
			43. Understaffing		
			48. Joint venture failure		

Numbers indicate Risk Ranking according to Aon's 2015 Global Risk Management Survey.

Cyber Risk

In last year's edition of the Study, we talked about the rapid increase in the number of data breaches, the rising cost of data breaches, the growth of the US cyber insurance market, and the growing needs of small- and medium-size businesses. These themes remain highly relevant today, as the risks and the solutions continue to evolve. As noted earlier, businesses now see hacking and computer crime as a top 10 risk for the first time, according to the Aon Global Risk Management Survey.

The meaning of "cyber"

As the world becomes increasingly complex and interconnected, the risks that businesses face are changing. Cyber risk is perhaps the chief concern related to these trends. Because cyber risk is evolving so quickly, it is important to clarify terms. Depending on your position in the industry, the word "cyber" means different things.

- **An insurance cover:** typically providing both first- and third-party protection to companies against costs related to a data breach and to liability arising from that breach. Demand for this coverage has taken off in the wake of the "mega" breaches as we have seen with Target, Home Depot, Anthem, and the US Office of Personnel Management. It is one of the fastest growing areas of the property casualty insurance market today. We estimate the US market to reach USD 2 to 2.5 billion of gross written premium in 2015. As a reference point, the global cyber security industry has annual revenue of USD 106 billion, according to MarketsandMarkets.

- **A peril:** cyber risk is not limited to the scope of a "cyber" insurance policy. Most readers have probably heard about the recent Fiat Chrysler recall of 1.4 million vehicles after hackers remotely took control of a Jeep Cherokee. What impact will cyber risk have on the physical world? And what impact can it have on traditional coverages such as property, marine and energy, general liability, and product liability, to name just a few? Could hackers disrupt businesses and knock out critical infrastructure? These questions are just beginning to be discussed widely.

- **A balance sheet threat:** what are insurers doing to manage the risk of a data breach to their own organizations? Do they have response plans ready to contain a breach when it occurs? And are they prepared for the potential brand and reputation fallout?

- **An unknown:** a survey conducted by Aon and the Ponemon Institute this year found that nearly 40 percent of the surveyed companies assess their cyber risk based on either gut feel or no assessment whatsoever. And the survey shows that on average, companies insure only 12 percent of their estimated cyber PML levels, versus insuring over 50 percent of their property PMLs. Yet 72 percent of companies say that their cyber insurance coverage is sufficient. These numbers suggest a market in which many companies are still grasping for a basic understanding of the risks to which they are exposed. Insurers and brokers have a significant opportunity to help educate companies on the risks they face.

The quest for capacity

One of the themes of our Study is that existing risks no longer drive robust growth and the market needs to embrace and cover emerging risks. Cyber risk is an example of this theme—but some question whether it is too complex, too varied, and too rapidly changing to underwrite. These are legitimate concerns. Yet the customer need is clear. Some companies now seek more than USD 1 billion in limits for cyber insurance. To date, we have not seen buyers and sellers able to agree on a price for such a transaction. And if the private market does not provide solutions, it may fall on governments—and tax payers—to provide a backstop, as has been done for flood risk and for terrorism.

We hope that as data and analytics improve, cyber risk moves from the "complex and undermanaged" end of the spectrum into the insurance mainstream where markets can adequately price risk, transfer it, and share it.

History repeating itself?

The current situation with cyber invites comparisons to the terrorism insurance market. Despite the presence of TRIA and the US government's hopes for a functioning private terrorism reinsurance market to develop after 9/11, terrorism remains underinsured by the private market. Will cyber follow the same course?

"Cyber is the tail wagging the dog of traditional risk."

Matt Cullina, CEO, Identity Theft 911

There are reasons to believe that cyber will follow a different course. Cyber risk has the potential for a much more robust data set than terrorism, given the daily occurrence of cyber attacks. Moreover, while terrorist attacks imply a significant concentration of risk, cyber exposures are relatively well distributed. And loss control efforts can reduce the frequency and duration of data breaches. The table below highlights some of the key points of comparison.

This is not to deny the considerable questions and uncertainty that currently surround cyber risk and insurance. Cyber insurance products struggle with clear loss triggers and an objective determination of loss severity. And the main threat to businesses—damage to reputation and brand—is not insured. See also page 35 on brand risk.

The next evolution

The cyber insurance products in the market today are driven by current privacy laws, and are designed primarily to protect the insured for costs associated with a data breach. The next wave of cyber insurance will emerge as businesses take a more holistic view of the impact that cyber risk could have on their operations, such as system failures, business interruption, and supply chain disruption. This evolution could have far-reaching implications for traditional coverages.

As more data is accumulated and as modeling techniques catch up to the underlying technologies, we expect enormous increases in our ability to model cyber risk, to mitigate it, and to transfer it to insurance markets. In ten years, we anticipate cyber will be a major line of business.

Terrorism and cyber risk comparison

Consideration	Terrorism	Cyber
Objectively determined loss events	Yes	Yes, but evolving legal issues; occurrences may be hard to determine for reinsurance
Ability for insured to risk manage	Limited	Extensive
Frequency	Low in US, high in some countries	High
Loss can be objectively determined	Yes	Varies; reporting and notification requirements standard or stipulated; reputational losses hard to quantify
Independent insureds	No, concentrations of risk in big cities	Yes—many attacks are targeted at individual insurers, but potential for systemic attacks remains
Good spread of risk	No—the "New York" problem	Reasonable
Adverse selection: private knowledge impacts loss potential	Low	Medium
Availability of frequency data	Poor; very few attacks in developed countries; data in security organizations hard to access	Millions of attacks each year
Availability of severity data	Good, can leverage military testing	Limited, and difficult to determine amount of loss

Microinsurance

Most the exhibits in the Study focus on a core group of 50 large global insurance markets. With 98.2 percent of global premium, these countries are a good representation of the global insurance market today—yet they are not the entire market. The other 131 countries tracked by Axco account for the remaining 1.8 percent of premium, a share that has the potential to increase significantly in the coming years. A basic principle of marketing is to focus on the needs of your non-customers, and not just your customers. On that principle, an additional four billion potential insurance customers are just beginning to come online. Enter microinsurance.

Microinsurance is a tool to protect low-income households against risks such as sickness, a death in the family, or crop failure that can be catastrophic in the absence of social security programs often taken for granted in the richer world. The premiums and benefits of microinsurance are specifically matched to the needs of this population.

Microinsurance can help break the cycle between vulnerability and poverty. Natural disasters are continually in the headlines, and developing countries such as Thailand and Nepal, lacking robust private insurance markets, are among the hardest hit. After an emergency, a family may need to make difficult choices in order to make ends meet, such as putting children to work, eating less, or selling critical productive assets. Microinsurance can provide an alternative to improve families' resilience. Evidence has shown that low-income workers will invest more in their livelihoods, and get higher returns, if they have insurance. Microinsurance can also help improve other metrics.

- **Public health:** microinsurance promotes access to healthcare and encourages early detection and treatment of illness.

- **Government budgeting:** microinsurance relieves some of the burden on public resources for providing pensions and healthcare.

- **Community resilience:** microinsurance supplements the roles of the community and government to provide relief and assist populations to rebuild after a disaster.
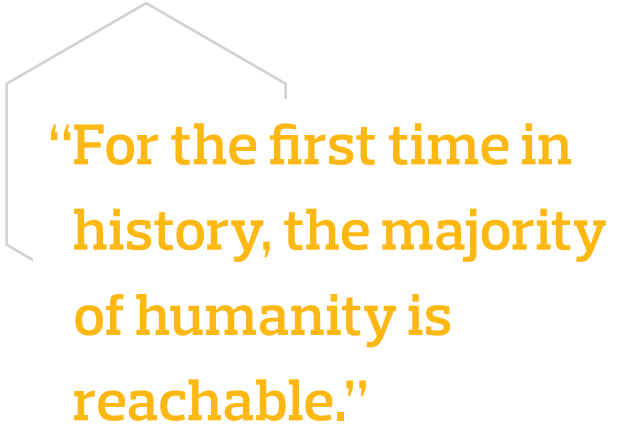
Once seen as a tool mainly for governments and NGOs, microinsurance companies are evolving into viable commercial enterprises. Growth has been facilitated by new distribution channels, namely mobile carriers, retailers and utilities, as well as microfinance institutions. A growing number of global insurers are now offering microinsurance in some capacity.

A growing market

According to the latest numbers, 263 million people worldwide are now covered by some form of microinsurance. This is up from 78 million people in 2005—roughly 19 percent annual growth. The most prevalent areas for coverage are Asia, Latin America, and Africa. Coverage ratios remain low, with only 4 percent to 8 percent of the eligible population currently insured, meaning there is considerable room for growth.

A range of microinsurance products are now offered, the most common ones being credit life and funeral insurance, agriculture insurance, and health insurance.

Global microinsurance premiums are currently estimated to be USD 2.2 billion. Loss ratios vary by region depending on how the risk is priced, from an average of 26 percent in Latin America to 79 percent in Asia. This disparity suggests greater uncertainty—or immaturity—in estimates of the risk in Latin America.

> "For the first time in history, the majority of humanity is reachable."
>
> Leapfrog Investments

Global microinsurance written premium: USD 2.2 billion

48.6M people insured

USD 828M gross written premium

11% est. annual growth 2005-2013

170.4M people insured

30% est. annual growth 2011-2012

USD 829M gross written premium

44.4M people insured

33% est. annual growth 2005-2013

USD 548M gross written premium
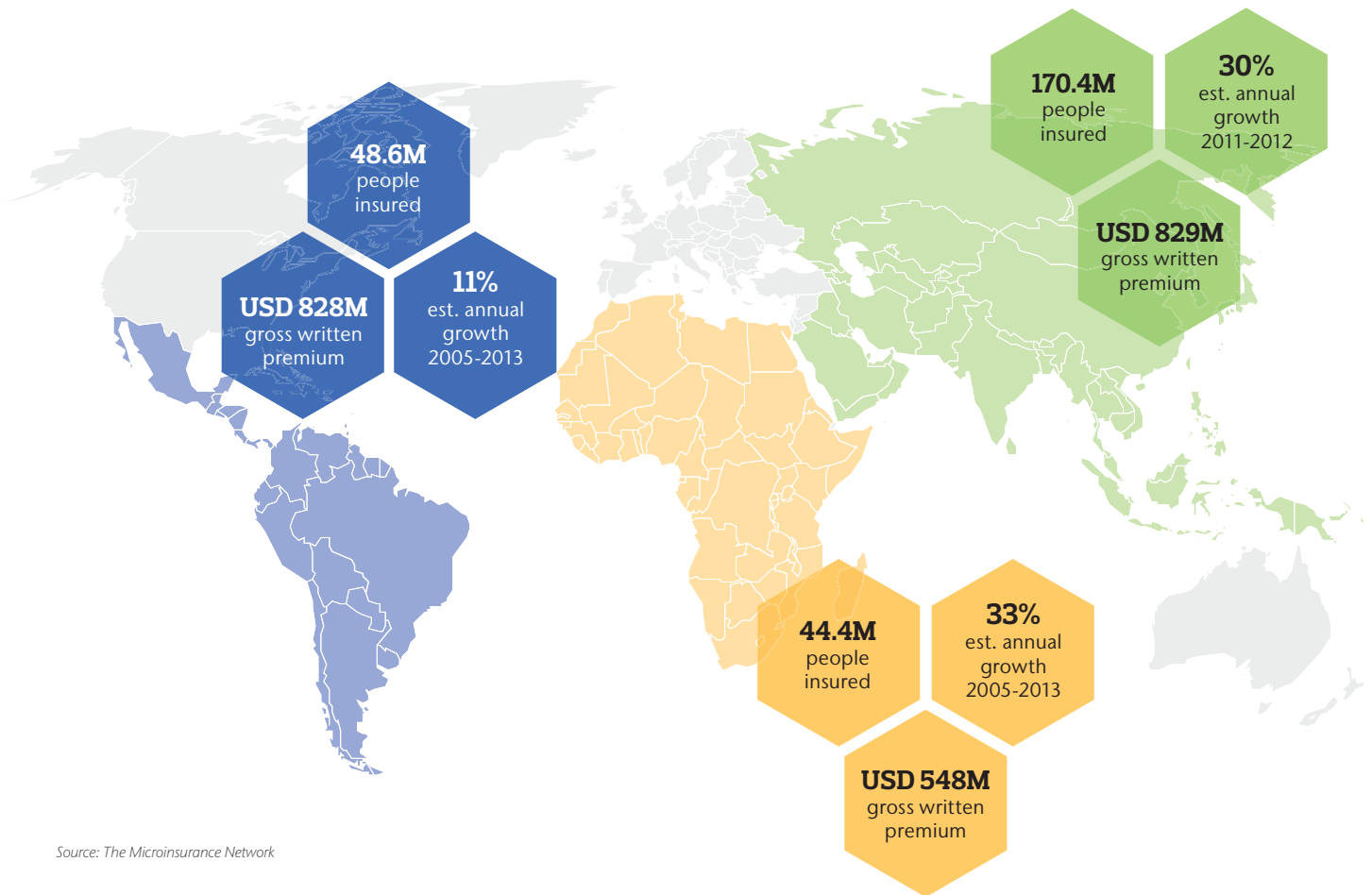
Source: The Microinsurance Network

The future outlook

Establishing a microinsurer requires a more significant up-front capital investment than a microfinance operation of similar size. Given the small premiums it can be difficult to get the operation to scale to create a good distribution of risk, although many of the products offered are non-aggregating. On the positive side, the mobile phone is becoming ubiquitous, and is a natural distribution channel. It offers the promise of more efficient distribution and an improved ability to scale quickly.

The future of microinsurance is bright, but challenges must be overcome if it is to realize its potential. Fittingly, these challenges are a microcosm of those faced by insurers in the developed world: the need for more innovation, to bring more talent to risk assessment, product design and pricing, for enabling regulation, and finally for continued efforts to improve financial literacy among potential customers. Microinsurance is a long-term play. In the short term its role is maybe more a social initiative but in the long term the goodwill accruing to early movers has the potential to pay a significant growth dividend.
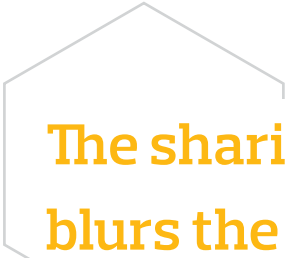
The Sharing Economy: Filling the Insurance Gap

The rapid rise of mobile internet has changed the consumer market in ways unimaginable when we wrote the first edition of the Study. Today's smartphone contains the computing power of yesterday's laptop. Improved connectivity has created extensive peer to peer networks, placing consumers in direct contact with sellers of goods and services. Technology firms are growing rapidly and forcing the insurance industry to innovate and adapt to new risks, including the sharing economy, policy aggregators, and potentially even driverless cars.

Home and auto, two of the largest existing risk lines, are under pressure to innovate in the face of technology startups like Uber, a transportation network company (TNC), and Airbnb, a peer-to-peer lodging company. In the sharing economy, individuals rent out their personal assets for money in direct competition with established businesses like taxis or hotels. According to "The Sharing Economy", a 2015 consumer survey by PwC, this market is expected to grow to USD 335 billion in 2025 and make up 50 percent of all rental transactions. The sharing economy blurs the distinction between personal and commercial insurance risks. The largest opportunity for insurers is to offer policies to bridge the gap between traditional personal and commercial insurance.

Drivers for TNCs need gap coverage when using their personal car. These drivers are covered by their personal auto policy when the TNC app is off and they are covered by the TNC's commercial policy when a passenger is in the car, but they are not covered by either policy when the TNC app is on but there is no passenger in the car. This gap has discouraged most drivers from being transparent with their insurers out of fear of losing their personal policy, thus personal insurers have likely covered such risk without proper compensation.

In May 2014, Colorado became the first US state to pass a bill governing the business operations and insurance requirements of ridesharing. California followed shortly after with a bill dictating the TNC drivers be covered explicitly by their own policy or the TNC policy. Under the bill, from the moment the driver accepts a ride request until the ride is complete, TNC insurance must cover USD 1 million for death, personal injury, and property damage. In addition, TNC insurance must include USD 1 million of un- or under-insured motorist coverage when a passenger is in the car. These amounts are far greater than those provided by most personal auto policies in the US. When the app is on but no ride request has been accepted, TNC insurance must cover death or injury of USD 50,000 per person and USD 100,000 per occurrence, as well as USD 30,000 for property damage. In the event the driver's primary policy ceased to exist or has been canceled, the TNC must provide contingent liability coverage.

The sharing economy blurs the distinction between personal and commercial insurance risks.

In an attempt to streamline the patchwork of coverage, rating bureaus offered policy endorsements for ride sharing policies earlier this year. The National Association of Insurance Commissioners has proposed model legislation that largely resembles the California law. Various insurance companies now offer a ridesharing policy in at least 13 states, many of which are an endorsement to an existing personal policy.

In the field of peer-to-peer lodging, it is harder to define where a personal policy ends and a commercial policy begins. Standard homeowners insurance policies exclude commercial activity in the home, so home-sharing companies have started offering guarantees or policies that cover such activity. Home-sharing policies typically exclude incidents that occur in common areas of the residence, lost cash and valuables, and personal liability. Another concern is that the home-sharing policy only covers hosts for scheduled premises when guests are present. If a former guest makes a copy of the house key and burglarizes the home at a later date, the home-sharing policy would not apply and it would be near impossible to file a homeowners claim when there is no sign of forced entry. Hosts also run the risk of breach of contract with their landlords or breaking local ordinance laws governing hotels, neither are covered by insurance.

Commercial premium bypassing the market

Individuals operating in the sharing economy represent new opportunities to provide coverage, but the technology companies running these networks represent a threat on the commercial lines side. Insurers have historically been the owners of large databases required to quantify the underlying exposure. In contrast to previous insurance risks, TNCs and peer-to-peer services are mobile app based and data driven. The service providers are tech-savvy and own the data, which places them in a similar position as rating bureaus in the early days of insurance. This data advantage allows technology firms to establish captive insurers or self-insure, thus taking premium out of the marketplace. Insurance companies must be able to add value with their claims expertise, offer products that simplify coverage, and meet the needs of all parties involved in a peer-to-peer transaction in order to maintain their market position.

In many cases insurance has become a bottleneck to further innovation.

US personal lines premium vs. GDP, indexed 1996 = 1.0

Legend: US GDP · Homeowners · Private Passenger Auto

US commercial lines premium vs. GDP, indexed 1996 = 1.0

Legend: US GDP · Commercial Property · Commercial Standard Liability · Commercial Specialty Liability

US relative employment index, indexed 1996 = 1.0

Legend: Life & Health · Property & Casualty
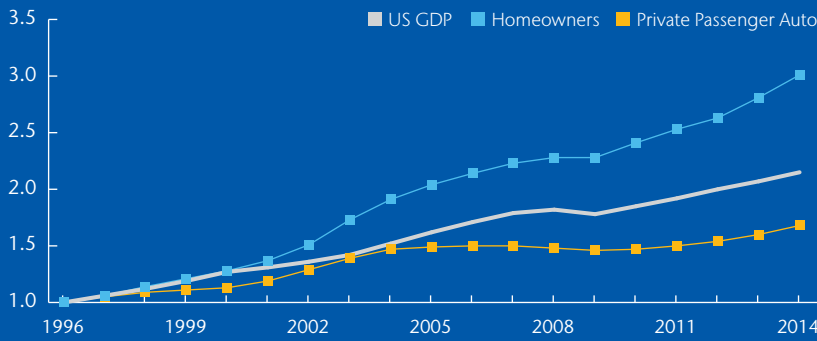
Homeowners

is the only major
Property & Casualty product
to grow faster than
US GDP
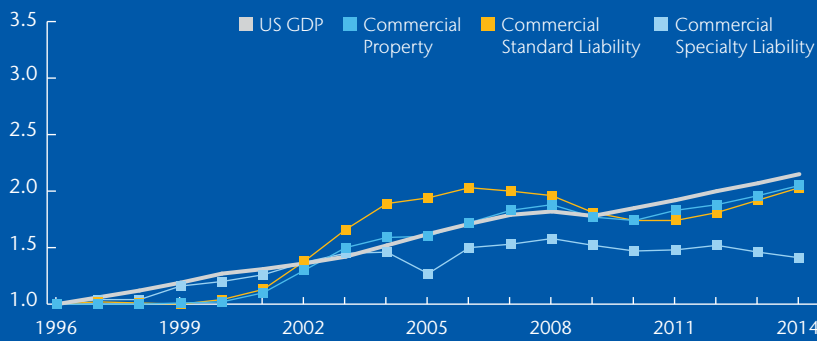
Commercial specialty

lines premium last
peaked in
2008
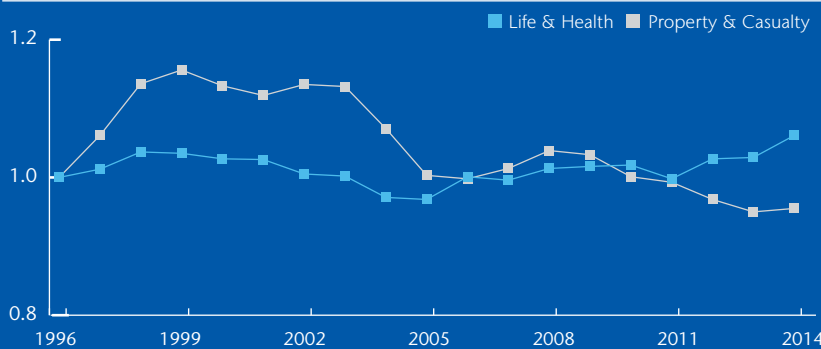
In 2014
Property & Casualty
insurance employment
increased
for the first time since 2008

US Insurance Premium & Employment

In 1996, the US property casualty insurance industry had one employee for every **USD 490,000** of premium. In 2014, that number was one employee for every **USD 950,000** of premium, or **USD 680,000** adjusted for inflation—nearly a 40 percent productivity increase.

Section 3

Supply & Capital
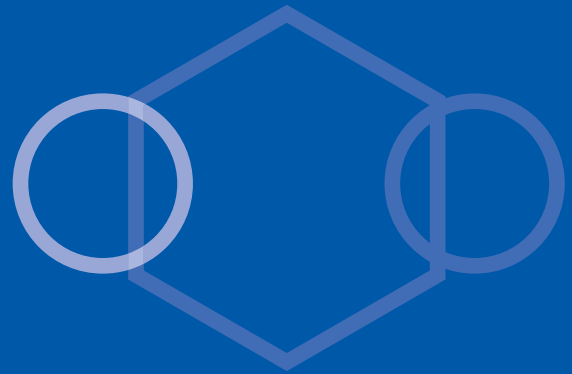
Supply & Capital

Capital represents the most important determinant of industry supply. Insurance capital should broadly keep pace with, or slightly outpace, GDP growth in order to accommodate higher exposure driven by urbanization. In addition, growing middle classes in developing economies further boost the need for insurance capital.

Since 2005 insurance industry capital has increased by 51 percent, not adjusted for inflation. Over the same time period reinsurance capital has increased by 80 percent and alternative capital by 505 percent. Global GDP has increased by 65 percent on a market exchange rate basis and 76 percent on a purchasing parity basis.

The increase in capital over the last ten years has been slightly lower than the GDP growth rate, but since the 2008 recession it has far exceeded the amount necessary to keep pace with exposures.

Over the last ten years, reinsurance capital has grown more quickly than GDP, in part driven by the growth of alternative capital.

Reinsurance capital needs are driven by peak exposures, which today means US wind. Over the last ten years US wind exposures have grown more slowly than both global GDP and reinsurance capital, and as a result we have seen lower catastrophe reinsurance rates in the market. Only when China becomes the world's peak exposure, likely in the 2020s, will reinsurance capital need to grow materially more quickly than GDP.

Insurance—the first industry to "Uberize"?

The phenomenal growth of Uber, a company less than five years old with a USD 50 billion valuation, needs no introduction. The fact the word "Uberize" has moved into common usage is an indication of its impact and reach. But what does it mean to Uberize? We see several potential definitions.

- **Uberization, v1:** as the elimination of intermediaries was popularized by Nassim Nicholas Taleb. In Uber's case, this means the taxi medallion owner. There are numerous examples, particularly in insurance, of technology disintermediating parties who add no value to a transaction.

- **Uberization, v2:** "surge pricing", or the ability to dynamically adjust pricing and increase supply in response to a shift in the demand curve. In Uber's case, this occurs during rush hour or a downpour.

- **Uberization, v3:** the introduction of increased supply competition.

It is this third definition that is most relevant for the insurance industry. Increased supply competition, and an increased fungibility of capital entering and exiting the market, has been a hallmark of the last twenty years. It started after Hurricane Andrew and the Northridge Earthquake in the early 1990s with the first insurance securitizations and startup Bermuda reinsurers. Since then, after each round of dislocation in the market, new underwriting capital has been deployed more and more quickly. In 2013 alternative capital moved from being a price-taker to a price-maker for peak US catastrophe risk, with the effect of steeply driving down prices.

Today, with over USD 68 billion alternative capital deployed in the industry, and with it having an outsized influence on catastrophe risk pricing, the insurance industry can truly be said to have been Uberized in the sense of being subject to greatly increased supply competition. Moreover, the influence of alternative capital is beginning to extend far beyond catastrophe risk. So-called hedge fund reinsurers have an appetite across the risk spectrum, including many high-frequency, low severity stable existing risk lines.

We believe abundant capital, providing capacity for existing and emerging risks, will be available to support significant growth in the insurance industry over the coming decade.

We believe abundant capital, providing capacity for existing and emerging risks, will be available to support significant growth in the insurance industry over the coming decade.

Global insurance capital since 2005

USD Trillions

9% 11% -29% 33% 9% 3% 6% 5% 5%

2005 2006 2007 2008 2009 2010 2011 2012 2013 2014

Global reinsurance capital since 2005

USD Billions

20% 6% -17% 18% 18% -3% 11% 7% 7%

2005 2006 2007 2008 2009 2010 2011 2012 2013 2014
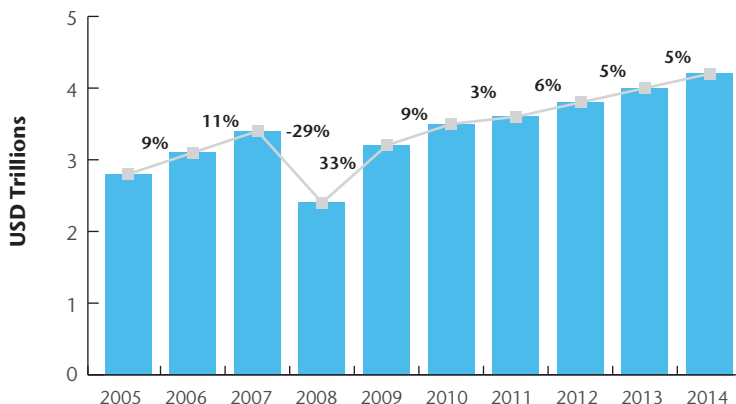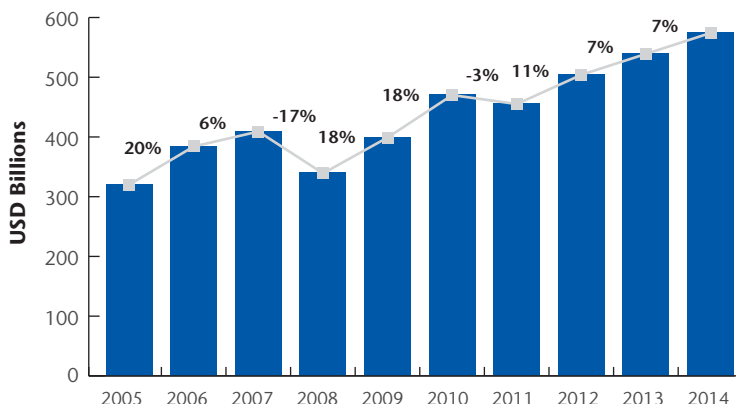
Alternative capital since 2005 (included in reinsurance capital)

USD Billions

64% 22% -14% 21% 4% 13% 67% 9% 31%

2005 2006 2007 2008 2009 2010 2011 2012 2013 2014
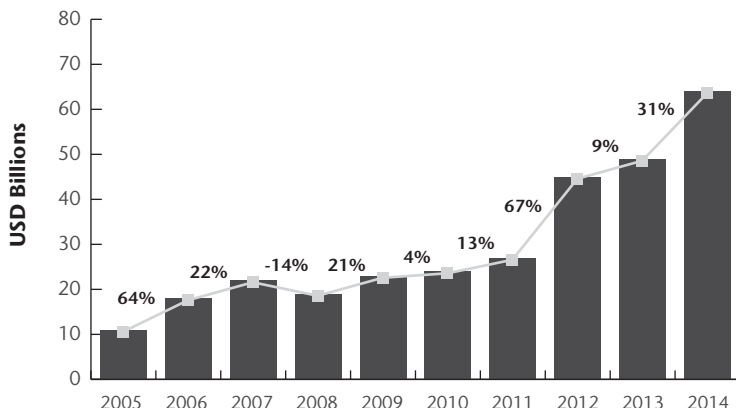
US Mortgage Credit Risk Sharing

The Great Recession, the global economic decline roughly spanning from 2007 to 2010, has the distinction of being the worst global recession since World War II according to the IMF. One significantly affected financial sector was the US housing market with many participants suffering material losses from mortgage defaults.

Subsequent to the crisis, the US mortgage industry has undergone material reforms and the macroeconomic environment has improved dramatically.

Starting in mid-2013, Freddie Mac and Fannie Mae, known collectively as government sponsored enterprises (GSEs) and now under US Government conservatorship, began sharing credit default risk on their recently acquired mortgages by accessing both the capital markets and the insurance industry with innovative risk sharing structures.

To date, the GSEs have issued more than USD 20 billion of credit linked notes. This risk sharing has been mandated by their regulator, the Federal Housing Finance Agency (FHFA). The FHFA has also dictated that the GSEs find multiple ways to share risk so as to not be reliant on a single type of risk sharing execution.

Starting in November of 2013, new insurance programs have come to the market with 12 deals and USD 2.2 billion of limit placed to date. These figures will grow and the transactions could create an annual opportunity to place more than USD 6 billion of limit with the potential to generate as much as USD 2 billion of premium.

A historical perspective on GSE credit risk transfer

The GSEs were created to provide liquidity and stability to the US housing market. Historically they have done this by purchasing portfolios of loans that are originated according to their underwriting standards and securitizing the cash flows into mortgage backed securities with the guaranty of timely payment of principal and interest to investors.

In 2008, the newly created FHFA placed Fannie Mae and Freddie Mac under conservatorship with the financial support of the US Treasury to ensure their continued viability as essential actors in the US housing market. As of 2015, both are still under conservatorship of the FHFA, which is being guided by The 2014 Strategic Plan for the Conservatorship

of Fannie Mae and Freddie Mac. As part of the Strategic Plan, the FHFA, has developed an annual scorecard for the GSEs, which measures their progress against three major goals.

- **Maintain**, in a safe and sound manner, foreclosure prevention activities and credit availability for new and refinanced mortgages to foster liquid, efficient, competitive, and resilient national housing finance markets.

- **Reduce** taxpayer risk through increasing the role of private capital in the mortgage market.

- **Build** a new single-family securitization infrastructure for use by the Enterprises and adaptable for use by other participants in the secondary mortgage market in the future.

Historically the GSEs retained all credit risk on the loans that they acquired with the exception of mortgage insurance they required mortgagors to purchase on loans with loan-to-value (LTV) ratios above 80 percent.

Starting in 2013, the GSEs expanded their ability to share the credit default risk on their loan portfolio beyond just mortgage insurance. First, Freddie Mac's Structured Agency Credit Risk (STACR®) and Fannie Mae's Connecticut Avenue Securities (CAS) credit linked note programs allowed for capital market transactions where investors could sustain loss of principal in the event of material credit default losses on subject loans. Next, Freddie Mac's Agency Credit Insurance Structure (ACIS®) and Fannie Mae's Credit Insurance Risk Transfer (CIRT™) programs allow the GSEs to purchase insurance against credit default loss on portions of their held portfolios of loans. Both programs for sharing credit default risk with third parties were put in place at the direction of the GSE conservator and not due to concern about underlying loan performance. Going forward, the GSEs are shifting from an approach that retains all of the credit default risk on acquired loans to an approach that distributes this risk via multiple vehicles to the private market.

Nationwide home price index since 1991

Fannie Mae average credit score by origination period
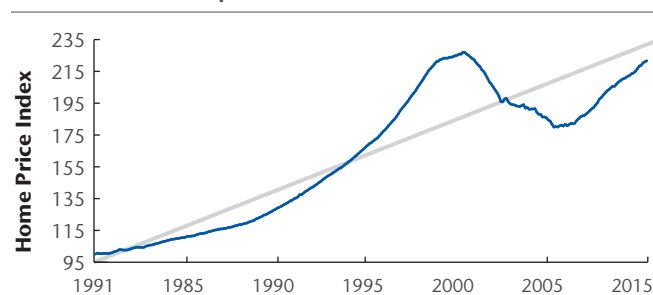
The current US mortgage environment

The US mortgage marketplace enjoys the benefit of both improved macroeconomic factors and historically high underwriting standards. Today's environment is drastically improved for at least four reasons.

1. **Improved home price environment:** average home prices have recovered from their lows in 2011 and are now approaching levels implied by long term steady home price growth.

2. **Improved unemployment rate:** unemployment stands just above 5 percent, which is its lowest level since 2008.

3. **More stringent income documentation and appraisal process:** the low or no documentation loans, which drove material loss through the Great Recession, have largely disappeared. Appraisals are now independent from the lenders and estimated values are heavily scrutinized, improving the information available and the performance of the collateral in the event of a default on the mortgage.

4. **Stronger underwriting standards:** general credit quality has improved with average credit scores on recently originated GSE loans around 750 compared to origination scores of around 700 on years 2006 and prior. In addition, the proportion of loans represented by scores less than 620 has been very small since 2009.

Despite recent news regarding loosened underwriting standards, the current underwriting environment is very strong relative to the past 15 years and, according to the Urban Institute's Housing Credit Availability Index, is over 2.5 times tighter than it was in the last normal period for US mortgage in the late 1990s and early 2000s.

Brand new opportunity for the insurance industry

This is the first opportunity that the insurance market has had to insure the broad US housing market. Historically, insurance opportunities were largely limited to first loss on high LTV mortgages that were supported by monoline mortgage guaranty insurance.

The insurance transactions completed to date cover loans recently acquired by GSEs that are 30-year, full documentation, fixed rate mortgages with high credit quality and nationwide geographical diversification. Every pool of loans subject to a transaction is known in advance and can be reviewed for underwriting quality before commencement of transaction. Coverage tends to be on an aggregate excess of loss basis and there are opportunities to participate on a first loss basis or at much more remote attachment levels.

Mortgage credit risk, while new to the insurance industry as an underwriting opportunity, has been studied extensively as an asset class. Both GSEs have publicly shared individual loan performance data to facilitate the exploration and modeling of the risk and, similar to natural catastrophe risk, there is an industry of modeling firms dedicated to quantifying the risk of mortgage credit default.

Aon Benfield is working with both GSEs to place these credit risk transfer transactions in the insurance marketplace. They represent a unique opportunity for growth and a way to put insurance capital to work in a new, but well understood and well modeled, risk class. For more information on accessing the mortgage credit risk opportunity, please contact your Aon Benfield broker or the mortgage contact listed on the last page.

Global
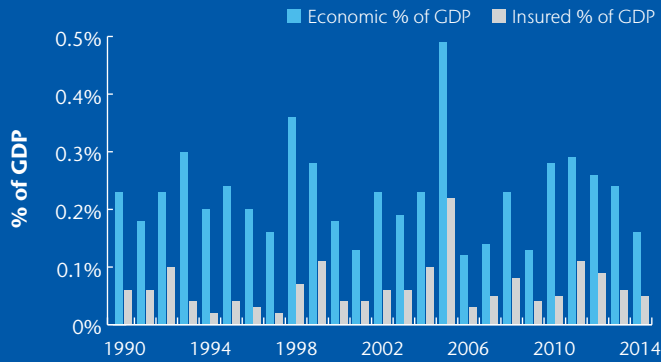
EMEA
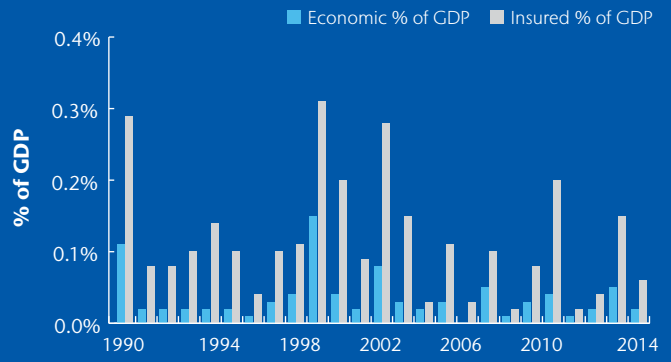
US
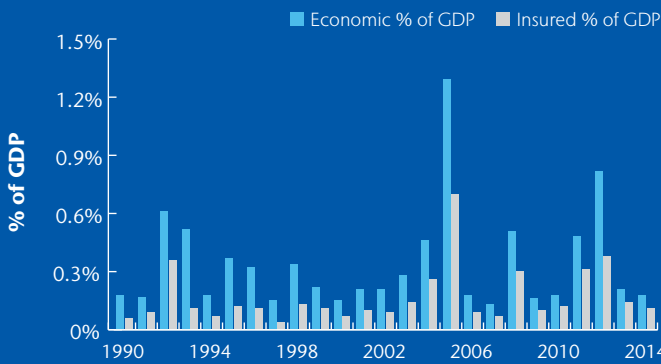
APAC
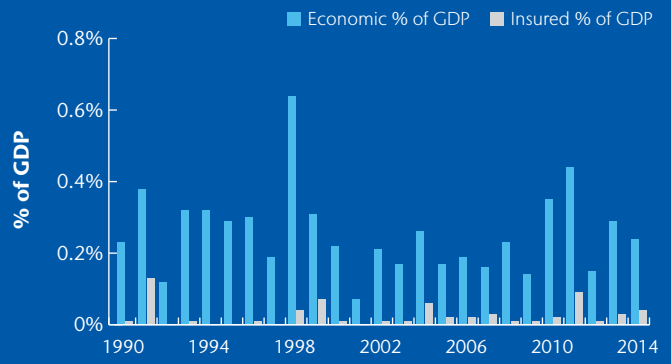
7.3%
global economic weather
loss trend

1.1%
economic weather
loss-to-GDP trend

85%
of increase in weather losses due to
economic activity and urbanization

Trend numbers are 1980 – 2014.

Impact of Weather Events on the Economy

We believe that property catastrophe losses will continue to dominate the headlines, driving the largest individual insurance losses in every region. While other perils have the potential to cause larger losses, none act with a frequency even close to that observed in property. The private insurance market will continue to expand its offerings, absorbing more losses currently insured by governments. The growth of insurance capital over the last ten years has offset the increased exposure caused by urbanization and population growth in exposed coastal areas. We expect these trends to continue for another decade.

Section 4

Data & Analytics
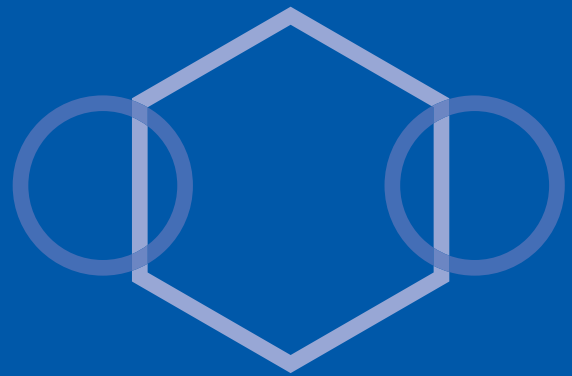
Data and Analytics for Risk Assessment

The importance of underwriting expertise, data, and analytics in facilitating an insurance market transaction by intermediating between demand from the risk owner and supply represented by capital cannot be overstated. We have already discussed its profound impact on the property market. Risk assessment talent has become the scarcest resource in the market today. One reason for its scarcity is the difficulty of keeping current with the huge increase in data and the rapid development of analytic tools we have seen recently.

The impact of Big Data and improved analytic methods

Big data and improved analytic techniques are having a profound impact across personal lines and smaller commercial business. Their impact is felt in at least two ways. First, traditional approaches to pricing are no longer adequate. Companies must master the art of true multivariate pricing. Second, the search is on for new predictive variables to include in pricing algorithms—a search Aon's predictive data streams iniative addresses.

Big data captures behavioral characteristics in a way not previously possible. Understanding risk behavior using a lens focused on behavior in adjacent areas, such as credit, has been incredibly fruitful. But we have only begun to scratch the surface of available data items. We can look for new predictive variables in the "digital exhaust" we all leave behind as we navigate our day-to-day lives—through information about our location and travel patterns, our shopping habits, and indicators of our interests and personality. We can also capture more directly relevant data through risk-monitoring quid pro quos, such as home telematics, and the Internet of Things. Aon Benfield's predictive data streams initiative is actively working with a number of different big data providers to help source these new types of variable to provide underwriting or pricing lift for our clients.

Competing against Silicon Valley

In their book "How Google Works", ex-CEO Eric Schmidt and former SVP of products Jonathan Rosenberg describe how today's big data world combines three self-reinforcing trends that together enable many of the new innovations coming out of Silicon Valley.

1. The combination of **cheap, or even free, data with free distribution across the Internet**. Apps have a zero marginal cost of production. Today's data is real-time and user-generated, and offers the potential for new customer insights. Data platform owners are king, and their platforms enable new products to grow at truly unprecedented rates.

2. Mobile connectivity that allows **location awareness**. Products and services can now be offered and delivered to customers at the exact point in time they are needed, based on an understanding of where the customer is, and what they are likely to be doing.

3. **Cheap and scalable cloud computing** provides the necessary horsepower to analyze torrents of data in near real-time.

Schmidt and Rosenberg say the implication of these three trends is that product excellence has become paramount. In the past control of information, a stranglehold on distribution, overwhelming existing market power, or even vested interest, have erected walls against competitors. Today these walls are crumbling on all fronts. Data that used to be difficult and expensive to collect can now be pulled up in seconds on a smartphone. Customers feel confident to bypass traditional distribution and access new providers directly because they can access and review thousands of independent consumer-written reviews. Bad reviews can go "viral", spiraling out of control and causing irreparable brand damage in a matter of days. Changing technology can make existing players, often with market power accumulated over decades, irrelevant in years or even months—an effect seen over many sectors of the economy including entertainment, transportation, and education.

Silicon Valley technology startups can compete with a bold mindset around legal and regulatory compliance. Often they have no existing revenue or franchise value, and so they are more willing to take big risks in order to secure first mover, network-effect, advantages. They look to establish a clearly better service than incumbents, and then work to mobilize public opinion to get the rules changed. The insurance industry needs to be prepared to compete against startups that approach regulation in an entirely alien way—while remaining strictly compliant ourselves. For these reasons the question of whether the old value chain will be able to produce new ideas is one that must be addressed.

Can the old value chain produce new ideas?

Discussions of organic growth within insurance tend to focus on stealing share from competitors, because traditional, existing risk lines have not been growing in developed economies— as we saw in Section 2, Existing Risks. The industry has also looked for growth in emerging markets and emerging risks.

Emerging markets, with strong underlying GDP-led demand growth do provide good prospects, and we rank the top 50 markets as well as provide growth and profitability winners and losers for motor, property and liability in Section 6. However, in emerging markets competition is often fierce. China, by far the world's strongest growing economy over the last ten years, is dominated by domestic companies, who together have over a 98 percent market share.

Emerging risks represent the best opportunity for green-field growth. The industry needs to engage more vigorously with new data and modeling techniques, and new capital providers to offer relevant products to risk owners. Companies need to look beyond existing customer bases to find risk owners who are currently uninsured—finding that no products in the market offer a compelling value. Niche lines have continued to be successful for many carriers, but for larger insurers they do not provide sufficient scale to generate material growth. Rather than decomposing the market further, the winners of tomorrow will understand how to quote all risk and be able to offer mass-customized pricing across a very broad risk appetite.

In the following pages we look at the insurance opportunities behind several specific risks: providing relevant limits to tackle large corporate liabilities, new developments in modeling terrorism, and reputation and brand covers. We find data and analytics play an important role bringing these opportunities to life.

We begin, however, with the sobering story of motor insurance in the UK since 1985. It is a story showing how quickly new companies can establish significant market shares in a dynamic market, and also showing that established brands can compete effectively. The old value chain can produce new ideas, but to do so it must learn to think in new ways and leverage the new tools and capabilities technology has made available.

Real time data

enables insurers to become **more relevant in their customers' lives.**

The UK Motor Market: Could it Happen in your Country?

The UK motor market has seen very considerable disruption and change over the last 30 years. The market's low-touch regulation of rate and product form has allowed for greater innovation and change than in many other more regulated and protected markets around the world. Today two of the top four writers of UK motor insurance are companies founded since 1985. In contrast, in the US all of the top 10 writers were founded before 1940. In most of Continental Europe there are also no new companies in the top 10. In these markets there have, of course, been many apparent changes from mergers and acquisitions activity.

Since 1985 the UK market has evolved through five different and distinct periods, each of which has potential lessons for other countries. What has been called the "telephone revolution" began in 1985 with the founding of Direct Line. Over the next ten years the market moved from being virtually 100 percent face-to-face business, conducted through high street agents and brokers, to over 80 percent transacted by phone.

The next evolution began in the late 1990s, with the emergence of new brands in insurance. Non-insurance brands, with daily or weekly customer interactions, leveraged their trusted position with customers to sell insurance products—led most notably by Tesco's and Sainsbury's, two grocery store chains.

In the early 2000s, business began to shift from phone to the Internet. Price comparison websites allowed customers to compare different offerings very easily. In what was already becoming a commodity product, the initial price point became even more important to win new business. If an insurer wasn't near the top of the list on price for any given customer, they were unlikely to win their business. This commoditization of motor insurance allowed smaller niche brands to compete against traditional scale players with stronger brands. Being efficient and operating online, with a low initial price point, became essential for success. As a result, the industry was driven into vicious price competition.

At the same time legislative changes in the UK, which were intended to make it easier for consumers to get access to justice, increased the ability of third party organizations, such as personal injury lawyers, to profit from claims. The details of potential claimants, especially for injuries that were difficult to prove or disprove such as whiplash, became highly valuable as potential leads, leading to the emergence of the phenomenon of "claims farming".

These trends meant that there was significant pressure on insurer's top and bottom lines. The more agile insurers who managed these trends well profited, but many insurers found trading conditions increasingly difficult. Indeed the Association of British Insurers reports that the last time the motor insurance industry made an underwriting profit as a whole was in 1993. As a result of the poor profitability, insurers had to look for new ways to generate income, which even included "claims farming" where their own policyholder was not at fault, as well as aggressive cross-selling of ancillary products. These trends also led to an efficiency and effectiveness drive from personal lines insurers, reinforcing the value of the low-cost online business models that had developed. By 2011 online sales represented over half the market, with even more people researching online before completing the transaction by telephone.

In the cut-throat new world, those customers who were most likely to be involved in an accident involving an injury claim, and who were least likely to purchase additional ancillary products, appeared increasingly unattractive to insurers. In particular, young drivers presented a significant profitability challenge and so very few insurers wanted to write them, leading to sharply rising prices. Often for new teenage drivers, the premiums escalated to an annual level as high as the value of the vehicle itself.

A consumer backlash against the perceived low value of some add-on products, the practices employed to sell them, such as the auto-selection of ancillary products, and the huge variance in pricing for some cohorts that effectively priced them out of driving, led to a period of regulatory investigations and market reform.

Insurers responded to the challenge and looked towards data as a means to identify, price, and manage risk. Telematics and new big data oriented pricing variables have been introduced in order to achieve more accurate underwriting and more targeted segmentation of products. Interestingly, despite its greater flexibility and innovation in many areas, the use of credit

Founding date of top ten motor writers: UK and US

UK   US

#2 Aviva 1696
#9 RSA 1710
#7 AXA 1720
#3 Ageas 1824
#5 LV= 1843
#6 Great Lakes Re 1880
#10 Allianz 1890
#1 Direct Line 1985
#4 Admiral 1993
#8 Esure 2000

#9 Travelers 1853
#5 Liberty Mutual 1912
#1 State Farm 1922
#6 USAA 1922
#8 Nationwide 1926
#10 American Family 1927
#7 Farmers 1928
#3 Allstate 1931
#2 GEICO 1936
#4 Progressive 1937

1600   1700   1800   1900   2000
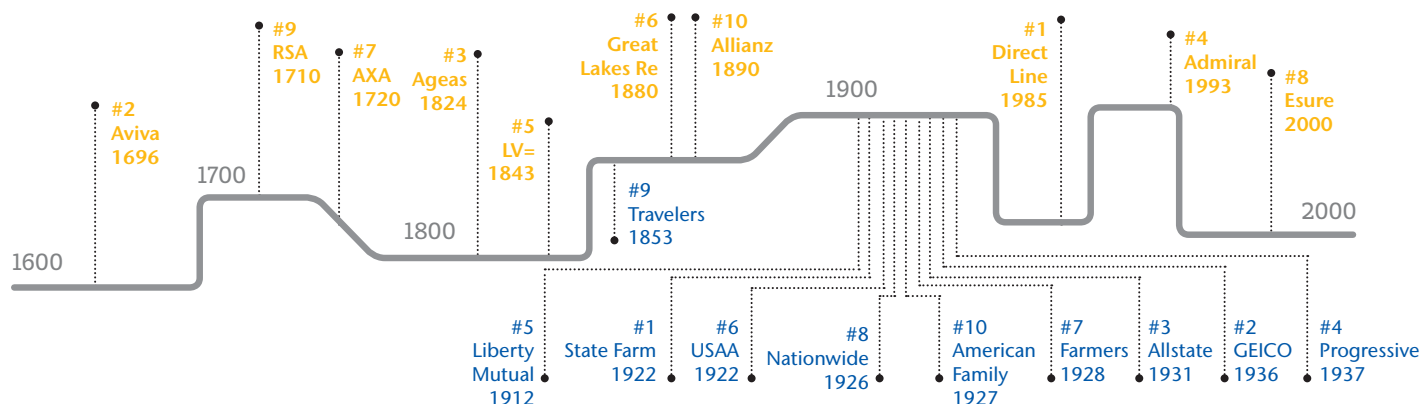
scoring for underwriting is a relatively new innovation in the UK, introduced in the past few years. And UK product design means that multi-car discounts for vehicles in a single household have only recently appeared, despite having been a staple in many other countries for several decades.

By 2015 the UK motor market is split roughly 40 percent phone and 60 percent online, although a far higher proportion of buyers will research online before completing the transaction by phone. Traditional face-to-face broking has almost entirely disappeared from the market. By contrast, in the US independent agency business still represents 31 percent of the personal auto market, down from 33 percent 20 years ago. Direct marketing has increased from 8 percent to 19 percent, mostly at the expense of the exclusive agency channel. And in Japan, online and phone sales make up less than 4 percent of the market.

The speed of change in the UK market proves that the insurance industry is capable of moving quickly – and that similar change could occur in other countries given a suitably flexible regulatory environment. These disruptions show that we do not have to wait for self-driving cars, driver aids such as automatic emergency braking, or changes in ownership trends of vehicles to see potentially significant changes in personal auto, a market that accounts for 47 percent of global property casualty premium.

A similar story played out in China. In 1980 there were only 7,922 insured vehicles nationwide—most were state owned—out of a nationwide fleet of 1.8 million. PICC was the monopolistic

carrier. Market competition was ushered in with the founding of Ping An in 1988. A third competitor, CPIC, was founded in 1991. Between 1988 and 2007 car dealers acted as the main distribution channel, leveraging their position to achieve commission rates of more than 30 percent. Change began in 2007 when Ping An introduced telesales into the motor market, greatly expandeding market share, as lower acquisition expenses created more competitive pricing. Other companies quickly followed their example. In 2010 Taobao, the biggest online shopping website in China, established a channel selling insurance. Though small today, Internet sales have an annual growth rate of more than 100 percent since their inception. By 2015 direct channels account for 35 percent of the market, a market now consisting of 264 million vehicles, including 154 million cars. The next chapter for China is detariffication, which is expected to begin in mid-2015, after several false starts.

Although we started this article by stating that two of the top four UK motor insurers today were formed since 1985, we should also remember that the lineage of many other top 10 businesses goes back hundreds of years. However, all of these companies have seen significant changes through merger and acquisition over the last two decades. UK auto insurance, while possibly not the most attractive market in the world, is certainly a good case study for lessons that could be applied— or imposed—elsewhere. Established auto insurers can continue to lead their markets, but they must think ahead and plan for potential changes in distribution, product, and pricing to avoid the possibility of becoming obsolete in an increasingly dynamic market environment.

Corporate Liability Giga Loss

How many corporate liability settlements in excess of USD 2 billion or USD 10 billion do we expect to see each year? The answers: 2.5 and 0.5 respectively. In fact, a simple rule of thumb fits the data very well for losses above USD 1 billion, or "giga losses". Just divide the loss level in billions into 5.0. The chart below shows how the model compares to history over the last 26 years.

Since 1989 we estimate there have been 86 giga loss settlements, or 3.3 per year. Applying trend, 57 of those were in excess of USD 2 billion, compared to the rule of thumb estimate 65, and 13 were more than USD 10 billion, exactly equal to the model estimate.

What does the model say about the frequency of a USD 100 billion event? 5 percent. To put that in context, the return period for a US wind event of similar size is just 2 percent. And remember, US asbestos losses for the entire insurance industry are estimated at only USD 85 billion. Until recently, the idea of a single accidental corporate event causing such a loss would have been considered incredible. Then Deepwater Horizon and Fukushima become everyday words, each dominating the headlines for weeks. Also remember: potential future cyber losses are not in the loss history!

These statistics contain good and bad news for the insurance industry.

The good news is that many of the losses were not covered by insurance. About half were driven by regulatory actions, were financially-driven, or resulted from general business practices, all unlikely to be commonly insured.

The bad news is that many of the losses were not covered by insurance. The remaining half of the losses result from directors and officers liability, environmental, products, premises and operations liability, and similar causes that are all potentially insurable. As is often quoted in the press, the industry has "lost relevance" in the giga loss liability space.

A second piece of bad news for the industry is that these individual events often cluster, with potentially multiple claims from a single event. In fact, the 86 losses arose from only 45 individual events, or about 1.9 losses per event. The Deepwater Horizon disaster resulted in eight USD 1 billion losses, and cigarette litigation in seven. On the other hand, 27 events saw only one loss, but there could have been several related events under USD 1 billion.

Model vs. actual liability giga losses
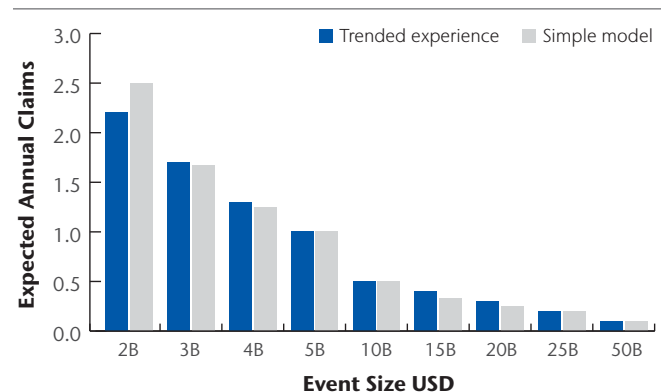
Liability giga losses present a data and analytics challenge. We need to think about systemic risks and unexpected linkages, such as the business interruption implications of the concentration of property devastated by the Thailand floods, or the impact of the Tohoku earthquake on car manufacturers—where it is estimated that more than four million units of vehicle production were lost globally because of the concentration of critical suppliers to the supply chain in the affected region. Developments in data and analytics make these modeling challenges more tractable today than they have been in the past.

Liability giga losses also present an obvious capacity and volatility challenge to the insurance industry. But property catastrophe reinsurance shows the industry is willing to deploy material, "relevant" limits for single reinsured entities. The largest catastrophe programs in the world today are nearing USD 10 billion in capacity. If we work the design challenge for a liability giga loss cover backwards we can ask: what is the bogey price for a relevant cover? At what level of pricing will a cover that attaches in excess of an insured's individual, or an insured's industry's, largest known loss be attractive to corporate buyers? We can then ask whether the same pricing would be attractive to capital providers.

Let's consider the energy sector as a specific example. The 92 companies in the energy sector of the S&P1500 hold nearly USD 1 trillion in equity on their balance sheets and over USD 400 billion of debt. The group has a weighted average cost of equity of 10.7 percent and a weighted average cost of capital of 8.6 percent. They have an average debt to total capital ratio of 29.1 percent. And their weighed average after-tax debt spread above government bonds is 2.0 percent, with an interquartile range of 1.9 percent to 2.4 percent, based on Bloomberg's methodology.

From the buyer's perspective, liability giga loss covers replace equity, and need to cost less than their equity risk premium to be attractive. A cost of equity of 10.7 percent corresponds to an equity risk premium of 7 to 8 percent above the risk free rate. From the seller's perspective, the cover's risk return characteristics are similar to a bond, and those characteristics will drive pricing. This is the same dynamic we see for cat bonds in the excess property catastrophe reinsurance market. These two points of view indicate there is a wide range of pricing that could make sense to buyers: between a 2 percent after-tax, or 3 percent pre-tax, spread based on the cost of debt up to a 7 to 8 percent pre-tax spread based on the equity risk premium. A substantial amount of catastrophe limit is purchased at a rate on line of three or less in the market and the average rate on line for all catastrophe programs is between 7 and 8 percent—so pricing in this range is consistent with what we see in the market today for the purchase of substantial limit.

At these levels of pricing the cover is potentially very attractive to energy companies. Its competitive advantage is primarily from accessing cheaper capital. But relative to holding more debt, on either a pre-event contingency basis or post-event funding basis, it has the attraction of not impacting debt to total capital ratios, not consuming valuable collateral, and, of course, not needing to be repaid. And it has a clear cost advantage over holding more equity.

Record breaking energy related events

Year	Event
1967	Torrey Canyon tanker disaster
1978	Amoco Cadiz tanker disaster
1988	Piper Alpha explosion
1989	Exxon Valdez tanker disaster
2010	Deepwater Horizon oil spill

Until recently, the idea of a single accidental corporate event causing a loss over USD 25 billion would have been considered incredible.

Would this range of pricing possibly be attractive to capital providers? Over the last fifty years there have been five energy related events contending for the record greatest nominal loss.

As we have seen, the average giga loss event spawns 1.9 individual claims. An energy sector cover attaching "out of the money" of historical experience would potentially have been hit about 0.2 times per year, or, conservatively assuming a full limit loss, would produce a nominal loss on line of 20 percent. However, any resulting settlements would take many years to pay out. A ten-year payout discounted at 4 percent would give a present value loss on line of only 13 percent for the sector, for example.

If we assume that giga losses are driven by the ten largest companies in the energy sector, then this analysis indicates each individual company has a loss on line of around 2.0 percent, or 1.3 percent on a present value basis. If the cover was priced at the lowest end of our pricing range, a 3 percent rate on line, then it would generate a 66 percent nominal loss ratio and a 44 percent present value loss ratio. At higher rates on line, which would still be attractive to buyers, the results would be even more attractive to insurers. In order to build a market with scale and a good spread of risk, pricing would need to be enough below the cost of equity to present a compelling purchase. Our calculations indicate the economics of a giga liability cover are positive enough to warrant further analysis from both buyers and sellers.

Assessing Terrorism Exposure

Large scale terrorist attacks can have a devastating impact on the insurance market and cause wide scale economic losses. Gathering a scientific understanding of potential damage from a terrorist attack is a well-developed field within military science; however, this understanding has not been replicated within the insurance sector. Traditionally, terrorism scenario models rely on a circular approach with a 250 meter radius and a 100 percent loss level—assumptions that do not realistically represent a city environment. Traditional scenario modeling does not utilize the full knowledge of the scientific community, and results in scenarios that are not scientifically reliable for use in an urban environment, where they are mostly used.

In order to address these shortcomings, Impact Forecasting, Aon Benfield's catastrophe modeling center of excellence, has introduced Computational Fluid Dynamics (CFD) blast modeling to catastrophe modeling in order to give terrorism scenario models more scientific realism and nuance. The new CFD approach breaks from traditional blast radius modeling by taking into account a number of factors that are absent in current blast analysis, but that are known to have a substantial impact on losses. For example:

- Does a structure deflect the blast away from an insured building, shielding it from damage?

- What if an insured location is on the 16th floor and damage is only on lower floors?

- Is the blast channeled down a street to hit a target further afield?

All of these factors have a material impact on the damage that can accrue. CFD analysis looks at how the blast will react within the three dimensional environment in which it takes place, and importantly, this environment is different for every location. Moving the blast location 100 meters will result in a different blast footprint and different losses. This is the scientific realism and nuance that CFD analysis brings to terrorism scenario modeling.

The two images below illustrate the differences between the CFD analysis and the traditional 250m approach by applying both techniques to the Rockefeller Center in New York City. The cylindrical shape on the left shows the footprint for the 250m approach. Comparing this to the nuanced damage gradation that can be seen in the image to the right helps to highlight the potential benefits of a more scientifically robust CFD approach. The right hand image reflects the constraining impact of building height, urban density, and construction type. This information is completely lost in the 250m approach, but brought to the forefront in Aon's CFD modeling software.

As insurers look to grow their terrorism books of business, CFD will help them manage risk more strategically, providing important insight for underwriters, reinsurance buyers, and exposure managers. Aon Benfield can now apply CFD analysis to any city in the world upon client request, quantifying the effect of location and blast size uncertainties to highlight the variation of the possible impacts.

Traditional modeling
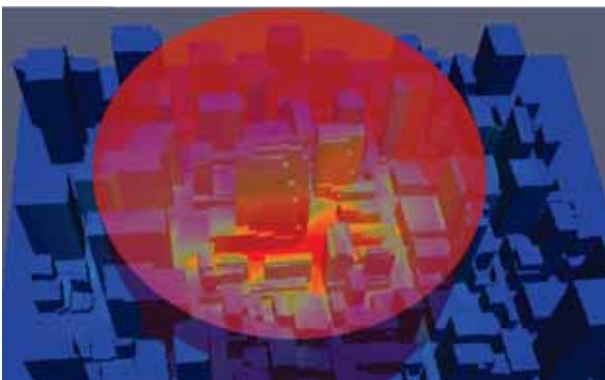
CFD modeling
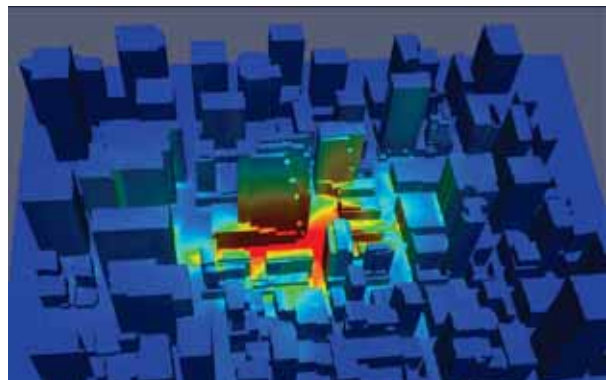
Reputation and Brand Risk

Damage to reputation or brand is the number one risk facing companies, according to Aon's 2015 Global Risk Management Survey. Brands represent some of the most valuable assets in the world, engendering loyalty from consumers and commanding a premium in the market. Many of the other risks that companies face can turn into a brand problem if not managed well—for example, failure to retain key talent, failure to innovate, business interruption, a large lawsuit, or a public data breach. In addition, 24-hour news and pervasive social media mean that a poor choice of words by one employee, or a complaint from an unhappy customer, can escalate to have global repercussions. Reputation and brand's number one position in the survey reflects all these realities. What are the corresponding insurance opportunities?

Likelihood of reputation damage
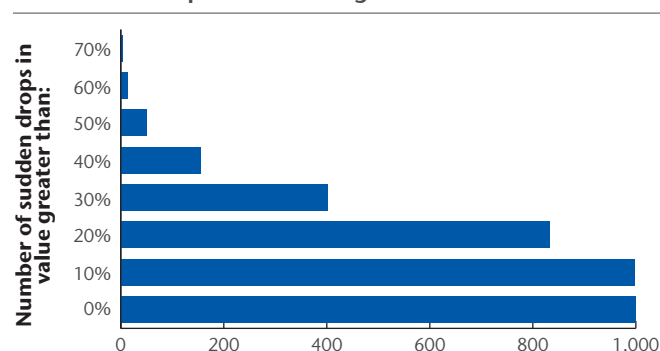
Source: Oxford Metrica, Aon

An Oxford Metrica study, sponsored by Aon, found there is an 80 percent chance of a company losing at least 20 percent of its market value, over and above the market change, during a five-year period. The majority of these negative shifts were driven by a failure to adapt to changes in the business environment, customer mismanagement, and poor investor relations. And in more than 70 percent of these cases, the exposures could not be hedged away via financial market or traditional insurance products.

Despite the difficulties, though, brand risk is something a company can manage. With innovative product design around loss trigger and loss amount, brand risk can be insured. These are major design challenges for the insurance industry but the potential size of the prize makes the investment worthwhile.

In today's market, reputation and brand insurance typically means cost-reimbursement and services, rather than true indemnification for the value loss to the brand, which is harder to quantify. Policies exist to provide services such as public relations management, social media campaigns, and monitoring.

Some cyber insurance policies also include reimbursement for brand expenses in their coverage. So far, the take-up of these policies is quite low, suggesting that the "content" or creativity of the industry has not yet brought demand and supply together in a compelling way. What would change this?

One solution would be to revisit the notion of providing direct indemnification for brand damage. Recently one company has begun offering this kind of product for farmers and fishermen. The loss trigger is a specified number of negative comments—for example, about rotten or polluted fish—in conjunction with a mentioned brand name on an Internet message board. Loss adjusters monitor the message boards to validate the claims. Reputational risk was a serious problem in the areas affected by recent catastrophes and some farmers went out of business. We believe this represents an interesting product innovation in a challenging area of the market, and we are interested to work with clients to develop other creative solutions, possibly leveraging reinsurance capital, to address businesses' deep concerns about reputational and brand risk.

There is an
80% chance
of a company losing at least
20% of its market value
during a five-year period

Population (billions)

● World population ● Urban population

1990: 5.3B
2015: 7.3B
2040: 9.0B
1990: 2.3B
2015: 4.0B
2040: 5.7B
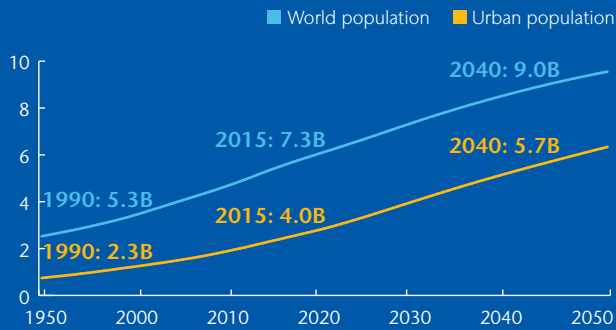
Connectivity: Number of global internet users (billions)
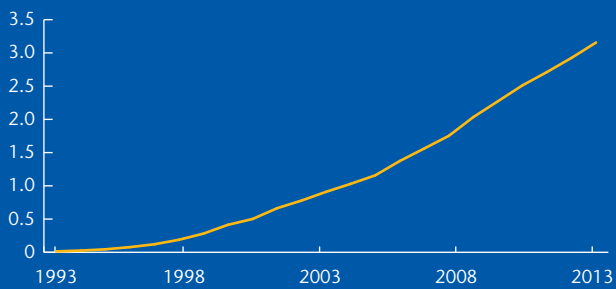
Number of devices connected to the internet (billions)

0.1   0.5   8.7   18.2   50.1
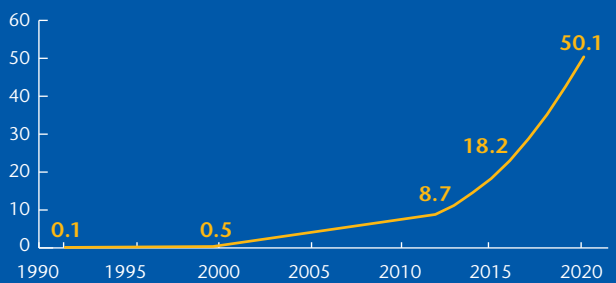
Global population

will hit

9 billion

in 2040

2007

was the first time that more than half the world population

lived in cities

66 million

new city dwellers per year through

2030

In 2014 there were

3 billion internet users

An estimated

50 billion devices

will be connected to the internet

by 2020

The number of internet users

grew 10x

from 1999 to 2013

Signs of the times

As the world population grows, it is becoming both more urban and more connected. A growing urban population will serve as a catalyst for commerce and wealth. It will also increase the concentration of property exposures, particularly in coastal areas, and stimulate demand for business insurance. The connected world will continue to expand, driven by growth in the internet of things and by mobile connectivity. Cyber risk and the need for cyber insurance will grow significantly as well.

Section 5

Perspectives
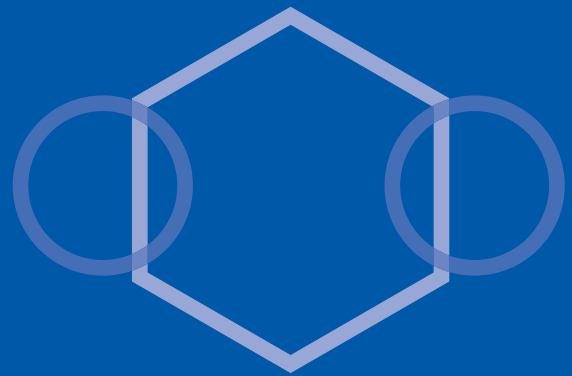
Why Buy Insurance?

It is said insurance is a product that is sold, not bought—an adage that applies to life insurance. Property casualty insurers often leverage a greater motivator: the law. Motor liability insurance, the largest single line globally, is almost universally mandatory for vehicle owners. Property insurance is generally required by lien holders in order to protect their collateral. Employers are required to demonstrate the ability to compensate employees injured at work, making workers compensation-like covers very common, particularly for smaller employers with limited financial flexibility. And contracting parties often demand some level of liability insurance.

We estimate that the question of "to buy or not to buy" is simply moot for at least 60 percent of global premium: in one way or another, the risk owner is compelled to buy insurance. But what about the remaining 40 percent? Achieving growth in the discretionary part of the insurance market will be key to achieving solid growth over the coming decade.

About 25 percent of personal lines insurance spend is discretionary, mainly homeowners and motor physical damage insurance purchased on homes and cars owned free and clear. A wide range of other ancillary products are sold to individuals, including various extended warranty protections, pet insurance, travel insurance, identity theft, and even wedding insurance. Successful products must strike an emotional chord as well as offer a compelling value. The industry needs to begin experimenting with products aimed at Generations X and Y, separating liability covers from property ownership for the sharing economy, for example, and simplifying product offerings to make more sense to consumers.

The greater discretionary insurance opportunity comes in commercial lines, though, where we estimate around 50 percent of premium is discretionary. Insurance competes with a range of realistic alternatives, especially for financially sophisticated corporations. These alternatives include captives, risk retention groups, and self-insurance. Why do corporations choose to buy insurance? Financial theory tells us that there is no compensation in the market for bearing idiosyncratic, diversifiable risks. Most insurance covers diversifiable risk, so there is a question to be answered. There are at least three market-based rationales why insurance makes sense for corporations—even publicly traded ones—and one non-market motivation.

Risk management services reduce loss costs

The first rationale is that risk assessment and risk management services bundled with insurance result in lower loss costs—in a sense, insurance pays for itself. These services can be explicit risk management activities, or they can be implicit, through the underwriting process. We have already discussed how the industry has been a leader in promoting safety in the home, the workplace, on the roads, and through product design. In commercial insurance, bespoke risk assessment and risk management services are often even more effective. Explicit risk engineering studies during the design phase of a building, workflow ergonomic studies, best practice processes and procedures for doctors, lawyers, and human resources professionals are just a few examples of the numerous services offered to risk owners, all of which aim to reduce costs through loss prevention and loss mitigation. This type of advice is often bundled with an insurance product, to help credentialize it.

Successful products must strike an **emotional chord** as well as offer a **compelling value**

Claims handling

The second rationale concerns claims handling. Very few non-insurance entities are in the business of defending against lawsuits or settling transactionally intensive, specialized, workers compensation claims. An insurance policy provides an easy way to pre-purchase expert claims handling services at a fixed cost. Again, bundling with an insurance policy ensures a correct alignment of interest to protect the risk owner.

Risk financing

The third rationale is related to risk financing. As Yogi Berra observed, "In theory there is no difference between theory and practice; in practice there is." In theory capital markets should efficiently allocate risk, and the particular capital structure of a firm should not impact its value. But in practice different capital providers do have different risk appetites and preferences for or aversions to particular risks. A venture capitalist, for example, probably does not want to be exposed to natural catastrophe risk. Another good example is the difference between the energy business—oil and gas exploration, extraction, refining and distribution—and the power business—the generation of electricity and its distribution to customers. Energy is a high risk business. The dangers of exploration and extraction are well known, and often in the headlines. Energy companies are equity-heavy, produce volatile returns, and purchase relatively little insurance–although as we discussed in the previous section greater liability limits could be available to them at economic rates. Power companies produce clockwork returns, albeit with seasonal variation, use a lot of debt financing, and purchase insurance far more conservatively. Property catastrophe reinsurance is another example of risk finding the cheapest bearer. Insurance adds value by channeling risk to the capital most suited to bear it.

Non-market motivations

There are also non-market motivations to purchase insurance, mostly around regulation. Here we are not talking about explicit mandates, like auto liability, but instead regulations that function to make the cost of a risk explicit, often through the imposition of a capital charge. Today we see several examples of dislocations caused by inconsistent regulations that allow risk owners effectively to ignore the costs of some of the risks they bear. The most obvious example in the US occurs when applying for a mortgage: lenders require homeowners to buy wind and fire insurance but not earthquake insurance. As a result, hurricane insurance ends up subsidizing earthquake insurance, and states are unwittingly bearing significant earthquake risk with woefully inadequate insurance protection. Once the cost of risk—a cost that is all too easy to ignore—has been made explicit, the calculus for insurance to demonstrate its value is far more transparent.

As we design new insurance products, we should always consider why insurance is a better solution for the risk owner than self-insurance. The trading of raw risk based on different opinions about price may work well in the financial market, where positions can be taken on both sides and where transaction costs are low, but it generally does not work well in insurance.

Growth Outside Traditional Insurance

"Every major industry was once a growth industry."

Theodore Levitt, 1960

Theodore Levitt, the famous Harvard Business School professor, took the view that industry is a customer-satisfying process, not a goods-producing process. He maintained that industry begins and ends with the customer and his needs, "not with a patent, a raw material, or a selling skill." He went on: "A company must learn to think of itself not as producing goods or services but as buying customers, as doing the things that will make people want to do business with it." Does the insurance industry think of itself as doing things that make people want to do business with it?

At one level, clearly not. Insurers lag behind most other industries in both the quantity of customer interactions, which are often monthly or semi-annually compared to daily or weekly for other financial institutions, and their quality, which one digital satisfaction survey ranked 14th of 16 categories—below even government services.

In other respects, although almost 60 percent of insurance premium customers have no choice but to buy some insurance, there is still very aggressive competition for them—for example in competitive personal auto in markets like the UK and US. But property casualty insurers have tended to operate just as insurers, perhaps adding life or health products, and perhaps operating in combination with a bank, particularly in Continental Europe.

When faced with disruption or slow growth in their primary market, other businesses have sought to reinvent themselves. The classic example is the Timken Company, a manufacturer of buggy whips in the 1800s that is still in business today as a bearing supplier. A newer, but more famous, example is Apple's re-branding from Apple Computer to Apple Inc. in 2007. Netflix becoming an online supplier is a third. Are there comparable opportunities for insurers outside of traditional risk transfer products?

One opportunity we have discussed at length is to more fully embrace the risk transfer products for emerging risks to offset slow growth in existing risk products. We have pointed to cyber risk, reputation and brand covers, microinsurance and corporate liability as specific examples, as well as the needs of the sharing economy. We could also have discussed enhancements to existing coverages, some have been available in the past or in other countries—for example, flood insurance for homeowners, or larger limits for tougher pharmaceutical product risks.

Another opportunity is to extend insurers' brand from risk transfer to broader risk management. Why not offer a broader suite of risk monitoring, measuring, mitigation, and feedback solutions to customers? Insurers sell security and peace of mind to their insureds and their families, but so do other providers in non-insurance contexts. Insurers should consider expanding more aggressively into adjacent domains such as home security and fire reporting. The range of related capabilities here, enabled by a home wired to the Internet of Things, will provide enormous opportunities over the coming decade. One home security firm estimates that this market will grow to more than USD 70 billion by 2020 in the US alone.

1. Existing risk

**The shrinking risk
transfer market**

2. Grow emerging risk

- US mortgage credit
- Cyber
- Reputation and brand
- Microinsurance
- Corporate liability
- Sharing economy
- Terrorism

3. Expand in adjacent products & services

- Risk design
- Risk feedback
- Behavior coaching
- Security

Other adjacent domains include identity theft monitoring and services relying on credit assessment. Perhaps an insurance company will become the 21st century "Underwriters Laboratories" of cyber risk. Motor telematics opens the possibility of monitoring, education, and risk feedback services, for example, reporting on the driving habits of teenage children. In many of these areas the ideal customer is someone already regarded as a good insurance customer— someone exercising prudence, planning, and displaying responsibility—traits insurers are good at detecting.

Expanding into these adjacent services would have the added benefit of engaging the insurance company more fully in its insureds' lives, leading to frequent—daily or weekly—interactions across a range of important domains for the customer.

We believe the winners of tomorrow will be those firms that successfully meet customer needs in a broadly defined risk management, monitoring, and prevention market where traditional insurance will be only one part.

27 countries
with combined ratio below
95 percent

13 countries
with growth above
10 percent

Top 3
in country opportunity index
Indonesia, Malaysia, Singapore

47 percent
of global premium from
motor

Nigeria
lowest 5 year combined ratio
85 percent

4.2 percent
motor 5 year
growth rate

Romania
highest 5 year
combined ratio

23 percent
China motor
growth rate

34 percent
average
property volatility

14 percent
average
motor volatility

Section 6

Global Risk,
Profitability, and
Growth Metrics
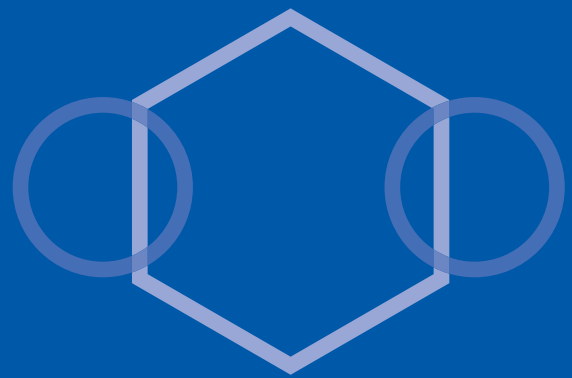
Global Premium, Capital, Profitability, and Opportunity

Globally, property casualty business again produced an underwriting profit in 2014 with a combined ratio of 97 percent, an improvement over last year's 99 percent combined ratio. The Americas averaged a 96 percent combined ratio, while Europe averaged 97 percent and Asia Pacific was highest at 99 percent.

In 27 of the top 50 markets, combined ratios were below 95 percent, and 6 countries were below 90 percent, compared to 21 and 10 countries last year. Furthermore, 13 countries showed five-year premium growth in excess of 10 percent, again led by very strong growth in China. The overall global combined ratio result, and the variation in results by country, demonstrate there are many desirable areas for profitable growth in the market today.

At year-end 2014, global insurance premium stands at an all-time high of USD 5.0 trillion, an increase of 3 percent over the prior year. Property-casualty premium increased 3 percent, life and health premiums by 3 percent, while reinsurance premiums decreased by 3 percent.

Global insurance premium and capital, USD trillions

	Premium	Capital
Property & Casualty	1.4	1.3
Life & Health	3.4	2.3
Reinsurance	0.2	0.6
Total	5.0	4.2

Global capital increased 6 percent year on year to USD 4.2 trillion. Property casualty insurance capital increased 5 percent. And reinsurance capital is again at all-time high, as we discuss at greater length in Aon Benfield's Reinsurance Market Outlook.

Property casualty penetration is 1.9 percent of GDP based on 50 of the largest countries, nearly flat compared to last year. Motor insurance accounts for 47 percent of property-casualty premium, while property accounts for 33 percent and liability 20 percent. This mix of business is nearly unchanged from last year.

Motor insurance is also the fastest growing line of business, with 4.2 percent annual growth over the last five years, driven by strong growth in China, Brazil, Argentina, Venezuela, and Saudi Arabia. Property is growing at an annual rate of 3.5 percent, and liability at 2.7 percent.

Global premium for motor

Motor: 4.2% annual growth
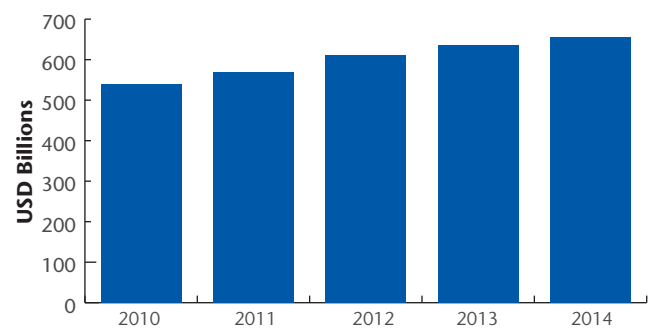
Global premium for property

Property: 3.5% annual growth
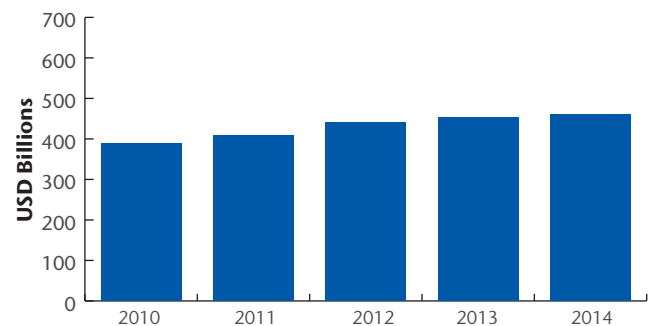
Global premium for liability

Liability: 2.7% annual growth
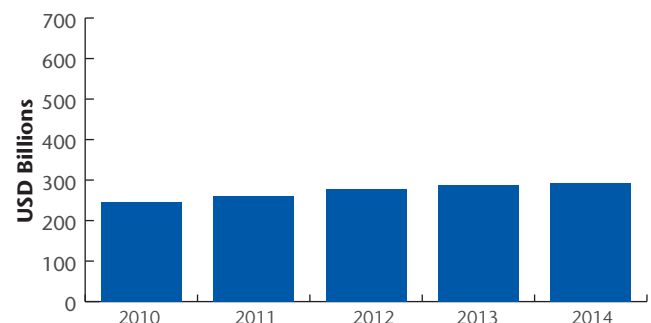
Global P&C gross written premium and growth rates by product line

Premium by product line

Motor: USD 656 billion

Property: USD 460 billion
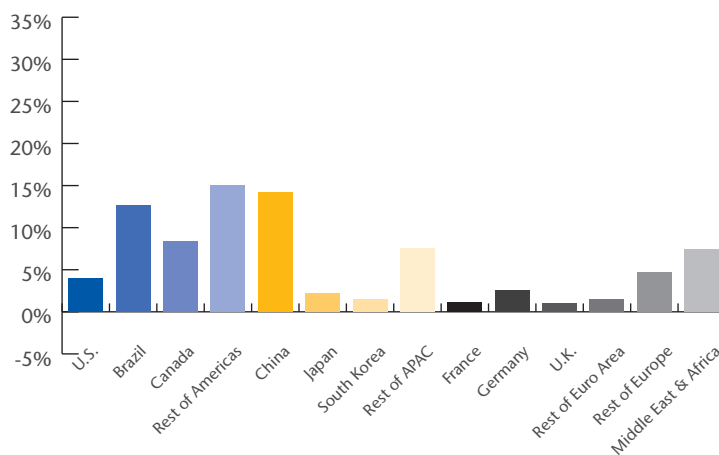
Liability: USD 292 billion
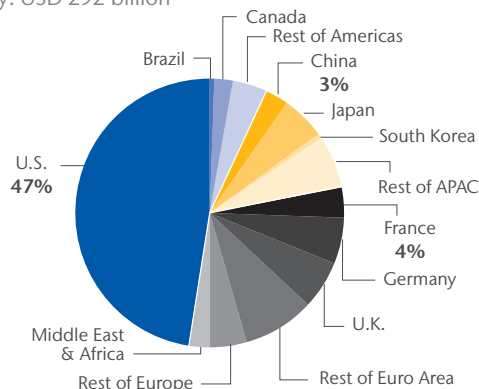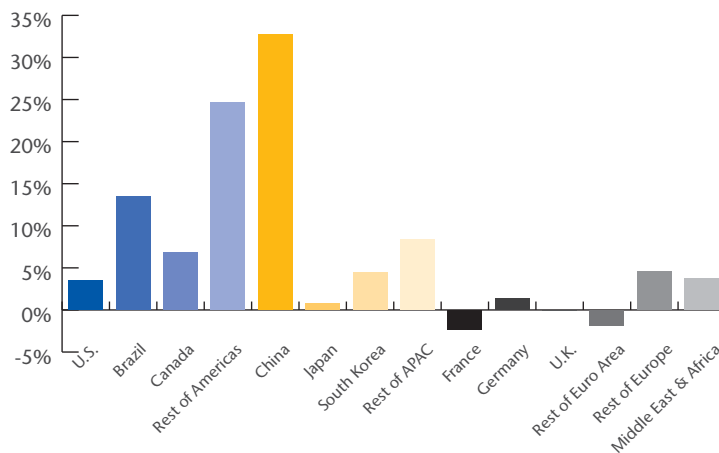
Notes: All statistics are the latest available. "Motor" includes all motor insurance coverages. "Property" includes construction, engineering, marine, aviation, and transit insurance as well as property. "Liability" includes general liability, workers compensation, surety, bonds, credit, and miscellaneous coverages.

Five-year average annual growth rate

Motor: 4.2% annual growth globally

Property: 3.5% annual growth globally

Liability: 2.7% annual growth globally

Top 50 P&C markets ranked by gross written premium by region

	P&C GWP (USD M)	Premium/ GDP Ratio	Annualized Premium Growth			Cumulative Net Loss Ratio			Cumulative Net Expense Ratio			Cumulative Net Combined Ratio		
			1yr	3yr	5yr	1yr	3yr	5yr	1yr	3yr	5yr	1yr	3yr	5yr
Americas														
US	550,972	3.2%	3.6%	4.7%	3.6%	68.9%	73.9%	73.4%	27.5%	27.3%	27.2%	96.4%	101.1%	100.7%
Canada	46,095	2.6%	4.7%	6.1%	6.8%	69.2%	68.4%	70.0%	29.7%	29.1%	28.9%	99.0%	97.5%	99.0%
Brazil	27,251	1.2%	13.2%	14.7%	14.1%	51.4%	52.5%	53.8%	32.9%	34.4%	32.8%	84.3%	86.9%	86.6%
Mexico	11,385	0.9%	11.1%	12.4%	11.1%	59.5%	59.7%	61.3%	34.1%	32.4%	32.8%	93.7%	92.1%	94.0%
Argentina	10,839	2.0%	35.5%	34.4%	32.6%	74.7%	71.1%	69.6%	34.8%	36.4%	36.8%	109.4%	107.5%	106.4%
Venezuela	7,276	2.0%	52.4%	32.5%	29.1%	62.1%	60.8%	62.6%	34.2%	35.6%	33.8%	96.3%	96.4%	96.4%
Colombia	4,551	1.2%	8.8%	9.4%	10.2%	59.5%	61.0%	60.7%	48.0%	47.8%	47.8%	107.5%	108.8%	108.5%
Chile	3,536	1.4%	9.8%	6.3%	12.2%	53.6%	51.7%	52.1%	42.9%	43.1%	43.7%	96.4%	94.8%	95.8%
Ecuador	1,812	1.8%	17.1%	14.9%	16.2%	57.9%	54.5%	54.4%	35.4%	34.8%	34.6%	93.2%	89.4%	88.9%
Subtotal	**663,717**	**2.7%**	**5.4%**	**6.2%**	**5.2%**	**68.1%**	**72.2%**	**72.0%**	**28.4%**	**28.2%**	**28.1%**	**96.4%**	**100.4%**	**100.1%**
Europe, Middle East & Africa														
Germany	71,893	1.9%	3.3%	3.2%	2.4%	76.1%	74.9%	74.9%	25.0%	25.3%	25.2%	101.1%	100.2%	100.2%
UK	64,308	2.4%	-0.3%	0.7%	1.3%	62.8%	65.2%	65.8%	34.9%	34.2%	34.0%	97.7%	99.4%	99.8%
France	63,121	2.2%	0.5%	2.1%	0.8%	74.8%	73.9%	75.0%	24.3%	24.3%	24.6%	99.1%	98.2%	99.6%
Italy	37,397	1.7%	-6.2%	-2.6%	-2.3%	68.9%	71.9%	73.9%	24.3%	23.8%	23.8%	93.2%	95.7%	97.7%
Spain	29,242	2.1%	-3.5%	-2.1%	-3.0%	72.3%	71.5%	71.9%	21.9%	21.4%	21.3%	94.2%	92.9%	93.2%
Russia	19,749	0.9%	6.6%	13.5%	7.9%	65.0%	64.2%	65.7%	27.9%	27.8%	25.7%	92.9%	92.0%	91.4%
Netherlands	16,026	1.9%	-2.9%	-2.6%	2.4%	86.6%	86.5%	86.4%	12.1%	12.5%	12.7%	98.7%	99.0%	99.1%
Switzerland	14,945	2.2%	1.3%	1.5%	2.0%	64.9%	69.1%	69.6%	29.7%	27.5%	27.0%	94.6%	96.6%	96.6%
Belgium	11,523	2.2%	1.8%	3.4%	2.7%	66.9%	68.1%	70.3%	28.1%	28.0%	27.8%	95.0%	96.1%	98.1%
Austria	9,774	2.3%	1.9%	2.9%	2.4%	69.1%	69.9%	70.6%	27.9%	28.4%	28.3%	97.0%	98.3%	98.9%
Norway	9,269	1.8%	4.7%	4.7%	3.5%	71.1%	72.3%	73.3%	13.7%	14.8%	15.7%	84.8%	87.2%	89.0%
South Africa	9,131	2.5%	7.8%	9.0%	8.1%	59.5%	60.7%	62.5%	32.6%	26.5%	24.8%	92.1%	87.2%	87.3%
Turkey	8,996	1.1%	22.2%	21.8%	15.2%	72.2%	76.0%	76.4%	25.6%	26.4%	27.4%	97.7%	102.5%	103.9%
Denmark	8,473	2.5%	-0.4%	1.8%	1.9%	72.8%	73.6%	75.7%	17.4%	17.1%	17.2%	90.2%	90.7%	92.9%
Sweden	8,247	1.4%	3.3%	2.1%	1.3%	72.1%	73.6%	73.3%	18.7%	18.4%	18.0%	90.8%	92.0%	91.3%
Poland	7,342	1.3%	-1.6%	0.6%	4.2%	61.9%	64.1%	66.5%	29.9%	29.9%	30.6%	91.9%	94.0%	97.1%
Finland	4,938	1.8%	11.5%	5.9%	4.5%	74.4%	79.1%	78.9%	20.2%	20.5%	20.6%	94.6%	99.7%	99.5%
Israel	4,355	1.5%	10.2%	5.9%	4.3%	72.8%	74.4%	75.9%	28.8%	31.1%	31.1%	101.6%	105.5%	107.0%
Czech Republic	4,008	2.0%	2.4%	1.7%	0.4%	62.1%	62.4%	63.5%	30.7%	30.0%	29.2%	92.8%	92.3%	92.7%
Portugal	3,736	1.7%	-4.6%	-2.9%	-3.7%	72.5%	71.1%	71.2%	23.7%	23.4%	23.0%	96.1%	94.5%	94.3%
Saudi Arabia	3,695	0.5%	20.5%	20.7%	17.0%	93.6%	82.9%	78.7%	14.5%	16.6%	17.6%	108.1%	99.5%	96.3%
U.A.E.	3,470	0.9%	-8.9%	-1.2%	0.1%	71.6%	72.8%	70.9%	22.7%	21.5%	20.0%	94.3%	94.3%	90.9%
Ireland	3,435	1.5%	-6.9%	-5.6%	-4.6%	73.8%	72.9%	72.9%	29.6%	28.6%	28.9%	103.4%	101.4%	101.8%
Greece	2,840	1.2%	-11.6%	-10.4%	-1.4%	50.7%	53.4%	57.6%	40.4%	40.8%	39.7%	91.1%	94.2%	97.3%
Romania	1,885	1.0%	2.4%	-1.2%	-2.0%	89.1%	76.2%	75.6%	65.1%	52.5%	44.7%	154.3%	128.7%	120.3%
Morocco	1,779	1.7%	5.9%	6.4%	6.9%	57.3%	60.8%	63.0%	32.8%	32.9%	33.2%	90.1%	93.7%	96.2%
Nigeria	1,154	0.2%	-0.7%	4.9%	7.5%	51.5%	49.3%	48.5%	40.6%	38.5%	36.4%	92.2%	87.9%	84.8%
Luxembourg	1,115	1.8%	13.4%	6.6%	5.4%	67.4%	65.8%	65.7%	37.4%	37.3%	37.6%	104.8%	103.1%	103.3%
Bulgaria	914	1.6%	-0.1%	0.4%	-1.2%	54.3%	54.7%	56.7%	33.0%	34.8%	38.4%	87.3%	89.5%	95.2%
Subtotal	**426,763**	**1.8%**	**1.1%**	**2.4%**	**1.9%**	**71.4%**	**72.2%**	**72.9%**	**25.4%**	**25.0%**	**24.8%**	**96.9%**	**97.2%**	**97.8%**
Asia Pacific														
China	100,350	1.1%	16.8%	16.9%	21.6%	63.8%	62.0%	64.5%	33.8%	33.0%	32.7%	97.7%	95.1%	97.2%
Japan	83,067	1.7%	6.8%	4.3%	1.9%	67.8%	71.2%	69.4%	32.7%	33.3%	33.9%	100.5%	104.5%	103.3%
Australia	34,231	2.4%	1.2%	5.7%	6.7%	64.9%	67.9%	69.2%	28.2%	27.5%	27.6%	93.1%	95.4%	96.8%
S. Korea	16,892	1.2%	2.4%	1.0%	3.5%	80.0%	78.9%	78.2%	23.7%	23.3%	23.4%	103.7%	102.2%	101.5%
India	9,873	0.5%	11.8%	19.3%	18.3%	81.9%	84.3%	86.3%	28.6%	28.8%	30.2%	110.6%	113.0%	116.5%
Thailand	5,520	1.5%	-0.1%	12.7%	11.8%	63.6%	70.3%	65.7%	33.6%	34.5%	35.5%	97.2%	104.8%	101.2%
Malaysia	4,530	1.4%	5.9%	7.1%	7.3%	56.4%	60.1%	61.5%	27.9%	28.3%	28.2%	84.4%	88.4%	89.6%
Taiwan	3,917	0.8%	3.3%	5.3%	1.9%	55.1%	57.2%	57.1%	37.8%	37.5%	38.6%	92.9%	94.7%	95.6%
New Zealand	3,886	2.1%	11.5%	11.1%	8.8%	56.5%	73.3%	78.4%	34.4%	34.2%	35.0%	90.9%	107.5%	113.5%
Indonesia	3,404	0.4%	10.8%	11.6%	12.2%	50.8%	53.4%	54.5%	32.9%	33.2%	32.9%	83.6%	86.5%	87.4%
Hong Kong	2,651	1.0%	7.8%	8.8%	7.5%	59.1%	60.7%	59.6%	32.1%	32.3%	33.9%	91.2%	93.0%	93.5%
Singapore	2,502	0.8%	2.1%	3.8%	5.0%	51.6%	53.8%	54.5%	34.8%	33.8%	33.7%	86.4%	87.6%	88.1%
Subtotal	**270,824**	**1.2%**	**9.6%**	**10.0%**	**11.1%**	**68.1%**	**69.7%**	**69.9%**	**31.0%**	**30.5%**	**30.8%**	**99.1%**	**100.2%**	**100.7%**
Grand Total	1,361,303	1.9%	4.9%	5.7%	5.4%	70.2%	72.8%	72.9%	26.8%	26.6%	26.6%	97.0%	99.5%	99.6%

Geographic Opportunities

To summarize and sort between the countries outlined in this section, we have created the Country Opportunity Index to identify those countries with a desirable mix of profitability, growth potential and a relatively stable political environment. The table below displays the 50 P&C markets ranked by this Index and divided into quartiles.

Eleven of the twelve countries in Quartile 1 were also in the top quartile last year, and nine have been in Quartile 1 for all three years we have run this Index. Indonesia, Malaysia, and Singapore tied this year for the number one position; all three have exhibited low combined ratios, healthy premium growth and GDP growth, and a stable political environment.

Last year's top country, Saudi Arabia, fell to number five due to a five percentage point increase in its combined ratio. United Arab Emirates reentered the top quartile this year and also tied for the number five position.

Note that the US, Japan, and most of Western Europe are in Quartiles 3 and 4. This Index suggests that to achieve strong insurance growth, it is best to look beyond the developed economies.

Aon Benfield Country Opportunity Index

		5yr Cumulative Net Combined Ratio	5yr Annualized Premium Growth	Real GDP 5yr Growth	Population 5yr Annualized Growth	Political Risk Assessment
Quartile 1						
1	Indonesia**	87.4%	11.8%	7.2%	1.4%	Medium
1	Malaysia**	89.6%	7.3%	6.9%	1.5%	Medium Low
1	Singapore**	88.1%	3.2%	5.6%	1.7%	Low
4	Ecuador**	88.9%	16.2%	6.2%	1.6%	Medium High
5	Chile**	95.8%	12.2%	5.6%	1.1%	Medium Low
5	Saudi Arabia**	96.3%	17.0%	6.5%	2.6%	Medium
5	Nigeria**	84.8%	7.5%	6.7%	2.7%	High
5	Australia*	96.8%	6.7%	4.4%	1.5%	Low
5	U.A.E.	90.9%	0.1%	5.9%	3.0%	Medium Low
10	Brazil**	86.6%	14.1%	3.1%	0.9%	Medium
10	South Africa*	87.3%	8.1%	3.8%	1.6%	Medium
10	Norway**	89.0%	3.5%	3.1%	1.2%	Low
Quartile 2						
13	Hong Kong	93.5%	6.6%	4.5%	0.7%	Low
13	Morocco	96.2%	6.9%	5.5%	1.0%	Medium
13	Sweden	91.3%	1.3%	3.2%	0.9%	Low
16	Canada	99.0%	6.8%	3.9%	1.1%	Low
16	Switzerland	96.6%	2.0%	3.1%	1.0%	Low
18	India	116.5%	18.3%	8.3%	1.3%	Medium
18	Russia	91.4%	10.5%	2.7%	0.1%	Medium High
18	Venezuela	96.4%	29.1%	1.4%	1.6%	Very High
18	Mexico	94.0%	3.7%	4.5%	1.2%	Medium
22	China	97.2%	21.6%	9.4%	0.5%	Medium High
22	Turkey	103.9%	17.8%	5.8%	1.2%	Medium
22	Colombia	108.5%	10.2%	6.3%	1.2%	Medium
22	Israel	107.0%	4.3%	4.9%	1.9%	Medium Low
Quartile 3						
22	New Zealand	113.5%	8.8%	4.1%	0.9%	Low
22	Luxembourg	103.3%	5.4%	3.5%	2.4%	Low
22	Taiwan	95.6%	3.4%	4.7%	0.3%	Medium Low
22	Denmark	92.9%	1.9%	2.1%	0.3%	Low
30	Poland	97.1%	4.2%	4.6%	0.0%	Medium Low
30	Finland	99.5%	4.3%	1.6%	0.5%	Low
30	Czech Republic	92.7%	0.4%	2.5%	0.1%	Medium Low
33	Argentina	106.4%	32.6%	4.0%	1.1%	High
33	Austria	98.9%	2.4%	2.6%	0.4%	Low
33	US	100.7%	3.6%	3.9%	0.7%	Low
33	Germany	100.2%	3.6%	3.1%	-0.1%	Low
33	Netherlands	99.1%	2.4%	1.9%	0.4%	Low
Quartile 4						
38	Thailand	101.2%	11.8%	4.3%	0.4%	Medium High
38	South Korea	101.5%	3.5%	4.7%	0.5%	Medium Low
38	Belgium	98.1%	2.7%	2.4%	0.7%	Medium Low
38	Bulgaria	95.2%	-1.2%	2.8%	-0.9%	Medium
38	UK	99.8%	1.3%	3.4%	0.8%	Medium Low
43	France	99.6%	0.8%	2.4%	0.5%	Medium Low
43	Spain	93.2%	-2.3%	1.5%	-0.1%	Medium
43	Portugal	94.3%	-3.7%	0.5%	-0.3%	Medium
46	Japan	103.3%	1.9%	2.3%	-0.2%	Medium Low
46	Italy	97.7%	-2.3%	0.8%	0.4%	Medium
46	Ireland	101.8%	-4.6%	3.8%	0.4%	Medium
49	Greece	97.3%	-7.9%	-1.8%	-0.4%	High
50	Romania	120.3%	-2.0%	3.7%	-1.6%	Medium High

*Indicates top quartile performer in 2014.
**Indicates top quartile performer in both 2013 and 2014.
Index defined in Sources and Notes.

Growth Markets and Out/Underperformers

To determine expansion opportunities we examined premium growth and loss ratio performance by country across motor, property, and liability lines of business as well as premium growth and combined ratio performance by country for all lines. The quadrant plots below identify countries as either low growth or high growth, and as either out performers or under performers.

To measure performance, the first three quadrant plots use loss ratio for each line of business while the right-most plot shows combined ratio for all lines of business. Each plot also provides the gross written premium size, in USD millions, of each country.

For all quadrant plots, growth is determined based on five-year annualized premium growth. Countries with values greater than 7.5 percent are classified as high growth.

Loss ratio and combined ratio performance is determined based on five-year cumulative loss ratio and five-year net cumulative combined ratio, respectively. Each country's loss ratio performance is compared against its income level peers, using a USD 30,000 GDP per capita split between high income and low income countries; whereas, combined ratio performance is compared against the global combined ratio. Countries with five-year loss ratios lower than the average of their income peers, or combined ratios below the global combined ratio, are classified as outperformers.

Motor

Loss ratio performance

Out performers

Austria	4,182		
Denmark	2,903		
Greece	1,749		
Hong Kong	480	China	76,295
Japan	49,564	Colombia	2,049
New Zealand	1,179	Ecuador	638
Nigeria	333	Indonesia	1,196
Norway	3,234	South Africa	4,069
Singapore	974	Thailand	3,637
Switzerland	6,449	Venezuela	5,062
U.S.	217,781		

Low growth / **High growth**

Australia	12,235	Argentina	4,892
Belgium	4,613	Brazil	17,019
Bulgaria	666	Chile	1,089
Canada	21,156	India	5,704
Czech Republic	1,821	Malaysia	2,424
Finland	2,051	Saudi Arabia	2,140
France	25,984	Turkey	5,172
Germany	31,113		
Ireland	1,507		
Israel	2,400		
Italy	24,799		
Luxembourg	518		
Mexico	5,205		
Morocco	1,011		
Netherlands	5,809		
Poland	4,226		
Portugal	1,695		
Romania	1,270		
Russia	11,127		
S. Korea	12,301		
Spain	12,710		
Sweden	3,509		

Under performers

Property

Loss ratio performance

Out performers

Belgium	3,564		
Bulgaria	214		
Greece	747		
Hong Kong	766	Brazil	8,359
Malaysia	1,613	Canada	17,996
Morocco	321	China	16,000
Netherlands	5,900	Colombia	1,404
Poland	1,815	Ecuador	815
Romania	423	India	2,310
Russia	6,391	Indonesia	1,721
Singapore	744	Luxembourg	415
Spain	10,215	Mexico	3,663
Switzerland	5,165	Nigeria	593
Taiwan	1,266	Saudi Arabia	1,267
U.A.E.	1,106	South Africa	3,946
U.K.	24,623	Turkey	3,111
U.S.	194,999	Venezuela	1,036

Low growth / **High growth**

Australia	10,857	Argentina	1,693
Austria	3,736	Chile	1,698
Czech Republic	1,094	Israel	1,181
Denmark	4,544	New Zealand	2,287
Finland	1,512	Thailand	1,577
France	26,714		
Germany	24,553		
Ireland	1,124		
Italy	7,206		
Japan	18,509		
Norway	4,415		
Portugal	1,005		
S. Korea	2,685		
Sweden	4,509		

Under performers

Twenty countries are high growth, loss ratio outperformers in at least one line of business. Of these twenty countries, five appear in each of the lines of business analyzed as high growth out performers: China, Colombia, Ecuador, Indonesia, and Venezuela. All but Venezuela were similarly distinguished last year.

If we compare these countries on the basis of overall combined ratio, four of the five are outperformers globally. The exception is Colombia, which underperforms its peers with a five-year net combined ratio of 108.5 percent, driven by a higher than average expense ratio. In addition to the four outperforming countries mentioned above, six additional

countries outperform the global averages for both growth and profitability. Brazil, as an example, outperforms for both motor and property insurance, and with an all lines five-year combined ratio of 86.6 percent, it has been a significantly more profitable market than its overall Americas peer group. See the Top 50 P&C Markets table for more details on page 46. Using combined ratio in addition to loss history allows us to further analyze and target high growth opportunities.

Liability

Loss ratio performance

Out performers

Austria	1,857	Australia	11,140
Canada	6,943	Brazil	1,873
France	10,423	China	8,055
Greece	344	Colombia	1,098
Japan	14,994	Ecuador	359
Malaysia	494	Hong Kong	1,405
Netherlands	4,316	Indonesia	487
New Zealand	421	Mexico	2,517
Nigeria	228	Poland	1,302
Singapore	785	Romania	192
South Africa	1,116	Russia	2,231
Switzerland	3,330	Saudi Arabia	288
Taiwan	397	Turkey	714
U.A.E.	1,137	Venezuela	1,178

Low growth ← → **High growth**

Belgium	3,347	Argentina	4,253
Bulgaria	34	Chile	749
Czech Republic	1,093	India	1,860
Denmark	1,026	Sweden	230
Finland	1,375		
Germany	16,228		
Ireland	804		
Israel	774		
Italy	5,392		
Luxembourg	182		
Morocco	447		
Norway	1,620		
Portugal	1,035		
S. Korea	1,906		
Spain	6,316		
Thailand	306		
U.K.	16,992		
U.S.	138,192		

Under performers

All Lines

Combined ratio performance

Out performers

Australia	34,231		
Austria	9,774		
Belgium	11,523		
Canada	46,095		
Czech Republic	4,008		
Denmark	8,473		
Italy	37,397		
Malaysia	4,530		
Netherlands	16,026		
Norway	9,269		
Poland	7,342	Brazil	27,251
Portugal	3,736	Chile	3,536
Spain	29,242	China	100,350
Sweden	8,247	Ecuador	1,812
Switzerland	14,945	Indonesia	3,404
Taiwan	3,917	Mexico	11,385
U.A.E.	3,470	Russia	19,749
		Saudi Arabia	3,695
		South Africa	9,131
		Venezuela	7,276

Also: Bulgaria, Greece, Hong Kong, Morocco, Nigeria, and Singapore. See premiums on page 46.

Low growth ← → **High growth**

Finland	4,938	Argentina	10,839
France	63,121	Colombia	4,551
Germany	71,893	India	9,873
Ireland	3,435	New Zealand	3,886
Israel	4,355	Thailand	5,520
Japan	83,067	Turkey	8,996
Luxembourg	1,115		
Romania	1,885		
S. Korea	16,892		
U.K.	64,308		
U.S.	550,972		

Under performers

Global Risk Parameters

The insurance business is always a tradeoff of assuming risk in exchange for potential—presumed—return. We now turn to the "risk" side of the risk and return equation. Measuring the volatility and correlation of risk has long been the hallmark of the Study.

The 2015 edition of the Study quantifies the systemic risk by line for 49 countries worldwide. By systemic risk, or volatility, we mean the coefficient of variation of loss ratio for a large book of business. Coefficient of variation (CV) is a commonly used normalized measure of risk defined as the standard deviation divided by the mean. Systemic risk typically comes from non-diversifiable risk sources such as changing market rate adequacy, unknown prospective frequency and severity trends, weather-related losses, legal reforms and court decisions, the level of economic

activity and other macroeconomic factors. It also includes the risk to smaller and specialty lines of business caused by a lack of credible data. For many lines of business systemic risk is the major component of underwriting volatility.

The systemic risk factors for major lines by region appear on the facing page. Detailed charts comparing motor and property risk by country appear below. The factors measure the volatility of gross loss ratios. If gross loss ratios are not available the net loss ratio is used.

Coefficient of variation of gross loss ratio by country

Motor

Country	CV
Thailand	2%
El Salvador	4%
Taiwan	5%
South Korea	5%
Japan	6%
Switzerland	6%
France	8%
Hungary	8%
Spain	8%
Australia	8%
Germany	8%
Malaysia	8%
Austria	9%
Czech Republic	9%
Netherlands	10%
Chile	10%
Israel	10%
Mexico	11%
Dominican Republic	12%
Colombia	13%
Italy	13%
Uruguay	13%
Brazil	13%
U.K.	13%
India	13%
Argentina	14%
Peru	14%
Poland	14%
China	14%
Canada	14%
Vietnam	14%
Denmark	15%
Bolivia	16%
Pakistan	16%
Turkey	16%
Honduras	17%
U.S.	18%
Slovakia	21%
South Africa	21%
Singapore	21%
Indonesia	22%
Ecuador	22%
Panama	22%
Venezuela	24%
Nicaragua	30%
Romania	36%
Hong Kong	40%
Greece	50%
Philippines	60%

Property

Country	CV
Denmark	11%
Israel	11%
Bolivia	16%
South Africa	16%
Australia	16%
Austria	18%
Germany	18%
Netherlands	18%
Italy	19%
Canada	20%
U.K.	22%
Spain	23%
Malaysia	23%
Switzerland	25%
France	26%
China	29%
South Korea	29%
Japan	30%
India	31%
Chile	32%
Hungary	34%
Ecuador	35%
Poland	35%
El Salvador	36%
Turkey	39%
Panama	40%
U.S.	40%
Honduras	41%
Uruguay	41%
Colombia	44%
Dominican Republic	46%
Nicaragua	47%
Venezuela	47%
Romania	49%
Argentina	52%
Vietnam	53%
Slovakia	54%
Pakistan	65%
Indonesia	70%
Taiwan	70%
Hong Kong	70%
Philippines	73%
Brazil	75%
Singapore	76%
Greece	77%
Peru	84%
Mexico	93%
Thailand	119%

Legend:
- Europe, Middle East & Africa
- Asia Pacific
- Americas

Reported CVs are of gross loss ratios, except for Argentina, Australia, Bolivia, Chile, Ecuador, India, Israel, Malaysia, Singapore, South Korea, Thailand, Uruguay and Venezuela, which are of net loss ratios. Accident & Health is defined differently in each country; it may include pure accident A&H coverage, credit A&H, and individual or group A&H. In the US, A&H makes up about 80 percent of the "Other" line of business with the balance of the line being primarily credit insurance.

Coefficient of variation of loss ratio for major lines by country

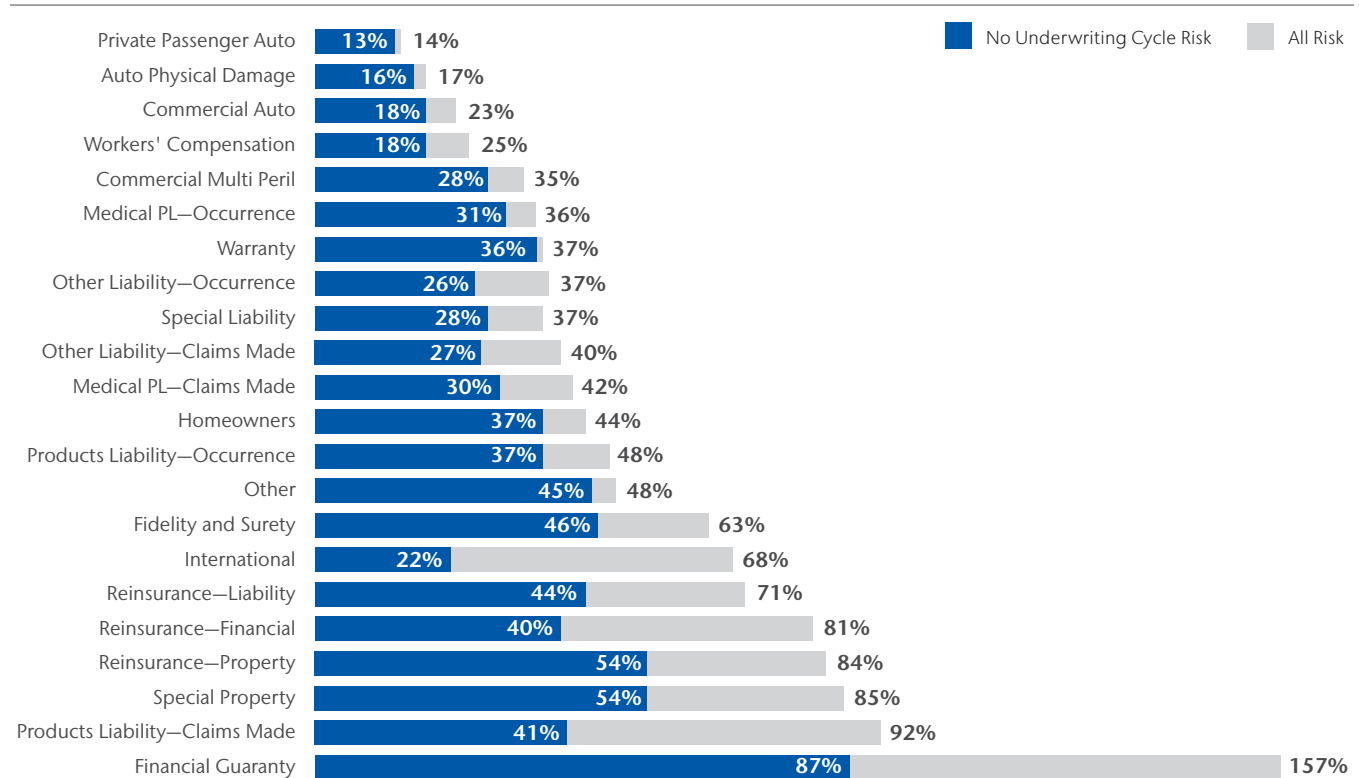|	Motor	Motor—Personal	Motor—Commercial	Property	Property—Personal	Property—Commercial	General Liability	Accident & Health	Marine, Aviation & Transit	Workers Compensation	Credit	Fidelity & Surety
Americas												
Argentina	14%			52%				63%	52%	8%		240%
Bolivia	16%			16%				16%		46%		64%
Brazil	13%			75%	43%	76%	97%	46%	36%		75%	
Canada	14%			20%	17%	34%	36%	38%	64%		115%	106%
Chile	10%			32%			47%	59%	31%			48%
Colombia	13%			44%		66%	32%	37%	72%			92%
Dominican Republic	12%			46%				47%				192%
Ecuador	22%			35%				51%				169%
El Salvador	4%			36%				19%				80%
Honduras	17%			41%				8%				100%
Mexico	11%			93%			68%	51%				
Nicaragua	30%			47%				70%				190%
Panama	22%			40%				18%				161%
Peru	14%			84%			55%	23%	27%	135%	92%	111%
Uruguay	13%			41%						13%		186%
US	18%	14%	23%	40%	44%	35%	38%	48%	37%	25%		63%
Venezuela	24%			47%				20%				228%
Asia Pacific												
Australia	8%			16%	23%	32%	54%		10%	30%		
China	14%	16%		29%	53%	28%	20%	18%	19%		49%	
Hong Kong	40%			70%			84%	21%	61%	73%		
India	13%			31%				6%	28%			
Indonesia	22%			70%			120%	41%	76%		103%	108%
Japan	6%			30%			11%	9%	17%	11%		
Malaysia	8%			23%			93%	36%	53%	96%		
Pakistan	16%			65%					43%			
Philippines	60%			73%		323%		62%	105%			203%
Singapore	21%			76%				42%	48%	28%		
South Korea	5%			29%			4%	18%	47%			
Taiwan	5%	5%		70%			45%	20%	72%		119%	
Thailand	2%			119%		119%		19%	27%			
Vietnam	14%			53%		154%	52%	29%	47%			
Europe, Middle East & Africa												
Austria	9%			18%	12%	45%	20%	11%	26%		44%	
Czech Republic	9%			29%			22%					
Denmark	15%			11%	12%	14%	19%	14%	27%	33%		
France	8%			26%	28%	30%	31%	24%	39%			97%
Germany	8%			18%	20%	30%	26%	20%	19%		47%	
Greece	50%			77%				83%	84%			
Hungary	8%			34%	1%	10%						
Israel	10%			11%			19%					
Italy	13%			19%			24%	19%	42%		42%	67%
Netherlands	10%			18%			27%	47%	30%		43%	
Poland	14%			35%								
Romania	36%			49%			100%					
Slovakia	21%			54%		35%	40%					
South Africa	21%			16%			60%	38%	42%			
Spain	8%	8%		23%	12%	27%	41%	13%	33%		37%	139%
Switzerland	6%			25%			21%	8%	47%		83%	
Turkey	16%		16%	39%		39%	43%	16%	48%		58%	102%
UK	13%	13%	16%	22%	22%	26%	31%	15%	47%			

US Risk Parameters

For the US risk parameters of the Study, we use data from 19 years of NAIC annual statements for 2,766 individual groups and companies. Our database covers all 22 Schedule P lines of business and contains 4.9 million records of individual company observations from accident years 1987-2014.

The chart below shows the loss ratio volatility for each Schedule P line, with and without the effect of the underwriting cycle. The underwriting cycle effect is removed by normalizing loss ratios by accident year prior to computing volatility. This adjustment decomposes loss ratio volatility into its loss and premium components.

Coefficient of variation of gross loss ratio (1987-2014)

Line of Business	No Underwriting Cycle Risk	All Risk
Private Passenger Auto	13%	14%
Auto Physical Damage	16%	17%
Commercial Auto	18%	23%
Workers' Compensation	18%	25%
Commercial Multi Peril	28%	35%
Medical PL—Occurrence	31%	36%
Warranty	36%	37%
Other Liability—Occurrence	26%	37%
Special Liability	28%	37%
Other Liability—Claims Made	27%	40%
Medical PL—Claims Made	30%	42%
Homeowners	37%	44%
Products Liability—Occurrence	37%	48%
Other	45%	48%
Fidelity and Surety	46%	63%
International	22%	68%
Reinsurance—Liability	44%	71%
Reinsurance—Financial	40%	81%
Reinsurance—Property	54%	84%
Special Property	54%	85%
Products Liability—Claims Made	41%	92%
Financial Guaranty	87%	157%

The underwriting cycle acts simultaneously across many lines of business, driving correlation between the results of different lines and amplifying the effect of underwriting risk to primary insurers and reinsurers. Our analysis demonstrates that the cycle increases volatility substantially for all major commercial lines, as shown in the table. For example, the underwriting volatility of reinsurance liability increases by 59 percent and commercial auto liability by 31 percent. Personal lines are more formula-rated and thus show a lower cycle effect, with private passenger auto volatility only increasing by 11 percent because of the cycle.

The details of the underwriting cycle adjustment are explained on page 58.

US underwriting cycle impact on volatility

Line of Business	Impact
Reinsurance—Liability	59%
Other Liability—Claims Made	47%
Other Liability—Occurrence	45%
Medical PL—Claims Made	42%
Workers Compensation	38%
Special Liability	33%
Commercial Auto	31%
Commercial Multi Peril	22%
Homeowners	20%
Private Passenger Auto	11%

US Reserve Adequacy

Reserve releases in the US are now in their ninth consecutive year, heightening concerns that insurers are cutting reserves too aggressively. We can form an independent opinion about the adequacy of statutory reserves using the high quality, uniform data at the legal entity available through the NAIC Schedule P in statutory accounts. These accounts provide US regulators with a clear view into insurance companies and are part of a very effective system of solvency regulation based on consistent and transparent reporting.

Six years ago, Aon Benfield started publicly tracking the reported reserve adequacy of US companies. Each year we analyze aggregate net loss development data by Schedule P line of business. Working at an aggregate level allows our actuaries to use different methods, and to weight the results in different ways, than is possible for company actuaries who are working with smaller and less stable data sets. Unlike some other public studies, each of our reports has called for continued reserve releases by the industry— predictions that have been borne out by subsequent facts.

The table below summarizes the analysis of the year end 2014 data. The overall industry redundancy position decreased to USD 6.3 billion at year end 2014—equivalent to only 1.1 percent of total booked reserves. This compares to USD 6.5 billion total industry redundancy position at year end 2013, while USD 9.5 billion was released by insurers during 2014. The amount of reserves released in 2014 was the lowest since 2007. However, a closer inspection of the results raises continued concerns about the reserve adequacy of the commercial lines sector.

The analysis reveals that commercial lines showed a slightly improved deficiency position of USD 2.0 billion at year end 2014 compared to an estimated USD 2.9 billion deficiency at year end 2013. While commercial property, workers compensation, and financial guaranty all remained stable or improved, the commercial liability reserve position deteriorated. Workers compensation also continues to appear to be in a deficient position.

The drivers of year-over-year change in our reserve estimates are illustrated in the waterfall chart on the next page.
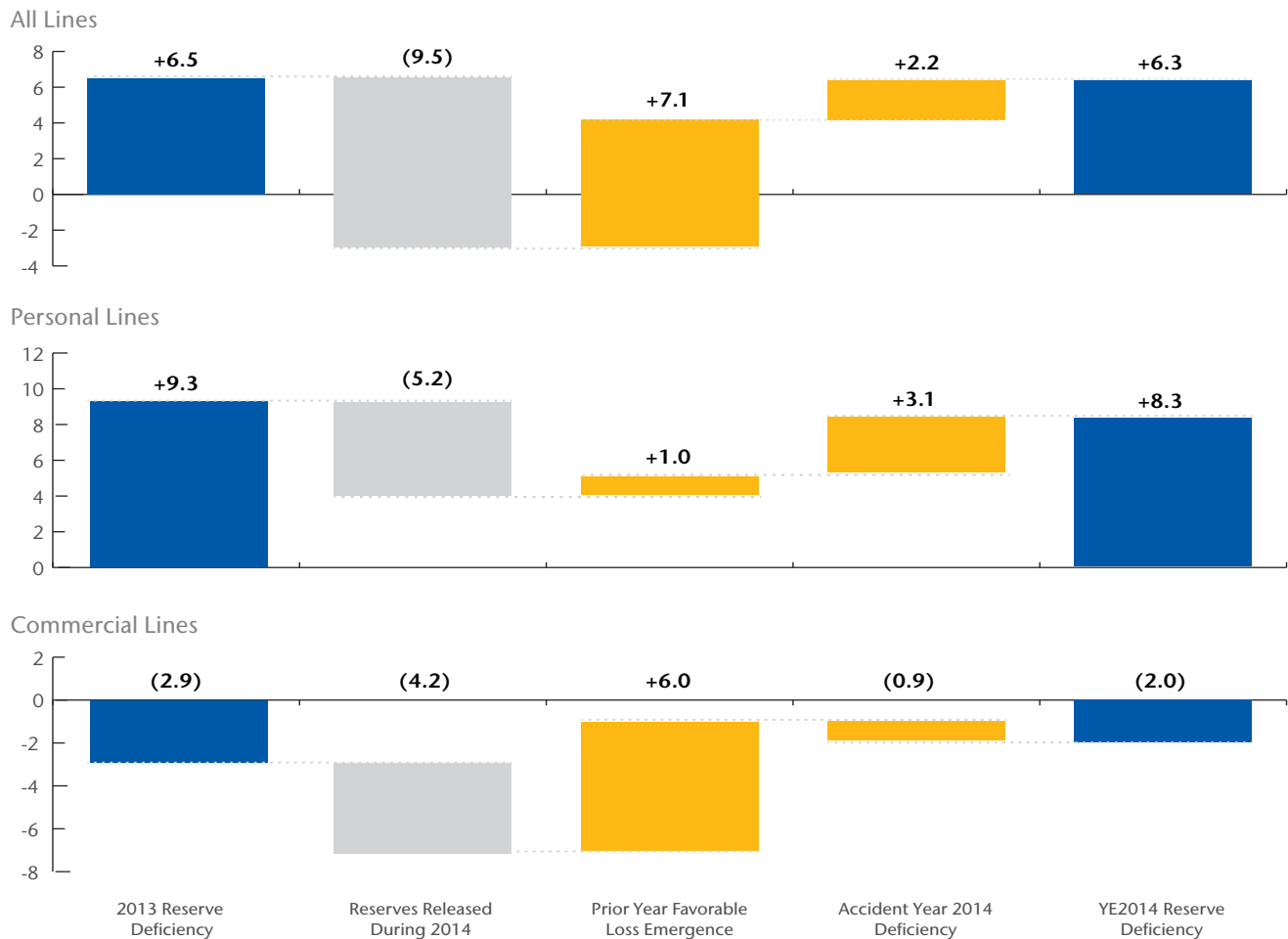
The year end 2013 estimate of the property casualty industry reserve redundancy was USD 6.5 billion. During calendar year 2014, the industry released USD 9.5 billion of reserves. Offsetting the impact of reserve releases were two factors: 2014 calendar year favorable loss emergence and redundantly booked reserves in the 2014 accident year. Favorable development of case-incurred losses in calendar year 2014 contributed to a decrease in ultimate loss estimates of USD 7.1 billion, while the 2014 accident year contributed an additional USD 2.2 billion of reserve redundancy. The sum of these pieces drives our year end 2014 redundancy estimate of USD 6.3 billion.

When we separate the year-over-year waterfall into personal and commercial lines, a different picture emerges. On the personal lines side, a reduction in booked reserves during the 2014 calendar year was somewhat offset by favorable loss emergence on prior years and redundancy in the 2014 accident year. However, on the commercial lines side, despite having favorable loss emergence offsetting the calendar year 2014 reserve releases, the 2014 accident year is under-booked. This results in a continued negative overall position for the industry's commercial lines.

US reserve estimated adequacy and loss development summary (USD billions)

Line	Estimated reserves	Booked reserves	Remaining redundancy at YE 2014	Favorable or (adverse) development						Years at run rate
				2010	2011	2012	2013	2014	Average	
Personal Lines	133.7	142.0	8.3	6.7	7.6	7.1	6.0	5.2	6.5	1.3
Commercial Lines	440.8	438.8	(2.0)	3.9	5.1	5.1	8.8	4.2	5.4	N/A
Commercial Property	42.6	43.1	0.5	2.7	1.4	1.1	1.7	1.2	1.6	0.3
Commercial Liability	233.1	233.9	0.8	2.4	4.1	2.5	2.8	2.4	2.8	0.3
Workers Compensation	148.7	145.6	(3.1)	(1.6)	(0.0)	0.0	0.6	0.8	(0.0)	N/A
Financial Guaranty	16.4	16.2	(0.2)	0.4	(0.4)	1.4	3.7	(0.2)	1.0	N/A
Total	574.5	580.8	6.3	10.5	12.7	12.2	14.8	9.5	11.9	0.5

Drivers of 2014 reserve redundancy or deficiency (USD billions)

All Lines

Personal Lines

Commercial Lines

| 2013 Reserve Deficiency | Reserves Released During 2014 | Prior Year Favorable Loss Emergence | Accident Year 2014 Deficiency | YE2014 Reserve Deficiency |

We estimate that companies will continue to release reserves through year end 2015, possibly extinguishing overall redundancy in the industry. Through the first quarter of 2015 companies have already released an additional USD 5.3 billion of reserves, compared to USD 5.4 billion through first quarter of 2014. USD 3.7 billion of this release is from personal lines, while commercial lines released an additional USD 1.6 billion. In 2013, the release in the personal lines was thought to be attributable to conservatism in booked results at year end 2012 related to Superstorm Sandy, however we continue to see a similar pattern of behavior year after year from the personal lines focused companies.

With reduced equity in reserves going forward, mistakes in underwriting, rate monitoring, and primary pricing will no longer be covered up by a reserve cushion. Compounding this issue is a continued sluggish investment environment.

As we have discussed in past editions of the Study, understanding reserve risk is critical for effectively modeling company solvency. It is also a notoriously difficult problem: whereas all companies face broadly similar insurance risks, such as weather, legal, social, and medical trends, each company's reserving practices are idiosyncratic. Moving forward, rate adequacy and rate monitoring—not on an aggregate premium basis but on a rate per exposure basis—will be critical to the operating results of companies. Aon Benfield Analytics has developed effective models of industry loss drivers for some US lines and continues to expand its understanding of macro drivers across all classes of business. We can also assist clients with exposure-adjusted rate monitoring in this challenging reserve and investment environment.

Macroeconomic, Demographic, and Social Indicators

Country	GDP—PPP, USD billions	GDP 5yr real growth	Population—millions	Population 5yr annualized growth	GDP Per Capita—PPP, USD	Government consumption as % of GDP	Actual individual consumption as % of GDP	General government debt as % of GDP	New foreign direct investment—USD billions	Inflation rate	Unemployment rate	Corporate tax rate	Political risk assessment	Aon terrorism risk assessment	World Bank relative ease of doing business
Argentina	953.0	4.0%	42.4	1.1%	22,459	11.0%	67.7%	n/a	11.4	n/a	7.0%	35.0%	High	Medium	More difficult
Australia	1136.6	4.4%	23.9	1.5%	47,608	14.7%	57.5%	19.9%	52.0	2.0%	6.4%	30.0%	Low	Low	Easiest
Austria	402.4	2.6%	8.6	0.4%	47,031	14.7%	58.8%	51.0%	15.6	1.1%	5.1%	25.0%	Low	Negligible	Easiest
Belgium	492.3	2.4%	11.2	0.7%	43,800	18.9%	57.5%	67.1%	-3.3	0.1%	8.4%	34.0%	Medium Low	Low	Easiest
Brazil	3259.1	3.1%	204.5	0.9%	15,941	17.3%	67.3%	34.4%	80.8	7.8%	5.9%	34.0%	Medium	Medium	More difficult
Bulgaria	131.3	2.8%	7.2	-0.9%	18,327	25.9%	55.3%	0.4%	1.9	-1.0%	10.9%	10.0%	Medium	Low	Easiest
Canada	1640.4	3.9%	35.9	1.1%	45,723	17.2%	59.7%	38.3%	70.8	0.9%	7.0%	26.5%	Low	Low	Easiest
Chile	424.2	5.6%	18.0	1.1%	23,556	9.1%	63.0%	-2.7%	20.3	3.0%	7.2%	22.5%	Medium Low	Medium	Easiest
China	18975.9	9.4%	1375.0	0.5%	13,801	18.4%	29.7%	n/a	347.8	1.2%	4.1%	25.0%	Medium High	Medium	Easier
Colombia	667.7	6.3%	48.2	1.2%	13,851	12.8%	67.7%	30.2%	16.2	3.4%	9.0%	25.0%	Medium	High	Easiest
Czech Republic	325.3	2.5%	10.5	0.1%	30,895	24.4%	52.6%	n/a	5.0	-0.1%	6.1%	19.0%	Medium Low	Negligible	Easiest
Denmark	255.9	2.1%	5.6	0.3%	45,451	22.6%	48.1%	3.1%	1.6	0.8%	6.2%	23.5%	Low	Low	Easiest
Ecuador	185.2	6.2%	16.3	1.6%	11,380	10.8%	64.4%	n/a	0.7	3.2%	5.0%	22.0%	Medium High	Medium	More difficult
Finland	224.8	1.6%	5.5	0.5%	40,838	21.0%	54.6%	-41.5%	-5.3	0.6%	8.7%	20.0%	Low	Negligible	Easiest
France	2633.9	2.4%	64.2	0.5%	41,018	20.5%	61.1%	89.3%	6.5	0.1%	10.1%	33.3%	Medium Low	Medium	Easiest
Germany	3815.5	3.1%	81.4	-0.1%	46,896	16.3%	57.7%	46.9%	51.3	0.2%	4.9%	29.7%	Low	Low	Easiest
Greece	294.0	-1.8%	11.0	-0.4%	26,773	18.0%	76.8%	169.9%	2.9	-0.3%	24.8%	26.0%	High	Medium	Easier
Hong Kong	412.3	4.5%	7.3	0.7%	56,428	8.8%	59.8%	n/a	76.6	3.2%	3.2%	16.5%	Low	Low	Easiest
India	7996.6	8.3%	1276.3	1.3%	6,266	12.7%	57.4%	n/a	28.2	6.1%	n/a	34.6%	Medium	High	More difficult
Indonesia	2840.2	7.2%	255.1	1.4%	11,135	11.7%	62.3%	n/a	23.3	6.8%	5.8%	n/a	Medium	High	More difficult
Ireland	237.6	3.8%	4.6	0.4%	51,119	12.0%	39.6%	85.5%	50.0	0.2%	9.8%	12.5%	Medium	Low	Easiest
Israel	280.4	4.9%	8.4	1.9%	33,495	23.5%	59.9%	64.4%	11.8	-0.2%	5.5%	26.5%	Medium Low	High	Easiest
Italy	2157.1	0.8%	60.2	0.4%	35,811	16.5%	62.3%	111.8%	13.1	0.0%	12.6%	31.4%	Medium	Low	Easier
Japan	4843.1	2.3%	126.7	-0.2%	38,216	18.3%	58.6%	129.6%	3.7	1.0%	3.7%	33.1%	Medium Low	Low	Easiest
Luxembourg	53.2	3.5%	0.6	2.4%	93,174	14.4%	44.6%	n/a	30.1	0.5%	6.9%	29.2%	Low	Negligible	Easier
Malaysia	788.8	6.9%	30.8	1.5%	25,632	22.5%	46.9%	n/a	11.6	2.7%	3.0%	25.0%	Medium Low	Low	Easiest
Mexico	2224.3	4.5%	121.1	1.2%	18,370	15.6%	65.9%	45.0%	42.1	3.2%	4.3%	30.0%	Medium	Medium	Easiest
Morocco	265.7	5.5%	33.5	1.0%	7,931	15.0%	63.5%	65.0%	3.4	1.5%	9.0%	30.0%	Medium	Low	Easier
Netherlands	818.2	1.9%	16.9	0.4%	48,317	22.8%	45.1%	35.3%	32.1	-0.1%	7.2%	25.0%	Low	Low	Easiest
New Zealand	165.0	4.1%	4.6	0.9%	36,152	20.2%	63.9%	26.2%	-0.5	0.8%	5.3%	28.0%	Low	Negligible	Easiest
Nigeria	1108.7	6.7%	178.7	2.7%	6,204	17.1%	60.8%	11.5%	5.6	9.6%	n/a	30.0%	High	Severe	Most difficult
Norway	351.6	3.1%	5.2	1.2%	67,445	13.1%	35.0%	-248.1%	2.6	2.3%	3.8%	27.0%	Low	Low	Easiest
Poland	996.5	4.6%	38.0	0.0%	26,210	21.7%	61.8%	23.8%	-4.6	-0.8%	8.0%	19.0%	Medium Low	Low	Easiest
Portugal	287.4	0.5%	10.4	-0.3%	27,624	20.3%	65.7%	119.2%	7.9	0.6%	13.1%	21.0%	Medium	Low	Easiest
Romania	407.0	3.7%	19.8	-1.6%	20,526	24.5%	58.7%	n/a	4.1	1.0%	6.7%	16.0%	Medium High	Low	Easiest
Russia	3458.4	2.7%	143.7	0.1%	24,067	24.5%	54.3%	n/a	70.7	17.9%	6.5%	20.0%	Medium High	Medium	Easier
Saudi Arabia	1668.1	6.5%	31.4	2.6%	53,149	19.6%	28.2%	-87.5%	9.3	2.0%	n/a	20.0%	Medium	High	Easier
Singapore	470.6	5.6%	5.5	1.7%	85,198	17.8%	33.3%	n/a	63.8	0.0%	2.0%	17.0%	Low	Negligible	Easiest
South Africa	725.0	3.8%	54.9	1.6%	13,215	16.4%	68.6%	42.5%	8.1	4.5%	25.1%	28.0%	Medium	Low	Easiest
South Korea	1853.5	4.7%	50.6	0.5%	36,601	13.0%	49.5%	36.3%	12.2	1.5%	3.6%	24.2%	Medium Low	Low	Easiest
Spain	1619.1	1.5%	46.4	-0.1%	34,899	19.2%	57.1%	67.4%	44.9	-0.7%	22.6%	28.0%	Medium	Low	Easiest
Sweden	464.3	3.2%	9.8	0.9%	47,229	22.7%	51.4%	-19.3%	-5.1	0.2%	7.7%	22.0%	Low	Negligible	Easiest
Switzerland	480.9	3.1%	8.2	1.0%	58,731	7.8%	56.7%	24.6%	-8.2	-1.2%	3.4%	17.9%	Low	Negligible	Easiest
Taiwan	1125.3	4.7%	23.5	0.3%	47,899	15.5%	56.6%	n/a	n/a	0.7%	4.0%	17.0%	Medium Low	Low	Easiest
Thailand	1031.2	4.3%	68.8	0.4%	14,980	20.6%	53.5%	n/a	12.6	0.3%	0.8%	20.0%	Medium High	High	Easiest
Turkey	1569.4	5.8%	77.7	1.2%	20,188	18.3%	64.4%	25.9%	12.8	6.6%	11.4%	20.0%	Medium	High	Easier
U.A.E.	624.2	5.9%	9.6	3.0%	65,149	n/a	n/a	-253.3%	10.5	2.1%	0.0%	55.0%	Medium Low	Low	Easiest
UK	2641.4	3.4%	64.9	0.8%	40,676	19.6%	65.1%	82.6%	48.3	0.1%	5.4%	20.0%	Medium Low	Low	Easiest
US	18124.7	3.9%	321.2	0.7%	56,421	11.5%	75.2%	80.4%	295.0	0.1%	5.5%	40.0%	Low	Low	Easiest
Venezuela	505.7	1.4%	30.9	1.6%	16,346	13.1%	55.2%	n/a	7.0	96.8%	12.8%	34.0%	Very High	High	Most difficult

Global Correlation Between Lines

Correlation between lines of business is central to a realistic assessment of aggregate portfolio risk, and in fact becomes increasingly significant for larger companies where there is little idiosyncratic risk to mask correlation. Most modeling exercises are carried out at the product or business unit level and then aggregated to the company level. In many applications, the results are more sensitive to the correlation and dependency assumptions made when aggregating results than to all the detailed assumptions made at the business unit level.

The Study determines correlations between lines within each country. Correlation between lines is computed by examining the results from larger companies that write pairs of lines in the same country.

Aon Benfield Analytics has correlation tables for most countries readily available and can produce custom analyses of correlation for many insurance markets globally upon request. As examples, tables for the US, UK, Colombia, and China appear below.

US

	Homeowners	Private Passenger Auto	Commercial Multi Peril	Commercial Auto	Workers Compensation	Other Liability - Occurrence	Medical PL - Claims Made	Other Liability - Claims-Made	Products Liability - Occurrence
Homeowners		5%	27%	16%	-2%	5%	4%	0%	17%
Private Passenger Auto	5%		11%	24%	41%	21%	29%	22%	27%
Commercial Multi Peril	27%	11%		53%	29%	52%	55%	45%	40%
Commercial Auto	16%	24%	53%		53%	61%	68%	43%	67%
Workers Compensation	-2%	41%	29%	53%		47%	56%	52%	53%
Other Liability—Occurrence	5%	21%	52%	61%	47%		74%	56%	62%
Medical PL—Claims Made	4%	29%	55%	68%	56%	74%		70%	69%
Other Liability—Claims-Made	0%	22%	45%	43%	52%	56%	70%		29%
Products Liability—Occurrence	17%	27%	40%	67%	53%	62%	69%	29%	

UK

	Accident & Health	Commercial Lines Liability	Commercial Motor	Commercial Property	Financial Loss	Household & Domestic	Private motor
Accident & Health		36%	77%	52%	-47%	0%	42%
Commercial Lines Liability	36%		44%	38%	14%	51%	40%
Commercial Motor	77%	44%		44%	-13%	17%	71%
Commercial Property	52%	38%	44%		-19%	68%	33%
Financial Loss	-47%	14%	-13%	-19%		-1%	-25%
Household & Domestic	0%	51%	17%	68%	-1%		17%
Private motor	42%	40%	71%	33%	-25%	17%	

Colombia

	Accident & Health	Crop & Animal	Fidelity & Surety	General Liability	Marine, Aviation & Transit	Motor	Property	Special Liability	Special Property	Surety
Accident & Health		46%	12%	**34%**	4%	**38%**	**19%**	**16%**	**30%**	0%
Crop & Animal	46%		39%	35%	4%	**49%**	28%	40%	33%	13%
Fidelity & Surety	12%	39%		**50%**	10%	**31%**	7%	**20%**	10%	6%
General Liability	**34%**	35%	**50%**		-6%	**38%**	**17%**	**19%**	**15%**	1%
Marine, Aviation & Transit	4%	4%	10%	-6%		11%	10%	20%	18%	-4%
Motor	**38%**	**49%**	**31%**	**38%**	11%		**34%**	**24%**	**48%**	10%
Property	**19%**	28%	7%	**17%**	10%	**34%**		**13%**	**42%**	5%
Special Liability	**16%**	40%	**20%**	**19%**	20%	**24%**	**13%**		**12%**	1%
Special Property	**30%**	33%	10%	**15%**	18%	**48%**	**42%**	**12%**		13%
Surety	0%	13%	6%	1%	-4%	10%	5%	1%	**13%**	

China

|	Accident & Health	Agriculture	Credit	Engineering	Financial Guaranty	General Liability	Marine, Aviation & Transit	Motor	Other	Property	Special Risks
Accident & Health		**32%**	19%	17%	25%	**23%**	**16%**	32%	48%	55%	-29%
Agriculture	32%		39%	26%	-49%	**34%**	20%	8%	26%	3%	**-75%**
Credit	19%	39%		39%	-12%	15%	16%	**30%**	14%	21%	10%
Engineering	17%	26%	39%		28%	**29%**	14%	**48%**	42%	**28%**	**-37%**
Financial Guaranty	25%	-49%	-12%	28%		18%	-6%	-2%		6%	5%
General Liability	**23%**	**34%**	15%	**29%**	18%		**32%**	37%	34%	34%	-17%
Marine, Aviation & Transit	**16%**	20%	16%	14%	-6%	**32%**		31%	31%	8%	0%
Motor	32%	8%	**30%**	**48%**	-2%	37%	31%		38%	38%	-13%
Other	**48%**	26%	14%	**42%**		**34%**	31%	38%		37%	
Property	55%	3%	21%	**28%**	6%	**34%**	8%	**38%**	37%		21%
Special Risks	-29%	**-75%**	10%	**-37%**	5%	**-17%**	0%	-13%		21%	

Correlation is a measure of association between two random quantities. It varies between -1 and +1, with +1 indicating a perfect increasing linear relationship and -1 a perfect decreasing relationship. The closer the coefficient is to either +1 or -1 the stronger the linear association between the two variables. A value of 0 indicates no linear relationship whatsoever.

All correlations in the Study are estimated using the Pearson sample correlation coefficient.

In each table the correlations shown in bold are statistically different from zero at the 95 percent confidence interval.

Underwriting Cycle Adjustment

On page 52 the Study, we show loss ratio volatility parameters with and without the impact of the underwriting cycle in order to decompose total volatility into its loss and premium components. Here is a more detailed description of how the adjustment is computed.
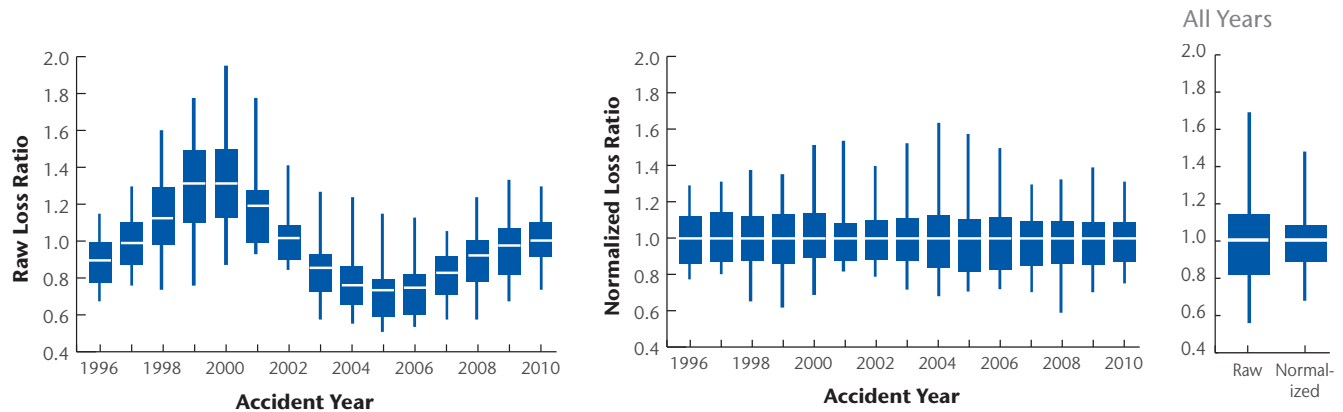
The graphs above illustrate the adjustment for US workers compensation, using data from accident years 1996 to 2010. The left graph shows the range of raw ultimate loss ratios. For illustration purposes, we have scaled the loss ratios to an overall 1.0 average by dividing by the all year average loss ratio—note this does not affect the coefficient of variation. The box and whisker plot shows the 25th to 75th percentiles in the box, and the 2.5th and 97.5th percentiles in the whiskers. The middle line is the mean for each accident year.

The underwriting cycle is clearly visible as the mean loss ratio increases to 1.3 times the all year average during the 1999 to 2000 soft market years and then decreases steadily during the hard market years to a low of 0.8 times average in 2005. The resulting uncertainty in the mean loss ratio over the cycle contributes meaningfully to the total volatility of the loss ratio.

The middle graph removes cycle uncertainty by normalizing each accident year separately to 1.0 by dividing each loss ratio observation by the straight average loss ratio for its corresponding accident year—a standard one-way Analysis of Variance (ANOVA) approach commonly used in statistics. After normalizing separately by accident year, all that remains is the volatility associated with the loss component of the loss ratio. The impact of the underwriting cycle has been removed.

We can calculate the loss ratio volatility, as measured by the coefficient of variation, for the raw loss ratio observations and then again for the loss ratio observations after they have been normalized by accident year. By comparing these two measures of volatility, we can gauge the impact of the underwriting cycle on the total volatility for a line of business.

For US workers compensation, the lower volatility is clearly evident in the right-hand graph, which shows box and whisker plots for all the data combined on a raw and normalized basis. If we apply this method to data from accident years 1987 to 2014, we find that removing the impact of the underwriting cycle lowers the coefficient of variation by 38 percent, from 25 percent to 18 percent as shown on page 52.

Since individual accident years can contain idiosyncratic effects other than the pricing cycle, such as catastrophe losses, the adjustment method described here can overstate the effect of the cycle. The overstatement will be greatest for property lines and relatively minimal for liability lines, where systematic catastrophe losses are far less common.

Tail Correlation

The Study includes numerous correlation matrices, but correlation alone does not fully describe dependence between variables. There are many ways to combine two variables to have the same linear correlation coefficient. For example, the familiar symmetric, elliptical contours of the normal copula can have the same linear correlation as a distribution pinched either on the left, the right, or both sides. The impact of dependence is most clearly seen in the distribution of the sum or portfolio return of the two variables, with extreme tail correlation producing an aggregate distribution with fatter tails. Variables in financial markets, such as daily stock returns, often exhibit such extreme tail correlation as was observed during the financial crisis.

However, outside the well-known, and well-modeled, case of property catastrophe losses our analysis of US data indicates little evidence of extreme tail correlation. Our analysis is based on comparing historical loss ratio observations for pairs of lines written by the same company against what the distribution would be if the observations were from a bivariate normal distribution—i.e. assuming a normal copula.

Raw data

Normal transformed
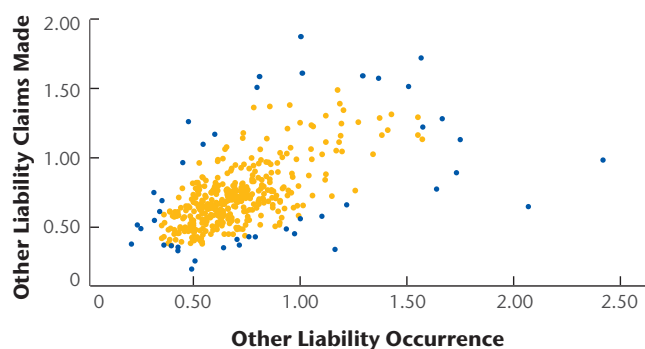
The graph above depicts this analysis for other liability occurrence and other liability claims made. The left graph shows the untransformed, raw loss ratio historical observations. Based on this graph, there is a clear positive correlation between the two variables, however, the tail correlation is difficult to see due to the skewness of the marginal distributions. The graph on the right alleviates this issue by transforming the observations onto the normal scale, by calculating the empirical cumulative distribution function for both variables and then taking the inverse of the normal cumulative distribution function at each point on the distribution. The normal transformation provides a clear picture of the dependency between the two variables, including in the tails. Confidence levels of 10 and 1 percent are calculated and shown on the graph as dashed ellipses. If the relationship between the variables is consistent with a normal copula, then we would expect 10 percent of the points to fall outside of the 10 percent confidence interval, and 1 percent to fall outside the 1 percent level. Here we see, 9.8 percent and 0.8 percent of points fall outside the 10 percent and 1 percent levels, respectively—giving no reason to reject the normal copula hypothesis.
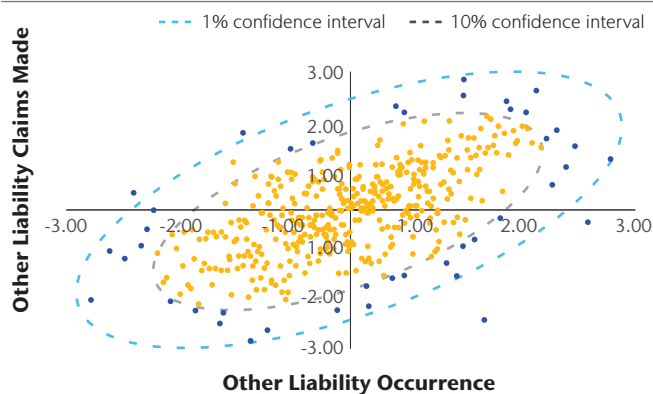
Tail correlation summary

Line 1	Line 2	Percent Outliers		
		10% Level	5% Level	1% Level
HOFO	PPAL	9.9%	4.9%	1.2%
CMP	CAL	9.7%	6.1%	1.8%
CMP	WC	10.9%	5.6%	1.1%
CMP	OLO	10.6%	6.1%	1.1%
CAL	WC	8.1%	4.7%	1.4%
CAL	OLO	9.4%	5.0%	1.5%
WC	OLO	9.9%	5.2%	1.0%
OLO	OLC	9.8%	5.0%	0.9%
MLC	OLC	8.1%	3.5%	0.6%
MLC	WC	9.7%	4.2%	0.0%

The table above shows the percentage of observations that are outliers at the 10 percent, 5 percent, and 1 percent levels for several additional pairs of lines. With the exception of CMP, a catastrophe exposed line, the results are consistent with a normal copula. However, it is important to remember that this analysis is based only on the past 28 accident years of data, and we may yet observe extreme tail correlation in future insurance results.

Sources and Notes

Inside the Data, Page 4

Sources:

A.M. Best, Axco Insurance Information Services, SNL Financial; analysis by Aon Benfield Analytics

Section 1: The insurance market

Inside the Data, "Insurance Relevance to the Economy"

Sources:

Axco Insurance Information Services, IMF World Economic Outlook Database April 2015 Edition

Section 2: Demand

Demand: Existing Risks

Sources:

2005-2010 FARS Final File, 2011 FARS Annual Report File, FHWA December 2014 Traffic Volume Trends, February 2015; National Practitioner Data Bank Public Use File, 12/31/2014, US Department of Health and Human Services, Health Resources and Services; 2015 ISO General Liability Trend Data and Analysis; National Fire Protection Association Report on Fire Loss in the United States During 2013; World Health Organization; Ministry of Health, Labour and Welfare (Japan); Statista; Department of Infrastructure and Regional Development (Australia); Government of India; Road Traffic Safety Authority (South Korea); Health Ministry Yearbook (China), UN Economic Commission for Europe (UNECE) Transport Division Database, Factory Mutual, Hartford Steam Boiler, Underwriters Laboratories: company websites

Demand: Emerging Risks

Sources:

Aon Global Risk Management Survey 2015

Cyber Risk

Sources:

"2015 Global Cyber Impact Report", conducted by the Ponemon Institute, sponsored by Aon Risk Services; A.M. Best

Microinsurance

Sources:

Axco Insurance Information Services; Leapfrog Investments; International Labour Organization; The Microinsurance Network, "The State of Microinsurance", 2015

URL: http://www.microinsurancenetwork.org/groups/state-microinsurance

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Sources:

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URL: http://www.pwc.com/en_US/us/technology/publications/assets/pwc-consumer-intelligence-series-the-sharing-economy.pdf;

Inside the Data, "US Insurance Premium & Employment"

Sources:

Insurance Information Institute, Current Employment Statistics Survery, Bureau of Labor & Statistics (US), SNL Financial

Section 3: Supply & Capital

Supply & Capital

Sources:

Aon Benfield Reinsurance Market Outlook 2015, analysis by Aon Benfield Analytics; Taleb tweet, Nassim Nicholas Taleb (@nntaleb) December 17, 2014; Surge pricing, "Let's Uberize the Entire Economy", Brian M. Carney, forbes.com; Supply competition: John H. Cochrane, "What health care should learn from Uber", June 2015, http://www.chicagobooth.edu/capideas/magazine/summer-2015/what-health-care-should-learn-from-uber

US Mortgage Credit Risk Sharing

Sources:

Aon Benfield, Bureau of Labor Statistics, Fannie Mae, Federal Housing Finance Agency, Freddie Mac, Urban Institute Housing Finance Policy Center

Inside the Data, "Impact of Weather Events on the Economy"

Sources:

Aon Benfield and World Bank GDP

Section 4: Data and Analytics

Data and Analytics for Risk Assessment

Sources:

"How Google Works", Eric Schmidt and Jonathan Rosenberg

The UK Motor Market

Sources:

Deloitte analysis of A.M. Best database of PRA regulatory returns, Association of British Insurers, CARE database, OECD, Axco Insurance Information Services, China Insurance Yearbook, sinoins.com, and company websites

Corporate Liability Giga Loss

Sources:

Advisen, Bloomberg; analysis by Aon Benfield Analytics

Reputation and Brand Risk

Sources:

"Reputation Review 2012", published by Oxford Metrica, sponsored by Aon Risk Solutions; Aon Global Risk Management Survey 2015

Inside the Data, "Signs of the Times"

Sources:

Geohive, United Nations Department of Economic and Social Affairs, internetlivestats.com, Cisco, CompTIA

URLs: http://www.geohive.com/earth/his_history3.aspx, http://esa.un.org/unpd/wup/CD-ROM

Section 5: Perspectives

Growth Outside Traditional Insurance
Sources:
ADT investor presentation, May 14th, 2015

Inside the Data, Page 42
Sources:
See Section 6

Section 6: Global Risk Parameters, Profitability and Growth Metrics

Global Premium, Capital, Profitability & Opportunity
Sources:
A.M. Best, Axco Insurance Information Services, IMF World Economic Outlook Database April 2015 Edition, SNL Financial, Standard & Poor's, World Bank

Notes:
Premium amounts stated in USD are converted to USD by Axco. Growth rates are calculated in original currency and exclude currency exchange fluctuation.

Country Opportunity Index Calculation: For each combined ratio, growth and political risk statistic, countries were ranked and segmented into quartiles. A score of 1 to 4 was assigned to each metric based on quartile. Opportunity Index Score = one-third multiplied by combined ratio score plus two-thirds multiplied by average of premium, GDP and population growth and political scores. Ties were broken by premium growth.

Growth Markets and Out/Underperformers—Premium and growth calculated using Axco data. Loss ratios for motor, property and liability lines also calculated using Axco. "All lines" loss, expense, and combined ratios are calculated using A.M. Best's Statement File–Global and are based on the net results of the largest 25 writers for a given country (where available).

Global Risk Parameters and US Risk Parameters
Sources:
ANIA (Italy), Association of Vietnam Insurers, BaFin (Germany), Banco Central del Uruguay, Bank Negara Malaysia, CADOAR (Dominican Republic), Cámara de Aseguradores de Venezuela, Comisión Nacional de Bancos y Seguros de Honduras, Comisión Nacional de Seguros y Fianzas (Mexico), Danish FSA (Denmark), Dirección General de Seguros (Spain), DNB (Netherlands), Ernst & Young Annual Statements (Israel), Finma (Switzerland), FMA (Austria), FSA (UK), HKOCI (Hong Kong), http://www.bapepam.go.id/perasuransian/index.htm (Indonesia), ICA (Australia), Insurance Commission (Philippines), IRDA Handbook on Indian Insurance Statistics, Korea Financial Supervisory Service, Monetary Authority of Singapore, MSA Research Inc. (Canada), Quest Data Report (South Africa), SNL Financial (US), Superintendencia de Banca y Seguros (Peru), Superintendencia de Bancos y Otras Instituciones Financieras de Nicaragua, Superintendencia de Bancos y Seguros (Ecuador), Superintendencia de Pensiones de El Salvador, Superintendencia de Pensiones, Valores y Seguros (Bolivia), Superintendencia de Seguros de la Nación (Argentina), Superintendencia de Seguros Privados (Brazil), Superintendencia de Seguros y Reaseguros de Panama, Superintendencia de Valores y Seguros de Chile, Superintendencia Financiera de Colombia, Taiwan Insurance Institution, The Insurance Association of Pakistan, The Statistics of Japanese Non-Life Insurance Business, Undersecretariat of Treasury (Turkey), China Insurance Yearbooks, and annual financial statements

Notes:
Modern portfolio theory for assets teaches that increasing the number of stocks in a portfolio will diversify and reduce the portfolio's risk, but will not eliminate risk completely; the systemic market risk remains. This behavior is illustrated in the left hand chart below. In the same way, insurers can reduce underwriting volatility by increasing account volume, but they cannot reduce their volatility to zero. A certain level of systemic insurance risk will always remain, due to factors such as the underwriting cycle, macroeconomic trends, legal changes and weather, see right chart. The Study calculates this systemic risk by line of business and country. The Naïve Model on the right hand plot shows the relationship between risk and volume using a Poisson assumption for claim count – a textbook actuarial approach. The Study clearly shows that this assumption does not fit with empirical data for any line of business in any country. It will underestimate underwriting risk if used in an ERM model. See graphs on facing page.

US Reserve Adequacy

Sources:
SNL Financial; analysis by Aon Benfield Analytics

Macroeconomic, Demographic, and Social Indicators

Sources:

Aon Political Risk Map 2015, Aon Terrorism & Political Violence Map 2015, Axco Insurance Information Services, Bloomberg, IMF World Economic Outlook Database April 2015 Edition, KPMG, Penn World Table Version 8.1, World Bank

Notes:
Table—GDP (PPP) is GDP in local currency adjusted using purchasing power parity (PPP) exchange rate into US dollars. The PPP exchange rate is the rate at which the currency of one country would need to be converted in order to purchase the same amount of goods and services in another country.

Global Correlation Between Lines

Sources:

FSA (UK), SNL Financial (US), Superintendencia Financiera de Colombia, and China Insurance Yearbook

Underwriting Cycle Adjustment and Tail Correlation

Source:
SNL Financial

Notes:
The chart displays accident years 1996 to 2010. The 38 percent volatility impact quoted at the bottom of the page refers to accident years 1987 to 2014, in order to match the parameters displayed on page 52.

Asset portfolio risk
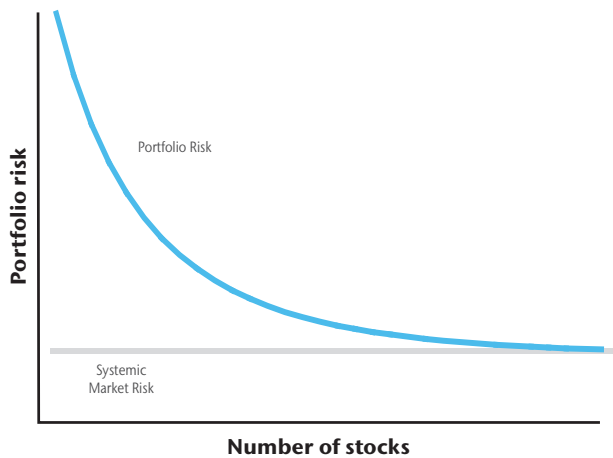
Insurance portfolio risk
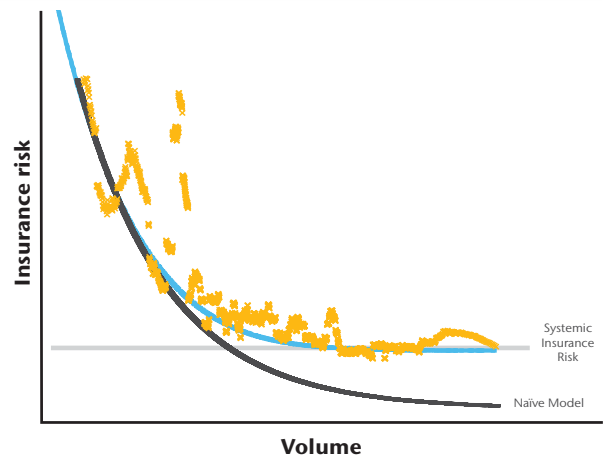
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