

Understanding and Addressing Global Insurance Protection Gaps



April 2018

The Geneva Association

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Understanding and Addressing Global Insurance Protection Gaps

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April 2018

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Published by The Geneva Association (The International Association for the Study of Insurance Economics), Zurich.

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Acknowledgements

This publication is an output of the Protection Gap research programme of The Geneva Association guided by Christian Mumenthaler, Group CEO of Swiss Re, and Markus Riess, CEO of Ergo Group.

We are very much indebted to the members of the Working Group that was established in support of our Protection Gap research activities, namely: Manuel Aguilera (MAPFRE), Arne Holzhausen (Allianz), Thomas Holzheu (Swiss Re), Gisela Plassmann (Ergo Group) and Clarence Wong (Swiss Re).

In addition, we would like to thank Petra Löw from Munich Re NatCatSERVICE for sharing historical data on natural catastrophe protection gaps globally and for different country income groups. Based on this data, we were able to perform genuinely original analyses.

Foreword



Anna Maria D'Hulster

Secretary General,
The Geneva Association

In November 2014, The Geneva Association published its maiden research report on '*The Global Insurance Protection Gap—Assessment and Recommendations*'. This report offered a summary of major protection gaps in non-life and life insurance, their root causes as well as recommendations for potential remedies.

The topic's relevance is unabated. Risk exposures, driven by digitisation, urbanisation and climate change as well as value accumulation and concentration, tend to outgrow insurance premiums, leaving individuals, households, firms and the public sector alike underinsured. It is well documented that on average only one third of economic disaster losses are insured. In other areas too, from agriculture to term life, people buy less insurance than is economically beneficial. In addition, the digital transformation of modern economies creates a major gap between cyber risk exposure and available risk management and transfer options. The fact that cyber premiums account for less than one per mille of global insurance premiums speaks volumes.

The root causes and prevalence of insurance protection gaps vary widely across the globe, reflecting different stages of economic development as well as social, institutional and cultural peculiarities. Insurance protection gaps are most striking in developing and emerging markets where combined insurance premiums still fall significantly short of these countries' and regions' share in global GDP.

Against this backdrop, The Geneva Association offers an updated quantification of protection gaps in the areas of natural catastrophe, cyber, healthcare and pension risk. These areas were chosen due to the availability of relatively recent global data. In addition, we put forward a comparative taxonomy of root causes, distinguishing between high-, middle- and low-income countries in order to enhance the understanding of insurance protection gaps as a function of economic stages of development. Finally, we discuss potential remedies and contributions from insurers, governments and private-public partnerships. Insurers have a vital role to play in this mix of solutions—as well-capitalised risk absorbers, as facilitators of cost-efficient risk transfer and diversification, and as enablers of more risk-conscious behaviours.

We hope that this publication will encourage stakeholders to discuss insurance protection gaps and potential remedies in a more holistic way, with a clear view of commonalities and differences across various lines of business and country income groups.

1. Management summary

The most appropriate definition of *insurance protection gaps* is the difference between the amount of insurance that is economically beneficial and the amount of coverage actually purchased. This gap is smaller than the broader *risk protection gap* which describes the difference between total losses and insured losses. Defined as above, the insurance protection gap is hard to measure and subjective. Therefore we replace it by an indicator comparing covered loss to total economic loss. This figure, however, needs to be put into perspective, as a certain level of risk retention makes economic sense.

Protection gaps differ widely in terms of size, nature and dynamics, depending on the line of business and the general maturity of the insurance market. Historically, uninsured natural disaster losses were at the root of the protection gap discussion and they are still among those that make the headlines most frequently and spur the most intense debates.

No progress in shrinking the natural catastrophe protection gap in lower income countries

According to Munich Re, the natural catastrophe protection gap (uninsured losses as a share of total losses) has narrowed steadily over the past 30 years, from 78 per cent to 70 per cent, and from 0.3 per cent to 0.2 per cent of the world's GDP. Despite this gratifying global trend, the protection gap remains massive, with only about 30 per cent of catastrophe losses insured. In addition, this global trend masks huge differences between the various country income groups. Progress in terms of shrinking the gap has basically been limited to high- and upper middle-income countries, where the shortfalls decreased markedly by 12 and 11 percentage points to their current average levels of 55 per cent and 86 per cent respectively. Alarming, there was hardly any progress in lower middle- and lower-income countries, with protection gaps persisting in excess of 95 per cent. Those countries remain extremely vulnerable, with average annual catastrophe-induced GDP exceeding the global average by a significant multiple. Using a Monte Carlo simulation tool for a sample of 30 countries and extrapolating the results, Swiss Re projects the future protection gap at more than USD 150 billion p.a. or about 0.25 per cent of global GDP.

The cyber protection gap is estimated at about 90 per cent—in the face of major hurricane-like economic loss scenarios

The least researched protection gap is cyber risk. Estimating the cost of cyber incidents is challenging. Reported figures are likely to understate the extent of damage caused as affected institutions often have neither an incentive nor an obligation to disclose incidents. Some studies put the annual global economic cost of cyber incidents at around USD 400 billion, almost 0.5 per cent of global GDP and almost twice the average annual amount of natural disaster losses.

Current annual gross premiums for global cyber insurance are estimated at USD 3 to 3.5 billion, about 1.5 per mille of global non-life insurance premiums, according to Lloyd's. Swiss Re expects the global cyber insurance market to grow briskly to USD 18 billion by 2025; however, this would still be less than 1 per cent of the global non-life insurance market. A comparison of the current cumulative global damage from cyber incidents with today's cyber premiums generated by the insurance industry suggests that virtually all cyber losses remain uninsured and, from a macro perspective, insurance-based transfer of cyber risk still lacks any real relevance. Lloyd's recently attempted to quantify the cyber risk protection gap, based on modelled economic loss scenarios of up to USD 53 billion (i.e. equivalent to losses from a major hurricane) and protection gaps of about 90 per cent.

Healthcare—out-of-pocket expenses amount to about 2 per cent of global GDP

It is even more challenging to quantify the healthcare protection gap, primarily on account of the institutional and legal complexity of healthcare systems as well as the huge differences in the quality and availability of healthcare services. Out-of-pocket expenses (OOP), i.e. the share of the expenses that the insured must pay directly to the healthcare provider, without reimbursement by a third-party such as an insurer or the government, can serve as a very rough indicator of healthcare protection gaps. When people incur copayments or fees for healthcare services, the amount of such OOP expenses in relation to income can reach financially catastrophic proportions for the individual or the household.

World Health Organization research shows that catastrophic expenditure can occur in all countries at all stages of development. In most OECD countries, health systems and financial risk-pooling mechanisms have been developed over several decades. Nonetheless, even in these countries some households are threatened by catastrophic payments. In general, health systems that require lower OOP provide a higher level of protection to the poor against catastrophic spending—spending which remains low in countries where OOP represents less than 20 per cent of total national health expenditure.

The macroeconomic proportions of OOP are sizeable. Across the various country income groups defined by the World Bank the GDP share of total national OOP ranges from 1.8 to 2.4 per cent. This ratio is just an illustration of the healthcare protection gap and could even be compared with the natural catastrophe protection gap's long-term annual average GDP share of 0.3 per cent globally. In light of rising levels of income per capita and unabated medical inflation, the healthcare protection gap is set to grow further.

Some estimates put the global pension savings gap at more than USD 100 trillion, about 1.5 times the world's GDP

As funding shortfalls are accumulated over time, the headline proportions of the 'pension savings gap' are even more staggering. It is defined as the difference between the present value of the yearly lifetime income needed to sustain a reasonable standard of living, and the actual amount that is saved for retirement plus the present value of pay-as-you-go (PAYG) benefits. Based on a target replacement rate of 70 per cent, defined as the percentage of a worker's pre-retirement income that is paid out by pension programmes on retirement, Aviva has quantified pension savings gaps for the European Union. The gaps show how much more people retiring between 2017 and 2057 would need to save each year to meet the 70 per cent target replacement rate level. The analysis suggests that European Union citizens may need to save an extra EUR 2 trillion p.a. to close the pension savings gap—equivalent to around 13 per cent of EU GDP in 2016.

In 2016, The Geneva Association estimated the global pension gap to be USD 41 trillion, after taking into account Pillar I (PAYG) entitlements. Excluding any Pillar I benefits, the gap amounts to more than USD 100 trillion.

The most recent estimate of current and projected future pension gaps was undertaken by the World Economic Forum. In 2015, the retirement savings gap for Australia, Canada, China, India, Japan, Netherlands, the U.K. and U.S., based on a 70 per cent income replacement target level, is estimated at around USD 70 trillion (including Pillar I benefits). This gap is roughly equal to 1.5 times the 2015 GDP of these countries. Extrapolating this ratio to the rest of the world would yield an illustrative global pensions savings gap of more than USD 110 trillion.

Why individuals and businesses buy less insurance than is economically beneficial

The reasons for insurance protection gaps lie with both demand- and supply-side factors affecting the demand for and the provision of insurance services. In addition, they vary for various stages of economic development.

On the demand-side, *affordability* remains a relevant obstacle primarily in developing and emerging insurance markets, as shown in this report. In addition, numerous empirical studies suggest that a lack of awareness, as a result of poor financial literacy or general education, plays an important role in explaining underinsurance, even in countries with higher levels of per-capita income.

Product appeal and service quality are of great importance, especially in advanced insurance markets, and they include the ease of buying insurance cover and the rising customer expectations in the wake of digitisation.

Policyholder trust in the context of insurance protection gaps is particularly relevant for developing and emerging markets, which are frequently characterised by relatively weak legal and regulatory systems for enforcing payment of valid claims.

Cultural and social factors can also help to understand insurance protection gaps, ranging from differences in risk aversion to factors attributed to religion, as shown by various empirical analyses focusing on low-income countries.

Behavioural biases are of more general relevance. More recently, behavioural factors have emerged as explanations for apparent demand anomalies in insurance. One example is loss aversion, i.e. individuals being more sensitive to small

losses than large gains. In insurance, the premium is a certain and near-term expense, whereas the claim benefit is uncertain and distant and is therefore perceived as a potential loss.

However, insurance protection gaps do not only reflect demand-side issues. Equally important are insurance market imperfections that hold back insurance supply. *Transaction costs* are one of the most prominent examples. In non-life insurance, for example, about 30 cents of each dollar premium are generally absorbed by distribution and general administrative expenses. Even though it reflects its complexity, this fact dents the economic appeal of insurance, especially in low-income countries.

In addition, imperfect and asymmetric information is a long-standing feature of today's insurance markets. It can explain insurance protection gaps as it is set to lead to *adverse selection*, i.e. 'poor' risks being more likely to purchase cover. Another structural reason for inefficient insurance markets is *moral hazard*, i.e. the probability of a person assuming more risks because someone else is carrying the cost of those risks. Also, daunting accumulation scenarios such as in cyber insurance present so far unresolved challenges.

Furthermore, *institutional parameters*, such as the legal and regulatory environment, are major determinants of insurance supply. In many developing and emerging markets, the legal environment (e.g. a proper contract law) is still weak, and rules are frequently not enforceable. In addition to an effective legal framework, a sound regulatory framework is required to enable a stable insurance market and protect policyholders.

Last but not least, certain risks do not meet the most fundamental criteria of *insurability* and are considered uninsurable from a commercial viability point of view.

Effective remedies require a concerted effort

Any comprehensive and promising approach to narrowing insurance protection gaps requires a multi-stakeholder effort. The collaboration of private-sector insurers and local governments is of particular importance.

The optimal configuration of this multi-stakeholder mix depends on the maturity of insurance markets and the

specific nature of protection gaps. In advanced economies, there is a limited need but significant capacity for heavy government involvement, for example in the full absorption of natural catastrophe risks. In developing markets, the trend is one of low risk transfer and management capabilities in combination with massive protection gaps. In this case, governments may need to play a strong enabling and guiding role, albeit against the backdrop of limited fiscal leeway.

In general, governments can help improve the availability of retail and wholesale insurance by introducing *compulsory schemes* which create sufficiently large risk communities and risk pools.

In addition, many public sector entities are increasingly utilising *new forms of sovereign risk transfer* in order to relieve their balance sheets, especially from natural disaster losses. Countries in Africa, the Caribbean and the Pacific have always been particularly exposed to extreme weather events such as hurricanes, droughts and floods, but in recent years this exposure has grown further on the back of population growth, urbanisation dynamics, overexploitation of natural resources, environmental degradation and changing climate and weather patterns.

As a complement to improving risk transfer, protection gaps also need to be addressed through the *prevention and reduction of losses*. Government-sponsored building codes, for example, have proved essential for establishing and enforcing risk-reduction measures.

Also, in many advanced insurance markets, governments step in as insurers or reinsurers of last resort for certain risks which defy the most fundamental criteria of insurability. Under such circumstances *government backstop programmes* can facilitate private sector insurance solutions which at least could offer partial coverage, e.g. against catastrophic terrorism and, potentially, cyber security scenarios.

Having said all this, insurers have to step up their game. For example, irrespective of an economy's stage of development, *digital and mobile technologies* can go a long way in addressing protection gaps by simultaneously promoting affordability, awareness and product appeal. On the back of unprecedented data availability and quality, technology also facilitates the product innovation that is generally needed to expand risk pools. Technology might ultimately even help to expand the limits of insurability.

2. Size and nature of insurance protection gaps

2.1. Natural catastrophes

Defining the natural catastrophe protection gap

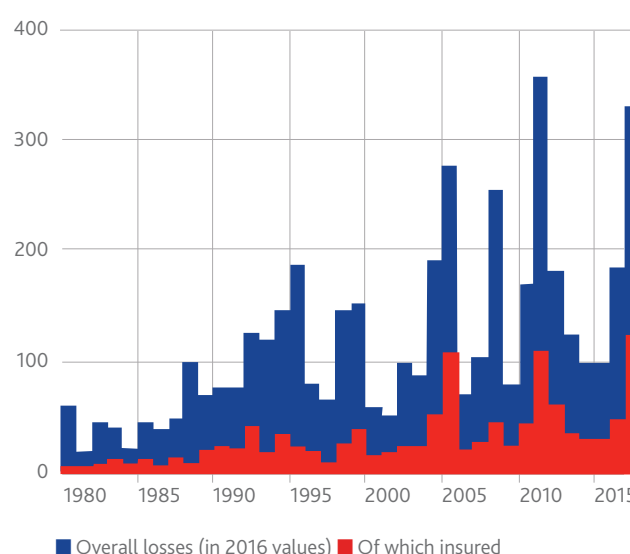
In property catastrophe insurance, the *overall* protection gap is generally referred to as the share of uninsured losses to total economic losses. The *insurance* protection gap, however, is smaller as the full insurance of all economic losses is neither desirable nor economically plausible. There are rational economic reasons for not fully insuring. Insureds usually retain some risks according to their risk appetite, risk bearing capability and cost-efficiency considerations. Individuals may use savings or credit lines as substitutes for insuring high-frequency/low-severity losses. In addition, Mossin (1968) suggests that it is not optimal to buy full insurance due to the transaction costs. Furthermore, insurers implement deductibles to mitigate moral hazard, translating into lower sums insured. Also, institutional factors such as extensive social security benefits reduce the need for individuals to take out private insurance. Therefore, the most appropriate definition of insurance protection gaps is the difference between the amount of insurance that is economically beneficial—taking into account some rational self-insurance or alternative ways of risk transfer—and the amount of coverage actually purchased.

For the purpose of this study we focus on the property catastrophe protection gap only and ignore general property risk, such as fire, water damage, burglary and business interruption.

Quantifying the natural property catastrophe protection gap

Figure 1 shows the difference between insured and economic losses since 1980. In absolute terms, according to the Munich Re NatCatSERVICE, the global catastrophe protection gap in the record catastrophe year of 2017 amounted to about USD 195 billion, or approximately 59 per cent of total economic losses of USD 330 billion, compared with the average value of about 70 per cent since 2000 (see also Figure 3).

Figure 1: Insured versus uninsured natural catastrophe losses, 1980-2017, in USD billion



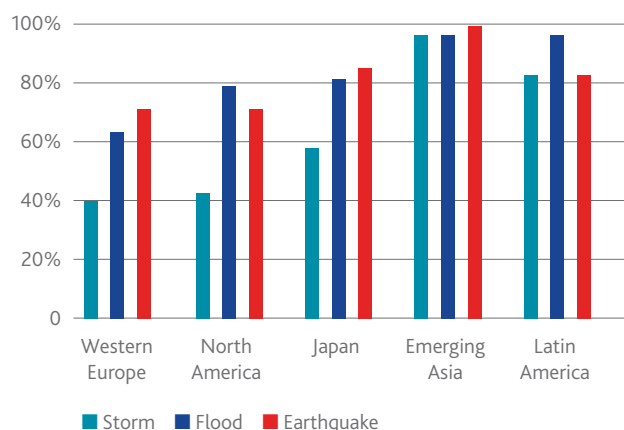
Source: Munich Re (2018)

A closer examination of the current protection gap by region and by peril

From 1980 to 2017, an estimated USD 4.6 trillion of economic losses were recorded globally as a result of natural disaster events. About USD 1.2 trillion were indemnified through insurance and approximately USD 3.4 trillion remained uninsured, according to the Munich Re NatCatSERVICE.

As revealed by Figure 2, the share of uninsured property catastrophe losses varies significantly by region and peril. In Emerging Asia, the protection gap exceeds 90 per cent for all three major perils (storms, floods and earthquakes). In Latin America, the protection gap is most pronounced for flood risk. In the mature markets of Western Europe, North America and Japan, storm risk is covered much more broadly than the other two perils (see Figure 2).

Figure 2: The average natural catastrophe protection gap by region and peril, 1980-2016



Source: Munich Re NatCatSERVICE

Figure 2 shows that the protection gap is a global phenomenon and not just a developing world issue. Coverage gaps are equally pronounced in many advanced economies. The April 2016 Kumamoto earthquakes in the Kyushu region of Japan, for example, caused economic losses of about USD 32 billion, with a protection gap of USD 25 billion. The insurance shortfall was even more dramatic in Italy, where the tremors that hit the central part of the country in August and October 2016 resulted in combined economic losses of USD 6 billion, of which a mere 3.4 per cent was insured (Munich Re (2018)). In the U.S. too, there are major pockets of underinsurance. For example, just over 10 per cent of homes in California have earthquake insurance. In addition, in 100-year U.S. floodplains, only about half of the homes are insured against floods (Kousky and Kunreuther (2017)).

Economic vulnerability as a function of GDP per capita

Figure 3 is based on data from the Munich Re NatCatSERVICE. It illustrates the importance of distinguishing between high-, upper middle-, lower middle- and low-income countries when discussing natural catastrophe protection gaps. Globally, the gap has narrowed steadily over the past three decades from 78 to 70 per cent (based on 10-year moving averages). However, gratifying as this trend may be, it does mask huge differences between income groups in different countries. Progress, in terms of shrinking the gap, was

basically limited to high- and upper middle-income countries (with GDP per capita of more than USD 12,235; and between USD 3,956 to USD 12,235, respectively, as defined by the World Bank). These two country groups recorded protection gap reductions of 12 and 11 per cent, respectively. This major success story does warrant more dedicated research into its determinants, not least in order to derive lessons applicable to lower middle- and lower-income countries (with a GDP per capita of USD 1,006 to USD 3,955; and less than USD 1,006, respectively). In these countries there was no progress whatsoever, with protection gaps stuck at more than 95 per cent (see Figure 3).

These findings help to understand why global policy efforts in the areas of disaster risk reduction and mitigation focus on lower- and lower middle-income countries.

Figure 3: The natural catastrophe protection gap (uninsured losses as a share of total losses) for different country income groups, 10-year moving averages, 1989-2016

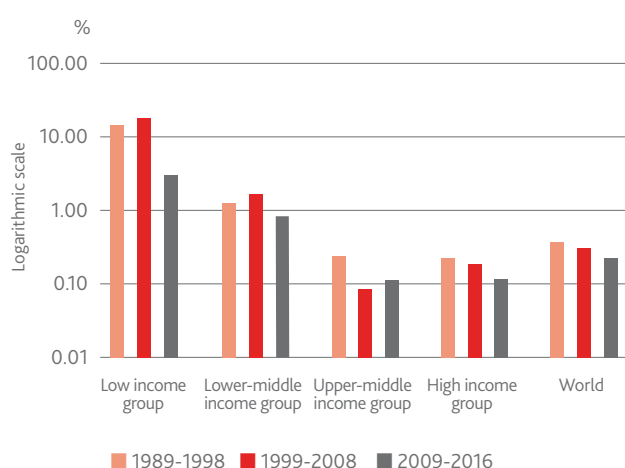


Source: Munich Re NatCatSERVICE

Figure 4 shows, on a logarithmic scale and based on 10-year moving averages, the share of uninsured disaster losses in GDP over the same period of time and for the same country income groups. Over the past three decades, the share of worldwide uninsured losses in global GDP has decreased from 0.31 to 0.19 per cent. For high-income countries, the share fell from 0.20 to 0.13 per cent. Upper middle-income countries show a reduction from 0.21 to 0.11 per cent. Lower middle-income countries display no clear trend, with shares hovering around 1 per cent,

indicating a significantly higher macro-economic relevance of uninsured losses compared to wealthier countries. This is particularly true for low-income countries, with average uninsured disaster losses amounting to around 15 per cent of GDP in the 1990s and 2000s before showing a reduction to about 3 per cent more recently, but this still shows an enormous degree of vulnerability as a result of underinsurance.

Figure 4: Uninsured natural catastrophe losses as a share of GDP for different country income groups, 10-year moving averages, 1989-2016



Source: Munich Re NatCatSERVICE

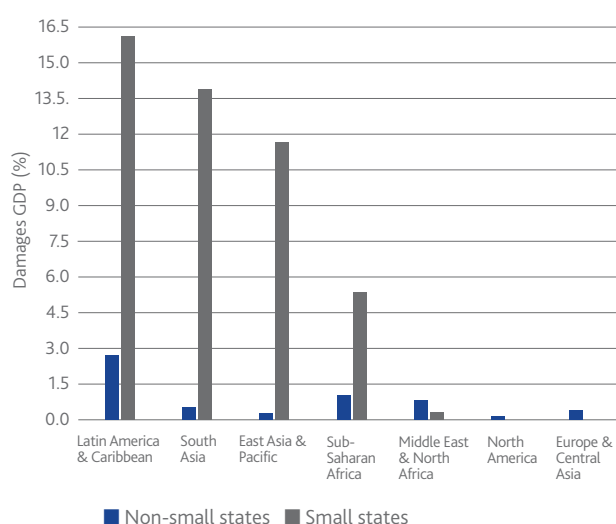
The IMF (2016) shows that small developing states are disproportionately vulnerable to natural disasters. The IMF membership includes 34 small developing states, categorised as countries with a population less than 1.5 million that are not advanced market economies or high-income oil exporting countries (as defined by the World Bank). About half of the group are lower or lower-middle income states.

Based on the most widely used database on natural disasters (EM-DAT), the IMF calculates that the economic cost of the average natural disaster between 1950 and 2014 was equivalent to nearly 13 per cent of GDP for small states compared to less than 1 per cent of GDP for larger states. Natural catastrophes are not only more costly but in some cases also more frequent in small states, partly reflecting their unfavourable location in the cyclone and hurricane belts on each side of the equator. In addition, if these countries fall into the low-income group, they generally lack the scale for the efficient implementation

of building codes and early warning/disaster response systems, for example.

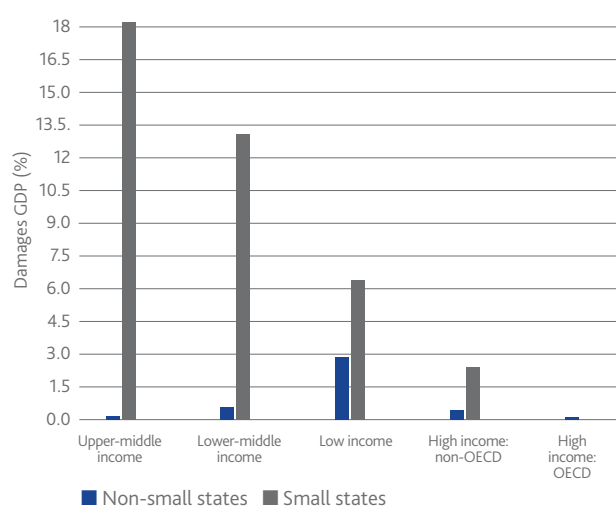
Latin America and the Caribbean display the highest level of vulnerability for both small and non-small states. From an income per capita perspective, upper middle-income small states and low income non-small states are most vulnerable (see figures 5 and 6).

Figure 5: Average impact of disasters (total losses as a share of GDP) by region, 1950-2014



Source: IMF (2016)

Figure 6: Average impact of disasters (total losses as a share of GDP) by income per capita, 1950-2004



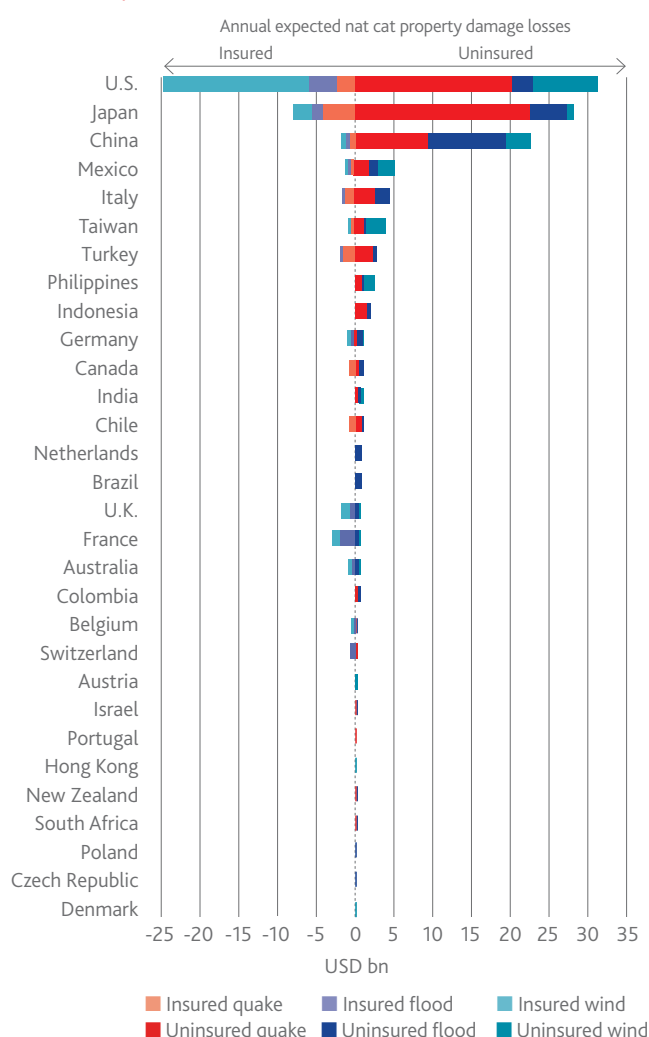
Source: IMF (2016)

Projecting the natural catastrophe protection gap

Using a Monte Carlo simulation tool, Holzheu and Turner (2018) estimate expected losses for a sample of 30 countries, based on information on assets and risks by location.

As shown by Figure 7, the world's biggest economies—the U.S., China and Japan—have the largest expected (modelled) uninsured natural catastrophe risk in absolute USD terms. All three countries display large property values exposed to peak natural disaster risks such as earthquake, flood and tropical storm.

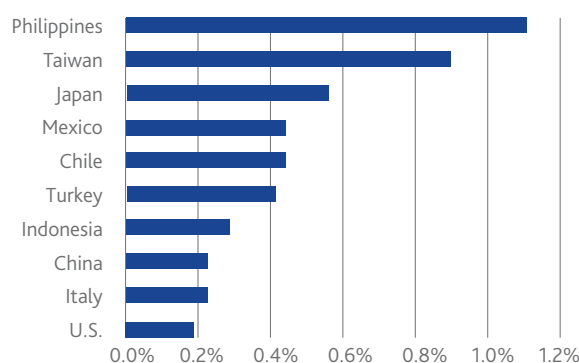
Figure 7: Expected insured and uninsured losses from natural catastrophes, in USD billion



Source: Holzheu and Turner (2018)

Holzheu and Turner also show that, as a percentage of GDP, Taiwan, Turkey and Chile stand to lose the most from earthquake risk, while Taiwan, the Philippines, Hong Kong and Mexico would be most severely affected by windstorm risk. Figure 8 summarises the combined scenarios for earthquake, flood and windstorm for the 10 most exposed countries of their sample. Generally speaking, emerging economies are more vulnerable to suffering from the disruptions caused by uninsured catastrophes. Among the mature markets, Japan stands out, reflecting a relatively low commercial insurance penetration (Swiss Re (2017b)). One reason for the limited take-up of commercial earthquake insurance in Japan is companies' high level of preparedness, e.g. through measures such as strengthening the resistance of buildings and establishing elaborate business continuity management processes. Therefore, the lack of commercial earthquake insurance cover is (somewhat) offset by effective pre-disaster risk mitigation and adaptation (The Geneva Association (2014); see also Section 4 for a discussion on the insurability of catastrophic risks and the way in which public-private partnerships could support the development of a commercial market for such risks in both developed and emerging markets).

Figure 8: Expected uninsured losses from natural catastrophes as a percentage of GDP



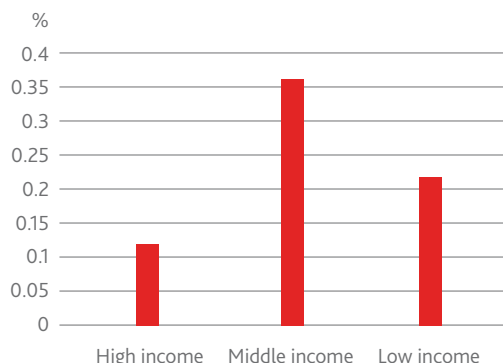
Source: Holzheu and Turner (2018)

Holzheu and Turner (2018) extrapolate these results to missing countries in proportion to their respective GDP. This extrapolation yields expected uninsured losses from catastrophes as an estimated USD 153 billion annually.

The authors acknowledge this estimate's shortcomings. It overestimates the protection gap since the modelled total economic losses include public infrastructure and commercial property where partial self-insurance exists. On the other hand, the projection tends to underestimate the overall protection gap since perils like hail, drought, tornadoes, mudslides and volcanoes are not included in the probabilistic models.

These findings are in line with those of Swiss Re (2015b), which also show expected natural catastrophe protection gaps by country income group. Middle-income countries display the highest relative protection gaps whereas high-income countries show the lowest, at just one third of the middle-income countries' relative exposure (see Figure 9).

Figure 9: Modelled natural catastrophe protection gaps by country income group¹



Source: Swiss Re (2015b)

The prospects for private property catastrophe insurance

Natural catastrophe protection gaps can place a significant burden on the public sector, for example as a result of lost public physical assets, the cost of emergency response measures and assistance to the affected population, foregone tax revenue and measures designed to mitigate the loss of uninsured private assets.

Against this backdrop, private sector insurance offers attractive financial, operational and information benefits

to public sector entities as well, such as guaranteed access to funds up to agreed limits, planning certainty as a result of annually budgeted premiums, no payback obligation as opposed to risk financing solutions, professional loss assessment for indemnity-based cover, fast payout under parametric schemes, and improved economic efficiency of resource allocation as insurance puts a price tag on risks (Baur (2016)).

Innovative approaches to product design may go a long way to increase the penetration of property catastrophe insurance. For example, coverage could be provided as an opt-out, where property owners in high-risk areas are automatically enrolled in insurance programmes unless they specifically decline to do so. Such nudging techniques have been successful elsewhere, for example in the area of employer-sponsored retirement plans (Thaler and Sunstein (2008)). Another related example is product bundling, which can reduce distribution and underwriting costs, for example in the area of mortgages. Some mortgage banks require borrowers to pay home insurance premiums alongside the mortgage payments (Holzheu and Turner (2018)).

In addition, digital and mobile distribution can leapfrog access to insurance in countries where no traditional distribution networks have developed up to now (Cole (2015)). In Sub-Saharan Africa, for example, the most effective partnerships have been between mobile operators and insurers. On that basis, microinsurance can provide low-income households with affordable insurance products. For property risks, many microinsurance programmes have used index-based insurance products for weather to cover crop damages (Barnett et al. (2008)).

Governments can also assist in improving the availability of risk transfer solutions to individuals and corporations by introducing compulsory insurance schemes or offering fiscal incentives. Such moves can be instrumental in creating sufficiently large risk communities. However, mandatory insurance schemes are rather infrequent in the property catastrophe space. A positive example is Turkey where residential buildings within municipal boundaries must have earthquake coverage through a

¹ The Swiss Re classification of countries differs from the World Bank's and is based on consumption per capita (greater than USD 25,000 for high-income countries, between USD 10,000 and USD 25,000 for middle-income countries and less than USD 10,000 for low-income countries).

private insurance company on behalf of the state-owned Turkish Catastrophe Insurance Pool (TCIP). Take-up rates are high as homeowners need earthquake coverage to access electricity or water services, obtain a mortgage, or receive rebuilding aid from the government if their homes are damaged in an earthquake.²

Generally speaking, disaster risk insurance penetration may also be affected by the type of post-disaster emergency financial aid system in place nationally or sub-nationally. In countries where such financial aid schemes are in place, residents may feel less incentivised to purchase disaster risk insurance. Therefore, disaster risk penetration needs to be looked at in the context of a broader national/sub-national disaster risk management system.

2.2. Cyber

Defining cyber risk

Cyber risk is arguably the biggest challenge facing modern digital economies. It can be defined as any risk emerging from the use of information and communications technology that compromises the confidentiality, availability or integrity of data or services. Its materialisation eventually leads to business disruption, (critical) infrastructure break down, and physical damage to humans and properties (The Geneva Association (2016b) and OECD (2017)). The notion of cyber risk encompasses a multitude of risk sources threatening the information and technology assets of firms, governments or individuals. The spectrum of risk includes identity theft, disclosure of sensitive information, and business interruption. Non-criminal sources such as power outages after a natural catastrophe as well as technical or human failure have to be distinguished from criminal sources (cybercrime), including physical attacks, hacker attacks and extortion.

Gauging the cost of cyber risk

Estimating the cost of cyber incidents is challenging. Reported figures are likely to understate the extent of damage caused as affected institutions often have neither an incentive nor an obligation to disclose

incidents. Some studies put the annual economic cost of cyber incidents at around USD 400 billion, about 0.5 per cent of global GDP (AGCS (2015), Graham (2017) and Lloyd's (2017a))—a figure well in excess of average annual economic costs associated with global natural disasters (see Section 2.1).

Quantifying the cyber gap

Most property insurance policies cover damage to physical assets only (even though business interruption is a steadily increasing part of commercial property covers) and often exclude cyber risk—which is generally the case with liability cover. While the policyholder assumes that cyber incidents are included, the insurer assumes the opposite. This ambiguity may cause major legal disputes and significant protection gaps, exacerbating more fundamental reasons such as a lack of insurability. According to AGCS (2015) fewer than 10 per cent of companies are thought to have purchased cyber insurance today.

Current annual gross premiums for global cyber insurance are around USD 3 to 3.5 billion, about 1.5 per mille of global non-life insurance premiums (Lloyd's (2017b)). Swiss Re expects the global cyber insurance market to grow briskly to USD 18 billion by 2025 (Swiss Re, 2015c), a figure which would still be considerably less than 1 per cent of the global non-life insurance market. The U.S. market is much more developed than its European counterpart, and according to OECD (2017), accounts for 90 per cent of the world total. One reason is the fact that several years ago the U.S. already introduced reporting requirements for cyber incidents as well as severe sanctions in case of non-compliance. The European Union will follow suit by June 2018 with the General Data Protection Regulation (GDPR) framework.

A comparison of the aggregate global damage from cyber incidents with cyber premiums generated by the insurance industry suggests that virtually all cyber losses remain uninsured, and from a macro perspective, insurance-based transfer of cyber risk still lacks any real relevance.

Lloyd's (2017b) attempts to quantify the cyber risk protection gap for two specific scenarios: a cloud service provider hack, leading to widespread service and business

² See sections 3 and 4 of this report for further analysis.

interruption; and a mass vulnerability attack, as a result of leaked information which is used by criminal parties to attack vulnerable businesses for financial gain.

These cyber event scenarios could lead to a wide range of potential economic losses. For the cloud service disruption scenario, estimated economic losses range from USD 4.6 billion for a large event to USD 53.1 billion for an extreme event; in the mass software vulnerability scenario, the economic losses range from USD 9.7 billion for a large event to USD 28.7 billion for an extreme event. However, economic losses could be much lower or higher than the average in these scenarios due to the uncertainty surrounding cyber aggregation and accumulation—a key reason why some (re)insurers question the insurability of cyber risk.

Only a small fraction of such losses would be indemnified by cyber insurers. For example, in the cloud services scenario, insured losses are estimated to range from USD 620 million for a large loss to USD 8.1 billion for an extreme loss. For the mass software vulnerability scenario, the insured losses would amount to USD 762 million (large loss) and USD 2.1 billion (extreme loss).

Under the cloud services scenario the cyber risk protection gap (uninsured losses as a share of total losses) would come in at 87 per cent for a large loss and 83 per cent for an extreme loss. The gap is even larger for the mass vulnerability scenario and is estimated to be around 93 per cent for both a large and an extreme loss event (see Figure 10).

Based on current estimated global cyber insurance premiums of around USD 3 billion, it is apparent that a single cyber event has the potential to dramatically increase industry loss ratios by up to 250 per cent for extreme loss events, illustrating the catastrophe potential of the cyber risk class.

Overcoming challenges to insurability

Based on Berliner's (1982) seminal insurability criteria, Biener et al. (2015) shed light on the fundamental constraints facing cyber insurance. A first challenge to insurability is the lack of independence and predictability of cyber losses. As a result, risk pooling hits its limits. Exposures are largely unpredictable not only because of a lack of data (which is set to accumulate over time) but more fundamentally in light of the dynamics of cyber risks and the associated risk of change which complicates risk assessment.

A second insurability challenge in cyber insurance is asymmetric information. Adverse selection is almost inevitable as organisations that have experienced cyber incidents before are more likely to buy insurance. The lack of loss data impairs the risk classification of policyholders and in turn renders adverse selection even more acute.

Figure 10: Estimated coverage for modelled scenarios

Event	Overall losses		Insured losses		% Loss covered	
	Large loss	Extreme loss	Large loss	Extreme loss	Large loss	Extreme loss
Cyber CSP interruption	\$4.60bn	\$53.05bn	\$620m	\$8.14bn	13%	17%
Cyber mass vulnerability interruption	\$9.68bn	\$28.72bn	\$762m	\$2.07bn	7%	7%

Source: Lloyd's (2017b)

Figure 11 illustrates the ‘vicious circle of cyber insurance’ as a result of missing data.

Figure 11: The vicious circle of cyber insurance



Source: Deloitte (2017)

The lack of historical data is arguably the most fundamental challenge and contributes to tight coverage limits in cyber insurance markets. Policies generally do not cover losses in excess of USD 500 million; they also come with exclusions such as losses from accessing unsecure websites or terrorism. In addition, some indirect effects of cyber incidents cannot be measured, and as a result they are not covered. An example is reputational damage and its impact on customer and investor sentiment.

As shown by Lloyd's (2017b), economic losses from cyber events have the potential to be as large as those caused by major hurricanes. Therefore, insurers need to think about cyber exposure in these terms and focus on aggregated cyber-related catastrophes and the potential tail risk associated with cyber coverage.

Despite the many challenges to the insurability of cyber risk, one should bear in mind that the cyber insurance market is still at an embryonic stage. As the market matures, risk pools and relevant data sets will expand. New players will grow the market's capacity. As competition intensifies, the rates are set to come down. In addition, policy wordings and product specifications will see more standardisation, with beneficial effects on both supply and demand. And, last but not least, the fundamental issue of insurability may be addressed by public-private partnerships in order to develop a robust commercial market for cyber risks.

2.3. Healthcare

The healthcare funding mix

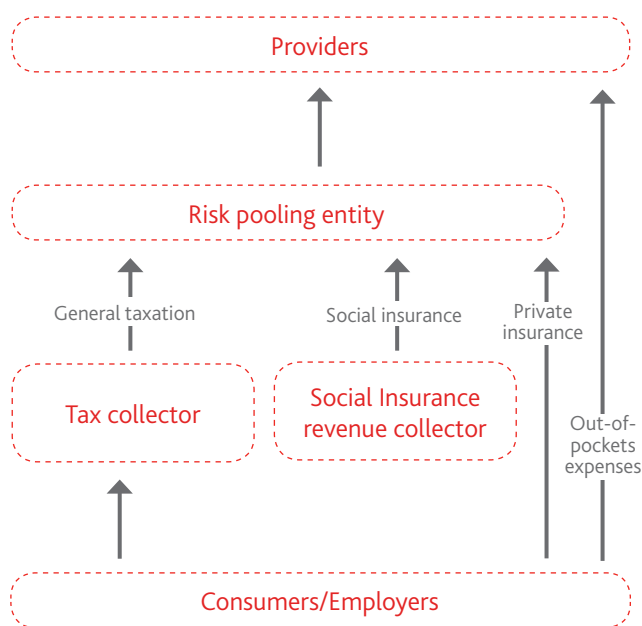
Government provisions form the basis of most healthcare systems, especially in developing and emerging markets where private insurance plays a relatively small role. Such public healthcare services, provided free of charge or at subsidised cost, are funded through general taxes.

Social health insurance schemes are a different way of financing state-sponsored healthcare systems, being based on individual salary or tax and employer contributions. They are generally administered through government entities, they include deductibles to mitigate moral hazard and they may be both voluntary and mandatory.

Private health insurance plans are pre-paid, usually voluntary schemes which are operated by private insurance companies. Government influence can be substantial, for example through regulations and subsidies. One recent example is China, which has made health insurance premiums income tax deductible to the amount of RMB 2,400.

Finally, there is out-of-pocket spending on healthcare, using private household income and wealth. Its share in total healthcare expenses is a function of the economy's maturity and the specific institutional characteristics of the national healthcare system (Savedoff and Sekhri (2004)—see Figure 12).

Figure 12: Healthcare financing mechanisms



Source: Savedoff/Sekhri (2004)

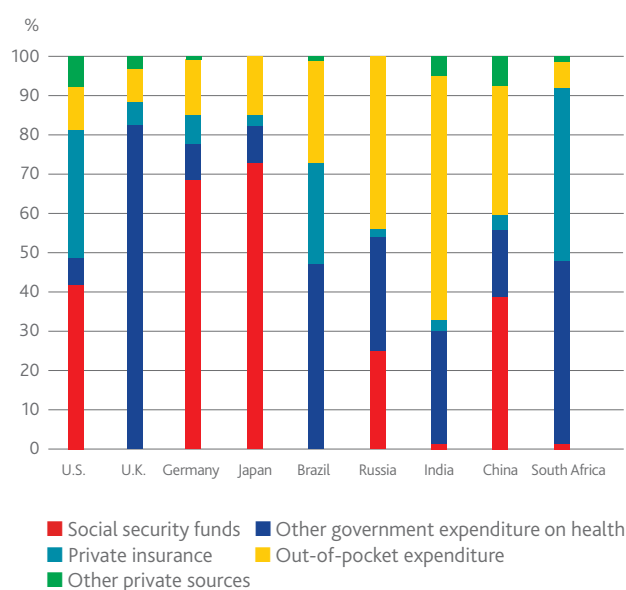
Defining the healthcare protection gap

In light of the institutional and legal complexity of healthcare systems, it is difficult to come up with a generally accepted definition of the healthcare protection gap. For people who are comfortable with the extent of (minimum) government-provided health and medical services there is no protection gap. Others may require additional services funded through social health insurance and private health insurance. In highly mature markets, some individuals seek healthcare services at an even higher standard (both in terms of quantity and quality) that they have to fund out of their own pockets, drawing on personal savings and assets. In many developing and emerging markets, however, out-of-pocket expenses play a dominant role because government and social insurance schemes provide only minimum coverage and private health insurance is at an embryonic stage. Having said this, such expenses can also be copayments, which governments mandate as a funding component and use as

a means to control the use of services. In addition, another relevant but virtually unquantifiable part of the healthcare protection gap is non-treatment or under-treatment due mostly to a lack of affordability and/or accessibility or an outright lack of supply and medical infrastructure, as indicated, for example, by very low numbers of doctors and hospital beds per 100,000 inhabitants.

Figure 13 illustrates the enormous differences in the healthcare funding mix, not only between mature and emerging markets but also within the respective country income groups.

Figure 13: Breakdown of national healthcare expenditure by source, 2014 data



Source: World Health Organization database (countries selected by The Geneva Association)

A specific approach to modelling the healthcare protection gap

According to a study published by Swiss Re in 2012, the healthcare protection gap in the Asia Pacific region could reach USD 197 billion in 2020.³ The research covers Australia, China, Hong Kong, India, Indonesia, Japan, Malaysia, the Philippines, Singapore, South Korea, Thailand, Taiwan and Vietnam. It found that government

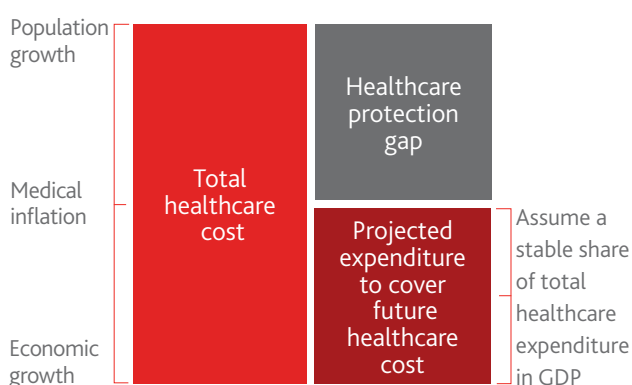
3 http://www.swissre.com/media/news_releases/nr_20121128_health_protection_gap_asia_pacific.html

provisions and out-of-pocket expenses are the two main funding sources of healthcare in the region, whereas private prepaid plans contributed less than 10 per cent of the total healthcare expenditure for all the markets covered in this report, with the exception of Taiwan which came in at 19 per cent.

The healthcare protection gap, according to Swiss Re, is defined as the difference between the level of healthcare costs which would be required to meet consumer needs—based on considerations including population growth, economic development and healthcare cost increases—versus the amount that would be available to cover those costs, assuming that society's total healthcare expenditure remained at a constant percentage of GDP (see Figure 14). This gap obviously evolves as it is influenced by many factors such as the introduction of new medicines and more people entering formal healthcare schemes.

The protection gap is based on projections of economic growth, medical inflation and population growth in the 13 individual markets covered. All three determinants suggest that healthcare expenses will account for a growing share of GDP, with the result that people and governments will need to increase their spending on healthcare.

Figure 14: Projecting the healthcare protection gap



Source: Adapted from Swiss Re (2012)

Out-of-pocket expenses (OOP) as a gauge for the healthcare protection gap

When people incur copayments or fees for healthcare services, the amount of such out-of-pocket expenses in relation to income can reach financially catastrophic

proportions for the individual or the household. Outsized expenditure can mean that people have to cut down on food and clothing or that they are unable to pay for their children's education. The World Health Organization suggests that OOP health expenditure be viewed as catastrophic whenever it is equal to or greater than 40 per cent of a household's non-subsistence income, i.e. income available after basic needs have been met. Therefore, OOP expenses can serve as a (necessarily imperfect) gauge for the healthcare protection gap.

OOP in mature economies frequently represent co-payments and non-catastrophic expenses that are not covered by insurance. Therefore, this measure is of limited value for determining underinsurance in high-income countries. In the U.S., for example, there is a mix of households that are protected with insurance cover (with increasing deductibles and copayments) against catastrophic expenses, while more than 10 per cent are completely uninsured and highly exposed to catastrophic expenses. The average OOP figure for the U.S. masks these differences.

In emerging economies, however, OOP mostly represents medical expenses for families without any insurance and therefore provides a more applicable gauge of underinsurance. Insurance or other funding would increase the utilisation of health services, leading to better health outcomes. However, analysing data for China, Li et al. (2012) show that expanding health insurance coverage does not always translate into improved health service coverage or better protection against (catastrophic) healthcare costs. If the depth (range of services covered by insurance) and height (extent to which costs are indemnified by insurers) are limited, the OOP remains high.

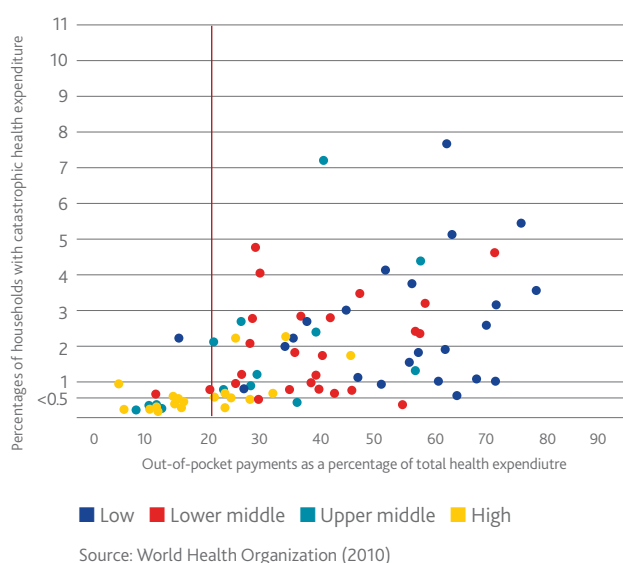
The most recent global analysis of catastrophic health expenditure is WHO (2010). The study identifies three factors driving catastrophic payments: (1) the availability of health services requiring OOP; (2) low household capacity to pay; and (3) a lack of prepayment mechanisms for risk pooling, e.g. funds collected through taxes and/or insurance contributions.

The research shows that catastrophic expenditure can occur in all countries at all stages of development. In most OECD countries, health systems and financial risk-pooling mechanisms have been developed over several

decades. Nonetheless, even in these countries some households are threatened by catastrophic payments.

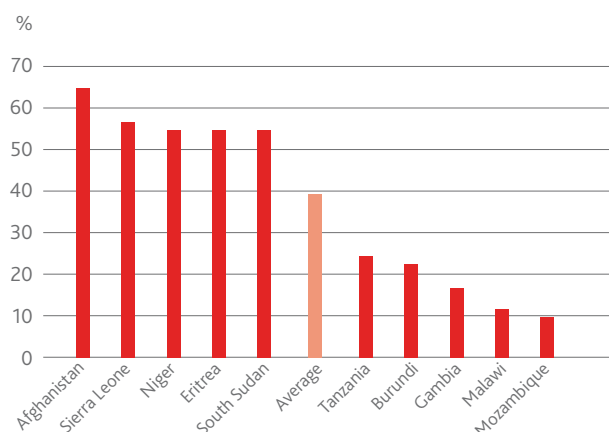
In general, health systems that require lower OOP payments provide a higher level of protection to the poor against catastrophic spending. As suggested by Figure 15, catastrophic health expenditure remains low in countries where OOP represents less than 20 per cent of total national health expenditure.

Figure 15: Percentage of households incurring catastrophic health expenditure against OOP as a share of total health expenditure (2010 data)



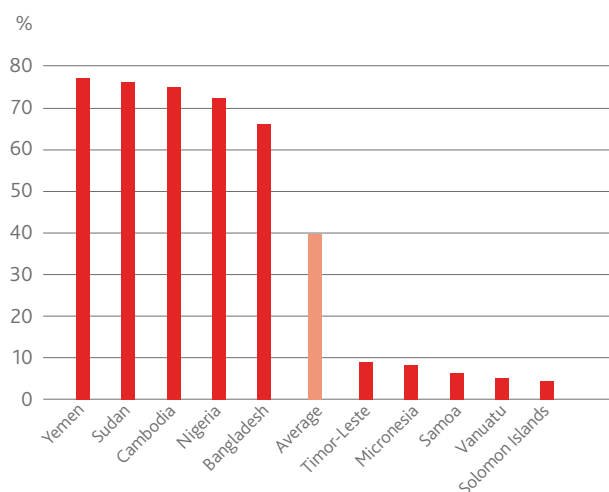
The impact of these OOP payments for healthcare goes beyond catastrophic spending. Poor households may decide not to use services at all and are likely to sink even further into poverty due to the adverse effects of sickness on their earnings and general welfare (WHO (2005)).

Figure 16: Share of out-of-pocket expenses in total healthcare expenditure: Low-income economies (2014 data)



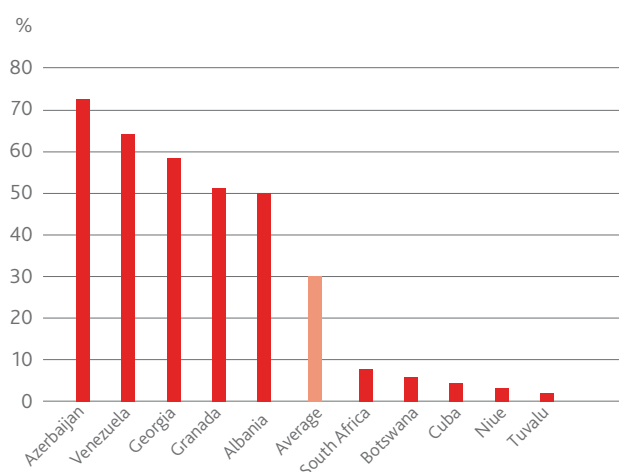
Source: World Health Organization database, The Geneva Association

Figure 17: Share of out-of-pocket expenses in total healthcare expenditure: Lower-middle income economies (2014 data)



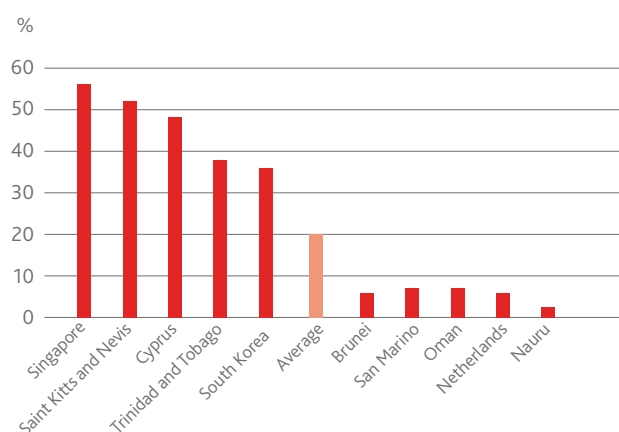
Source: World Health Organization database, The Geneva Association

Figure 18: Share of out-of-pocket expenses in total healthcare expenditure: Upper-middle income economies (2014 data)



Source: World Health Organization database, The Geneva Association

Figure 19: Share of out-of-pocket expenses in total healthcare expenditure: High-income economies (2014 data)



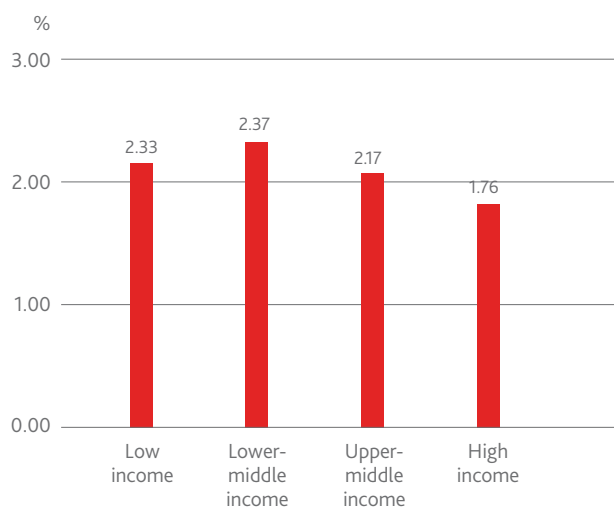
Source: World Health Organization database, The Geneva Association

However, especially in high-income countries the share of OOP needs to be considered in combination with the overall efficiency of the healthcare system. For example, while Singapore shows a higher share of OOP than other comparable high-income countries, its total healthcare

expenses to GDP ratio is smaller and the ultimate medical outcome superior. One can also argue that, at least close to the moment of their introduction, some new diagnosis and treatment techniques can only be utilised through OOP. In addition, as mentioned before, copayments can be mandated by governments as a funding component and a means of controlling the use of healthcare services.

Figure 20 illustrates the macroeconomic proportions of OOP. Across the various country income groups the GDP share of OOP ranges from 1.8 to 2.4 per cent—about seven times the average for historical natural catastrophe protection gaps (see Figure 9).

Figure 20: Out-of-pocket healthcare expenses as a share of GDP (2014 data)



Source: World Health Organization database, The Geneva Association

Prospects for private health insurance as a key element of the future funding mix

Healthcare costs are expected to continue rising faster than gross domestic product and consumer price inflation. Key reasons include:

- Cost escalation as a result of medical innovation and the increasing use of new technologies in medicine and treatments

- Healthcare being highly labour-intensive with lower rates of productivity growth compared to other sectors of the economy
- Economic growth and rising incomes in emerging markets which will translate into additional demand for healthcare services
- Population growth and ageing which will require a broader healthcare infrastructure and increase the financial burden from healthcare services, and
- Urbanisation and its drawbacks such as less healthy lifestyles, the (re)emergence of communicable diseases and detrimental levels of air pollution (Swiss Re (2015a)).

In combination with rising concerns about fiscal sustainability, private health insurance is set to play a bigger role. It offers individuals and households the option to pay for healthcare through regular premiums into prepaid plans and to reap the benefits of risk pooling whilst reducing the spectre of crippling healthcare expenses.

2.4. Pensions

Defining the pension gap

The 'pension gap' is defined as the difference between the present value of the yearly lifetime income needed to sustain a reasonable standard of living and the actual amount that is saved for retirement plus the present value of pay-as-you-go (PAYG) contributions over a 40-year period (The Geneva Association (2016a)). Obviously, the pension gap is conceptually different from other protection gaps as it concerns the cumulative adequacy of household savings which are a function of many non-insurance related factors such as the level of interest rates. For this reason, the phenomenon is also frequently referred to as the pension/savings gap.

Quantifying the pension gap

Pensions are generally a social type of insurance provided through a public mechanism, usually a PAYG scheme where today's workers pay for the retirement benefits of today's pensioners. In almost all countries, these

schemes are complemented by privately managed occupational and individual voluntary pension pillars. In many cases, insurance companies manage these schemes and assume longevity risks from governments and employers who still offer defined-benefit pension schemes (with guaranteed levels of retirement income) and from individuals who proactively seek to ensure the adequacy of their future retirement income. The shift towards non-public schemes is primarily a result of the increasing unsustainability of public schemes as people live longer and have fewer children.

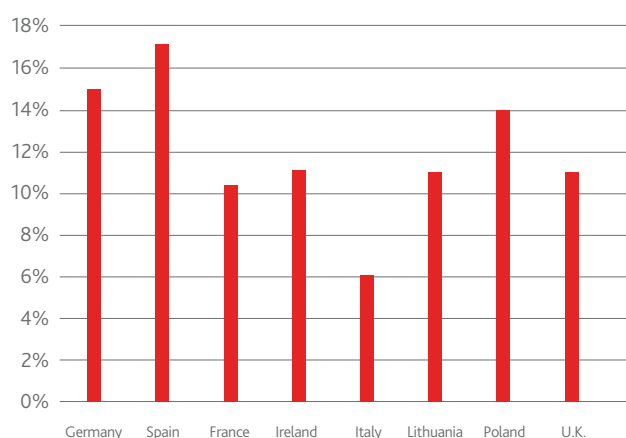
In most countries, both developed and developing, there is a widening pension gap, measured by the extent to which pension levels fall short of an appropriate replacement rate that would ensure the continuation of the accustomed standard of living during retirement. Demographics are generally the main cause for pensions protection gaps. Changes in the old-age dependency ratio (which measures the number of elderly people as a share of those of working age) challenge most pension systems across the globe.

Based on a target replacement rate, defined as the percentage of a worker's pre-retirement income that is paid out by a pension programme on retirement, of 70 per cent (as recommended by the OECD), Aviva (2016) has quantified pension savings gaps for the European Union. The gaps show how much more the people retiring between 2017 and 2057 would need to save each year to meet the 70 per cent replacement rate level. The analysis suggests that European Union citizens may need to save an extra EUR 2 trillion a year to close the pension/savings gap that is equivalent to around 13 per cent of EU GDP in 2016 (Figure 21).

As a percentage of GDP, Spain currently faces the biggest shortfall of 17 per cent. Italy's gap at 6 per cent is the lowest, but the country's generous state pension may not be sustainable in the future.

Another interesting finding of this research is that no single policy measure will be able to close the gap. Even radical measures that are almost inconceivable from a political perspective, such as increasing the retirement age by five or 10 years, would only reduce the gap by a quarter or by a half, respectively.

Figure 21: Annual pension/savings gap as a percentage of 2016 GDP

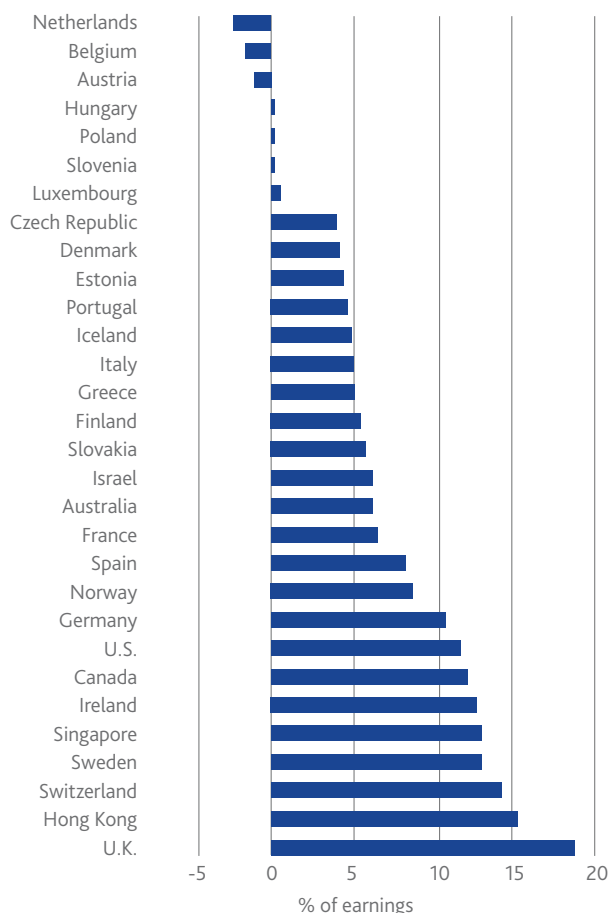


Source: Aviva (2016)

This analysis is based on comprehensive OECD data published biennially. It offers detailed information on net replacement rates, i.e. the after-tax level of pension benefits in retirement from mandatory public and private pension schemes relative to after-tax earnings when working. Drawing on this data and a number of assumptions, ILC-UK (2017) calculates savings gaps for 30 different countries and regions. These gaps illustrate how much an average individual entering the workforce today might need to save in order to achieve a replacement rate at the recommended level of 70 per cent. For countries with positive gaps, individuals will have less income in retirement than they require for an adequate lifestyle. Therefore, they need to save more, retire later or rely on more generous government support. According to ILC-UK, the average earner in 27 out of 30 countries and regions will face an income shortfall in retirement using the benchmark 70 per cent net replacement rate (excluding voluntary savings). The U.K. performs worst, showing a savings gap of 18 per cent of annual income. This amount would have to be saved each year to ensure an adequate income in retirement. In contrast, the Netherlands is a prominent example of a country benefitting from having both a public pension component and a mandatory or quasi-mandatory pension saving component. The country is not projected to have any retirement income shortfall for average earners (see Figure 22).

Having said this, the pension challenge goes beyond insufficient retirement savings. For example, even if retirement savings are sufficient, the challenge (especially for defined-contribution plan participants who have to bear the investment risk associated with their retirement savings) is to properly convert retirement savings into steady and reliable retirement income. One common mistake is to withdraw assets too quickly, which leaves individuals exposed to longevity risk.

Figure 22: Pension adequacy gap (based on mandatory (Pillars I and II) retirement schemes, excluding voluntary savings) as a percentage of earnings



Source: ILC-UK, based on OECD (2015)

The Geneva Association (2016a), based on Marin (2013), estimates the global pension gap at USD 41 trillion, after taking into account Pillar I (PAYG) entitlements. Marin had estimated the global pension gap at USD 100 trillion (or about 140 per cent of GDP) excluding any Pillar I benefits, using GDP and old-age dependency ratios (the number of elderly people as a share of those of working age) to project the amounts needed for retirement and then deducting estimated savings in pension funds. Marin assumes a 5 per cent discount rate and a 60 per cent replacement ratio. While Pillar I significantly reduces the gap, it cannot fill it in its entirety.

Another recent estimate of current (2015) and projected future (2050) pension gaps was undertaken by WEF (2017). The calculations assume that, generally, retirement needs will be met by a combination of income from three sources: (1) government-provided Pillar I pension, (2) employer-based Pillar II pension and (3) voluntary individual savings. The authors compare the aggregate level of savings to the expected average annual retirement income needs as well as life expectancies. The study targets eight countries with data available and the largest established pension systems or populations (Australia, Canada, China, India, Japan, Netherlands, the U.K. and U.S.).

The retirement savings gap in 2015, based on a 70 per cent income replacement target level for these eight countries is estimated at around USD 70 trillion, including Pillar I benefits, with the largest deficit being in the U.S. This gap is roughly equal to 1.5 times the 2015 GDP for the countries under investigation. Extrapolating this ratio to the rest of the world would yield an illustrative global pension/savings gap of more than USD 110 trillion.

According to the study, over 75 per cent of the 2015 USD 70 trillion pension gap is attributable to unfunded government-provided Pillar I pensions and pensions promised to public employees; 24 per cent of the gap is the result of deficient individual savings. The underfunding of corporate (defined-benefits) pension plans only accounts for about 1 per cent of the total gap.

The prospects for private life and pension insurance

Both governments and employers are increasingly shifting longevity and market/savings risks to individuals, for example, through reduced public pension schemes and the transition from defined-benefit to defined-contribution schemes in corporate retirement plans. This trend has widened pension protection gaps. Ultimately, such gaps can impose a severe additional financial burden on society as the number of individuals who outlive their assets and are thrown into poverty will probably increase.

Against this backdrop, the commercial potential for life insurers is as vast as their responsibility vis-à-vis society to make a meaningful contribution to risk mitigation and live up to insurers' claimed relevance. The insurance industry needs to explore innovative approaches to developing a more effective proposition for the challenge of the rising longevity risk facing society. A starting point would be to offer individuals easier access to simpler products with lower fees, for example deferred annuities that must annuitise at a certain age, as opposed to existing complex annuities with guaranteed withdrawal benefits or guaranteed income benefits, products that may not be affordable to the lower-income segments of society. In addition, the insurance industry, in conjunction with trade groups, associations and educators, could play a significantly bigger role in designing and delivering financial literacy education (The Geneva Association (2016a)).

However, public and private-sector decision-makers need to bear in mind that longevity risk has two components—the 'individual' and the 'aggregate'. Individual longevity risk arises because it is impossible to know when a particular individual will die. Individual longevity risk can be managed through risk pooling, which is performed by the government, pension funds and/or insurers that sell annuities.

Aggregate longevity risk, on the other hand, reflects the uncertainty of how long an entire population cohort will live. Historically, experts have consistently underestimated life expectancy. This systematic component of longevity risk cannot be mitigated through diversification by age groups or geography as certain mortality improvements due to medical breakthroughs, for example, will affect the entire population. Aggregate longevity risk is substantial and therefore a concern for the future of all pension systems.

Therefore, policy recommendations go beyond the insurance industry: closing the pension gap requires the involvement of both the public and the private sector. The current parameters and conditions surrounding pension systems such as retirement age, mandatory contribution rates, investment restrictions, the degree of competitiveness for pension fund administrators, incentives to save voluntarily and the degree of economic informality can all be adjusted in order to close the pension gap. Life insurance products, long-term savings plans and annuities offered by the insurance industry can also be embedded in pension systems to protect individuals against mortality and longevity risks and to complement existing pension schemes.

3. Root causes—A comparative analysis

It is neither feasible nor desirable that all economic costs of calamity are insured. However, there is a level at which individuals, households and firms buy less insurance than is economically beneficial. The reasons for such insurance protection gaps lie with both demand- and supply-side factors affecting the demand for and the provision of insurance services. In addition, they vary for various stages of per capita income and economic development. Along these two dimensions, the following section will explore the root causes of underinsurance across all lines of business covered by this study.




3.1. The demand side

In the following we discuss six specific demand-side obstacles to the take-up of insurance (for a general overview, see Eling et al. (2014) and Swiss Re (2017c)).

Affordability

According to standard economic theory, the price of a normal good is inversely related to demand for that good or service. Evidence from mature markets (Marquis et al. (2004)) shows a price elasticity of demand for insurance of 0.2 to 0.4 (i.e. if the price increases by 10 per cent, demand will decline by 2 to 4 per cent). Also, disposable income (and the income elasticity of insurance demand) is a major demand-side factor for explaining insurance purchases and insurance protection gaps (see, for example, Millo (2014)). In this context, the wealth distribution structure matters too as a broader middle class is set to have a positive effect on insurance demand (Feyen et al. (2011)). In addition, transaction costs can adversely impact (perceived) affordability (Baicker et al. (2012) discuss low take-up rates of public health insurance in the U.S. in the context of transaction costs). Global consumer surveys suggest that about half of insurance buyers base their final purchasing decisions on price. This price-driven buying behaviour is bound to result in major coverage gaps (EY (2014); in homeowner insurance this behaviour is particularly common (59 per cent), followed by motor (57 per cent) and life insurance (50 per cent)).

Figure 23: Top reasons for closing or replacing an insurance policy

	 Global life	 Global auto	 Global home
Cost/terms	50%	57%	59%
Policy benefits/coverage	47%	42%	48%
Recommended by broker, friends	38%	28%	39%
Frequency/relevance of communication	28%	16%	34%
Level of service	28%	26%	31%
Policy did not align to my life circumstances	26%	14%	26%
Research I conducted	25%	20%	30%
Experienced personal/family milestones	24%	11%	25%
Brand reputation	24%	17%	29%
Did not like the way claim was handled	22%	18%	26%
Customer loyalty benefits	20%	17%	26%

Source: EY (2014)

Not surprisingly, the relevance of affordability is even more acute in developing and emerging markets, where household budget constraints may require reduced consumption in other areas in order to be able to afford insurance premiums. The price sensitivity of insurance demand is, therefore, significantly more pronounced. According to Cole et al. (2013), the price elasticity of rainfall insurance demand in India is between 1.04 and 1.16. However, overall take-up rates of microinsurance may remain low even if prices are reduced. Even when prices are significantly below the actuarially fair level, Cole et al. (2013) show that fewer than half of households purchase rainfall insurance. Mobarak and Rosenzweig (2012) find that that a 50 per cent price reduction relative to the actuarial price, increases the probability of take-up by 17.6 percentage points, indicating a price elasticity of 0.44.

Awareness

The existing empirical evidence on mature insurance markets (for example Cappelletti et al. (2013)) suggests a positive relationship between financial literacy and insurance demand. Similarly, most of the empirical studies on developed economies show the same for education and insurance demand (e.g. Li et al. (2007)).

Besides deficits in financial literacy and general education, specific gaps in risk awareness play an important role in explaining underinsurance. This is particularly relevant for low-probability events. For example, research on individual behaviour during Hurricane Sandy in New York in 2012 showed that only one third of homeowners who owned removable storm shutters actually put them up (Meyer et al. (2014)).

In addition, even though there is evidence that insurance demand increases in the wake of natural disaster events, this effect vanishes over time as the memory of the loss event fades or as new residents who do not have prior disaster awareness move into disaster-prone areas (Gallagher (2014)).

As far as developing markets are concerned, Cole et al. (2013) find that insurance demand is higher among households with higher levels of financial literacy. Giné et al. (2008) suggest that a lack of product understanding is the second most relevant reason for not purchasing insurance, following affordability. However, other studies

(for example Clarke and Kalani (2012)) find no impact of financial literacy on insurance demand.

Appeal and quality of product/service

The perceived quality and appeal of the insurance offering is an important determinant of purchasing decisions. For example, Costa and Garcia (2003) show that the quality of care matters significantly to health insurance take-up: According to their analysis, in Spain the quality of service (e.g. long waiting lists) explains the low demand for public healthcare.

In developing countries, there is similar evidence. De Allegri et al. (2006), for example, suggest that the number of enrolments in community-based health insurance in rural West Africa is closely linked to the quality of the health centre.

In a broader sense, surveys suggest that ease of purchase is also an important factor in insurance buying behaviour. According to EY (2014), service and experiential factors, such as “easy to understand, clear communications” and “being easy to deal with,” are among the most relevant drivers of insurance purchasing decisions and are almost as important as price and scope of coverage. If insurance as an abstract and intangible concept is not properly ‘sold’, coverage gaps seem set to arise.

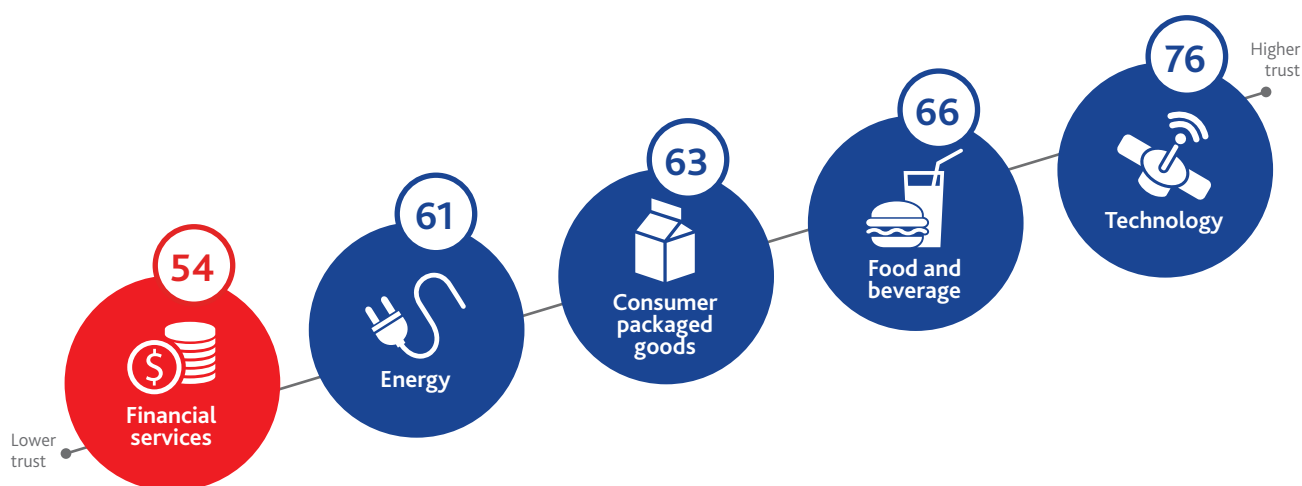
Trust

It is undisputed that trust, i.e. an individual's bet on a third party's future contingent actions, is an indispensable ingredient of the insurance business. Insurers are in the “business of trust”. They sell contingent promises to pay, more often than not at a distant and unspecified point in the future, e.g. in life insurance. From a policyholder's perspective, the insurer's willingness and ability to fulfil these promises cannot be assessed until a claim has been filed and settled. The insurer's performance is only incompletely observable at the time of signing an insurance policy. Information asymmetries make it difficult for the policyholder to instantly judge and assess the value of an insurer's promise to pay. Where this is possible, the overall reputation and performance of an insurance company, as well as a robust legal and regulatory framework, are instrumental in generating trust with policyholders (Schanz (2009)).

In addition, collective policyholder trust in insurers can be eroded by exogenous factors. One example is the protracted environment of ultra-low interest rates which has dented confidence levels in some mature life and health insurance markets.

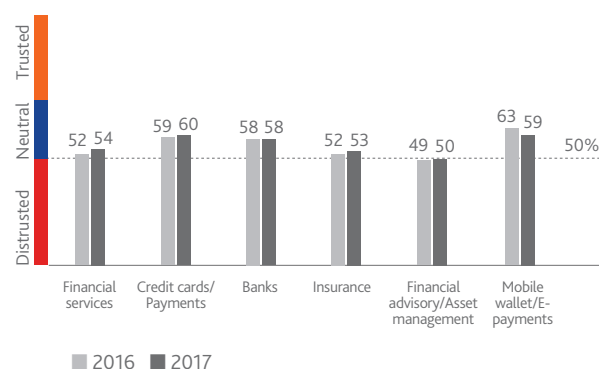
Global surveys show that financial services in general and insurance in particular suffer from a severe public trust gap compared to industries such as energy, consumer goods, food and technology (see figures 24 and 25).

Figure 24: Levels of trust by industry (percentage of people who trust each industry)



Source: Edelman (2017)

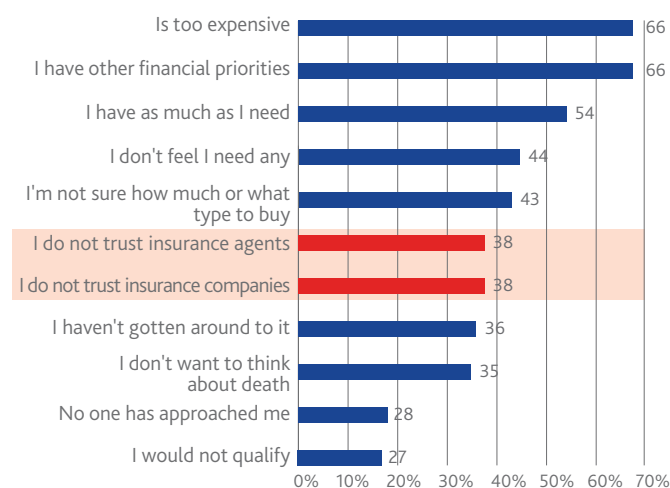
Figure 25: Levels of trust by financial services subsector



Source: Edelman (2017)

Figure 26 reveals that a lack of trust in insurance carriers and distribution channels is an important reason behind protection gaps, even in mature insurance markets.

Figure 26: Mistrust as a top reason behind the life insurance protection gap in the U.S.



Source: Rozar (2017), LIMRA (2017)

Trust issues in the context of insurance protection gaps are particularly relevant for developing and emerging markets, which are frequently characterised by relatively weak legal and regulatory systems for enforcing payment of valid claims (see Outreville (2013) and Cole et al. (2013)). Based on qualitative responses, Giné et al. (2008) find that trust in the insurance provider is a key determinant of rainfall insurance demand in India, for example. Cole et al. (2013) discovered that Indian household insurance demand is 36 per cent higher when there is a recommended and trusted insurance educator involved in the purchasing process.

Cultural and social factors

Cultural and social peculiarities can also help to understand insurance protection gaps. For example, Basaza et al. (2008), in their study on community health insurance in Uganda, find that pre-payment before illness was seen as “inviting disease”.

As far as the link between risk aversion and insurance demand is concerned, most empirical findings are either counter-intuitive or inconclusive. In contrast with economic theory and consistent observations in mature economies, studies in microinsurance markets show a negative relationship between risk aversion and insurance demand. Giné et al. (2008) and Cole et al. (2013), for example, find that more risk-averse households are less likely to purchase insurance. One interpretation suggests that households view insurance as risky as a result of price uncertainty in agricultural insurance (Kouame and Komenan (2012)) or the possibility of non-performance (basis risk) associated with parametric rainfall insurance in India (Clarke (2011)). As shown by Outreville (2013), empirical evidence on the relationship between risk aversion and insurance demand in developed markets is ambiguous.

In addition, various studies explore and test the effects of religion on risk attitudes in insurance markets. Eisenhauer and Halek (1999) find only a small effect on risk aversion. Others such as Noussair et al. (2012) establish more robust results in terms of a positive relationship between the number of religious people and levels of risk aversion. For Islamic countries, several cross-country studies find a negative correlation between (non-Takaful) insurance demand and religious beliefs/affiliation, e.g. Beck and Webb (2003).

Behavioural biases

With the rise of behavioural economics, seemingly irrational and inconsistent patterns of human behaviour are increasingly looked at as a possible explanation of why individuals, households and firms buy less insurance cover than is economically beneficial to them.

According to insurance theory, people benefit from incurring a small cost (the premium) to obtain protection against an event that could cause significant financial losses but that has a low probability of occurrence. If insurance can be produced with relatively small transaction costs, i.e. if it can be reasonably priced, a risk-averse individual should prefer a smaller but certain premium to taking the chance of experiencing a large loss. If properly designed and priced, insurance policies also offer incentives through premium discounts for those who mitigate their risk (Kunreuther and Pauly (2013)).

However, there is considerable empirical evidence that many consumers do not take advantage of insurance protection against losses of property and health, even if the insurance premium is subsidised or below the actuarial level, and do not invest in efficient loss reduction measures. In both cases they fail to behave in ways that would not only benefit them personally but might also enhance social welfare.

Historically, these phenomena have been explained through information asymmetries and search costs (The Geneva Association (2016c)). More recently, however, behavioural factors have emerged as contributing to such demand anomalies. One example is loss aversion, i.e. individuals are more sensitive to small losses than large gains. In insurance, the premium is a certain and near-term expense, whereas the claim benefit is uncertain and distant and is therefore perceived as a potential loss. Another example is mental accounting: individuals mentally allocate their planned expenditures into different accounts so that they feel constrained in spending on other activities. In insurance, people often refrain from premium payment commitments because they do not have a risk protection account in their mental model or because they have already exhausted the account through other commitments.

A final example is the status quo bias: individuals are reluctant to depart from the status quo, even though it

might be beneficial to do so. This matters particularly for low-income households. Since insurance is a relatively new product category for them, they tend to resist insurance commitments and instead cling to current risk-coping mechanisms such as informal savings (Kunreuther and Pauly (2013)).

3.2. The supply side

Insurance protection gaps do not only reflect demand-side issues. Equally important are insurance market imperfections that hold back insurance supply. In the following subsection we focus on four specific supply-side driven reasons for underinsurance.

Transaction costs

The cost of producing insurance cover is currently one of the most intensely debated industry topics, not least in light of technological innovation and the prospect of disruption by more cost-efficient ways of providing insurance cover (The Geneva Association (2016c)). In non-life insurance, for example, about 30 cents of each premium dollar are generally absorbed by distribution and general administrative expenses. Even though it reflects its complexity, this fact dents the economic appeal of insurance. As early as 1965 Lees and Rice (p. 143) noted: "In practice, insurance is not costless: sellers incur administrative, selling, and other expenses; buyers incur costs of time and trouble and expense for advice (...). Specifically, the transaction costs to the individual of completing and filling application and claims forms, paying premiums, keeping records, etc., as well as possible costs of obtaining information, may be of sufficient magnitude to make insurance policies against certain losses not worthwhile."

More recently, the relevance of the time and effort required for policy purchase/renewal and claim filing was discussed by De Bock and Gelade (2012). Thornton et al. (2010) identify these as important reasons for choosing not to enrol in health insurance, even when it is subsidised. Allowing workers to sign up directly at their place of employment, rather than miss a day of work due to the process, led to a 30 per cent increase in the take-up rate.

Based on Coase (1937), Lees and Rice (1965) even see an analogy between households and firms. Coase found that if market-based transactions were too costly they would be 'internalised' and take place within firms. Similarly, households (or more likely peer and risk retention groups) would opt to (partially) self-insure if insurance is associated with significant transaction costs.

Adverse selection and moral hazard

Imperfect information is a prominent feature of today's insurance markets and may explain insurance protection gaps (see the seminal work of Rothschild and Stiglitz (1976) on the economics of imperfect information in insurance). Insurers and policyholders operate in a space where the characteristics of the services exchanged are not fully known to at least one of the parties. Under such conditions, high-risk individuals cause an externality as the low-risk customers are worse off than they would be in their absence. This is a particular challenge in health insurance which could actually be exacerbated by medical advancements based on technology (e.g. increasingly inexpensive genetic tests).

One of the most influential academic works on the consequences of information asymmetry is Akerlof (1970). Taking the market for used cars as an example, he shows that if buyers cannot distinguish between a high-quality car (a 'peach') and a 'lemon', they will only be willing to pay a price for a car that averages the value of a 'peach' and a 'lemon'. As a result, sellers will only enter the market if they hold 'lemons', whilst 'peaches' will no longer be offered. This form of adverse selection, with high-quality cars no longer on offer, ultimately leads to a market failure. The notion of 'lemons' and 'peaches' can be applied to insurance markets ('poor' versus 'good' risks). Therefore, if the insurer prices its business on the average loss probability of the entire pool of insureds, those with the highest risk will be the most likely to purchase coverage, and as a result the insurer is set to lose money.

Arrow (1963) also found that risks were traded and transferred incompletely in real-world markets. One of the reasons he identified was moral hazard, i.e. the probability of a person assuming more risks because someone else carries the costs of those risks. This leads to an increase in the loss probability caused by the behaviour of the policyholder.

Institutional obstacles and shortcomings

Institutional parameters such as the legal and regulatory environment are major determinants of insurance supply. In many developing and emerging markets the legal environment (e.g. a proper contract law) is weak and rules are frequently not enforceable. In addition to an effective legal framework, a sound regulatory framework is required to enable a stable insurance market and protect policyholders.

In low- and lower middle-income countries in particular, immature regulatory frameworks are a major obstacle to insurance market development. A lack of solvency margins, not to mention risk-based solvency rules, insufficient minimum capital requirements and a general lack of cohesion, transparency, consultation and implementation are frequently observed regulatory deficiencies. In addition, excessive approval requirements could discourage product innovation (The Geneva Association (2014)).

Rudimentary or insufficiently enforced frameworks are clearly not conducive to risk-based pricing, adequate risk retention, product innovation and the overall resilience and stability of insurance markets. Under such circumstances, corporate defaults and mis-selling scandals, for example, are more likely, potentially shaking customer confidence in the industry as a whole—a particularly severe threat in nascent markets.

A general reliance on government aid as a substitute for insurance is another explanation for insurance protection gaps. Governments have historically played an important role in post-event disaster relief, for instance. In countries as different as China, Italy, Japan and Turkey most losses arising from natural disasters have traditionally been covered by the government on a post-event basis (Swiss Re (2015b)). Under such circumstances, private-sector risk transfer solutions face a crowding out. In the context of the U.S. National Flood Insurance Program, Kousky et al. (2013) find that an increase in average aid grants reduces average insurance coverage by more than the amount of aid.

The same crowding-out effect can arise from informal risk-sharing mechanisms, especially in developing countries.

For example, Jowett (2003), based on an analysis of health insurance markets in Vietnam, suggests that strong informal networks may crowd out insurance solutions.

In today's mature markets, social security systems based on the concept of mutuality can be viewed as "the closest relative to informal risk-sharing strategies" (Eling et al. (2014), p. 248). By providing protection against health, disability and mortality risks, social security is expected to have a negative impact on insurance demand (Outreville (2013)). One example is the provision of Long-Term Care (LTC) by the Japanese government which almost completely crowds out private LTC insurance. The empirical findings, however, are contradictory (Zietz (2003)). Some studies suggest a positive relationship (Browne and Kim (1993)) whereas others establish a negative link (Lewis (1989)).

Limits to insurability

Occasionally, the insurance industry is faced with events that test the limits of insurability. The destruction of the World Trade Centre on 11 September 2001 is probably the most prominent example. Prior to this event, the scale of losses from terrorist acts was comparable to other property losses, and therefore terrorism was rarely excluded from property policies. A more recent challenge is the insurability of cyber risk. Based on a broad empirical analysis and recent literature, Biener et al. (2015) examine this topic, based on the fundamental set of criteria introduced by Berliner (1982). They identify distinct characteristics of cyber risks compared to other operational risks and shed light on significant challenges associated with highly interrelated losses, lack of data, and severe information asymmetries. These challenges hinder the development of an effective cyber insurance market.



Against this backdrop, it is obvious that when assessing risks, any insurer or reinsurer must carefully take into consideration the fundamental principles of insurability (Berliner (1982)). Ignoring these constraints would ultimately undermine the (re)insurer's solvency and jeopardise the ability to honour obligations.

Randomness is the first relevant criterion: The time and location of an insured event must be unpredictable, and the occurrence itself must be independent of the will of the

insured. Second, the frequency and severity of claimable events must be quantifiable within reasonable confidence limits. In many developing markets this is a particular challenge given the paucity of data and actuarial know-how which forces insurers to add high uncertainty loadings, undermining the product's value proposition. Third, the premium rate must be economically viable, covering the insurer's expected cost of acquiring and administering the business as well as claims costs. In addition, the price must allow for an appropriate return on the capital allocated to the risk, a return which meets shareholder's return requirements. As such, insurability is not entirely a supply-side issue but also relates to the affordability of premiums.

Figure 27 summarises the various root causes of protection gaps and illustrates their respective main (but not exhaustive) relevance by country group, based on a review of the cited empirical references and our own assessment.

Figure 27: The root causes of insurance protection gaps—main areas of relevance

	Frontier markets	Emerging markets	Mature markets
 Demand side	<i>Affordability</i>		
	<i>Awareness</i>		
		<i>Appeal</i>	
	<i>Trust</i>		
	<i>Culture</i>		
	<i>Behavioural biases</i>		
	<i>Transaction costs</i>		
		<i>Adverse selection/moral hazard</i>	
 Supply side	<i>Institutions</i>		
		<i>Limits to insurability</i>	

Source: The Geneva Association

4. Remedies—Towards a multi-stakeholder effort

Any effective approach to narrowing insurance protection gaps requires a multi-stakeholder effort. The collaboration of private-sector insurers and governments is of particular importance and is the focus of this chapter. In addition, employers have an important potential role to play, for example by enrolling the workforce in income protection insurance schemes as part of their employment contract; by providing employees with ongoing financial education and training to enable them to make informed choices to protect themselves; and by promoting and incentivising healthy lifestyles (Zurich (2017)).

The optimal configuration of this multi-stakeholder mix depends on the maturity of insurance markets and the specific nature of protection gaps. Certain tasks require private-sector leadership whereas others are considered to be in governments' realm of responsibilities. A third category of challenges needs equal partnerships between both sectors.

In developed countries, there is a limited need for heavy government involvement, such as the full absorption of natural catastrophe risks. This is likely to be different in markets where there is a combination of low risk transfer and management capabilities, and massive protection gaps (see Section 2.1). Here, governments may need to take on a strong enabling and guiding role, subject to their fiscal capacity to do so.

Generally speaking, the public sector is essential to designing and providing the legal and regulatory framework that underpins any well-functioning private insurance sector, whose primary task is to develop cost-efficient and attractive risk transfer solutions.

4.1. The contribution of insurers

Embracing technology

Irrespective of a country's GDP per capita, digital and mobile technologies can go a long way in addressing protection gaps. First, the affordability of insurance improves as its 'production cost' decreases significantly. Digitisation enables massive cost savings in all relevant areas: claims and claims settlement, acquisition and administration. As a result, individuals and households but also corporations are likely to revisit their approach to self-retention and may transfer more risk to professional carriers.

At the same time, social media and mobile tools of communication enable quantum leaps in public awareness of insurance and its cost-benefit characteristics, as well as main product features. In conjunction with improved affordability, increased levels of awareness are expected to be a powerful catalyst for higher insurance penetration, particularly in developing markets. Having said this, access to digital media in low-income countries remains a serious challenge, especially for women and elderly persons.

Last but not least, digitisation comes with enormous advances in customer experience. Hassle-free and more regular communication, combined with a more favourably perceived cost-benefit ratio of more tailored and individualised insurance products could significantly enhance the appeal of insurance, the lack of which is also an important reason for protection gaps in advanced economies (The Geneva Association (2016c)).

Generally speaking, digital and mobile technologies can leapfrog access to insurance in countries with no existing traditional distribution channels (Cole (2015)). Mobile microinsurance has been successfully sold through partnerships primarily with mobile network operators but also through pharmacies and agricultural input companies. The critical success factors include a trusted brand reputation, payment collection capabilities and frequent customer interactions enabling the cost-efficient collection of small premium amounts.

Driving product extensions and innovation

Insurers are not renowned for innovation. This record can explain various protection gaps, primarily in mature markets. Residential earthquake risk, for instance, is generally uninsured, partly because of the behavioural factors discussed in Section 3.1. Therefore, much of the world's residential earthquake risk exposure is ultimately borne by mortgage providers such as banks. Providing lenders with tailored earthquake coverage is a commercial opportunity for insurers and helps narrow the natural catastrophe insurance gap (Swiss Re (2015b)).

Alternatively, and this is another area of opportunity for product bundling, some mortgage lenders require their borrowers to pay home insurance through an escrow system alongside the mortgage payments. This approach reduces transaction costs and puts the insurance

purchase–renewal process in the bigger context of cost of housing. From their panel data analysis Holzheu and Turner (2018) find a strong correlation between mortgage and insurance penetration.

A related concept is ‘nudging’ which has received widespread attention following the award of the 2017 Nobel Prize in economics to Richard Thaler. Applied to insurance, coverage may be provided as an opt-out. Homeowners in high-risk zones would be required to carry insurance unless they specifically decline it. Such techniques have been successfully implemented elsewhere, for example for enrolment into employer-sponsored retirement plans (Thaler and Sunstein (2008))

Another example of product innovation is cyber insurance. For instance, in April 2017, Willis Towers Watson, in collaboration with AIG, introduced CyFly, an innovative and flexible insurance solution specifically tailored to cover cyber exposure affecting the airline industry. The product extends airlines’ business interruption cover to third party service providers— a regular exclusion under ‘off-the-shelf’ cyber insurance policies. Further, business interruption is not limited to IT service providers alone but also includes non-technology providers such as global distribution systems, baggage processing, aircraft maintenance, fuelling and catering and airport security.⁴

Promoting microinsurance

Microinsurance provides low-income, vulnerable households with affordable insurance products. Due to the low premiums, key microinsurance features such as product design, distribution channel and claim settlement processes differ significantly from traditional insurance. Microinsurance generally offers small amounts of coverage and premiums per person. Distribution frequently relies on existing networks, sometimes bundling insurance with other products. Claims handling expenses are minimised by involving local communities in order to influence individual risk behaviour, improve verification, enhance product understanding and foster trust (Cole et al. (2013) and Giné et al. (2008)). Crop covers are frequently based

on weather indices which reduces underwriting and claims processing costs (Barnett et al. (2008)).

Life insurance, however, is the most popular microinsurance product in emerging markets. It usually comes in the form of microcredit life insurance which covers the outstanding balance of a loan on the death of a borrower. Such policies protect the portfolios of banks and, indirectly, facilitate consumer access to financial services.

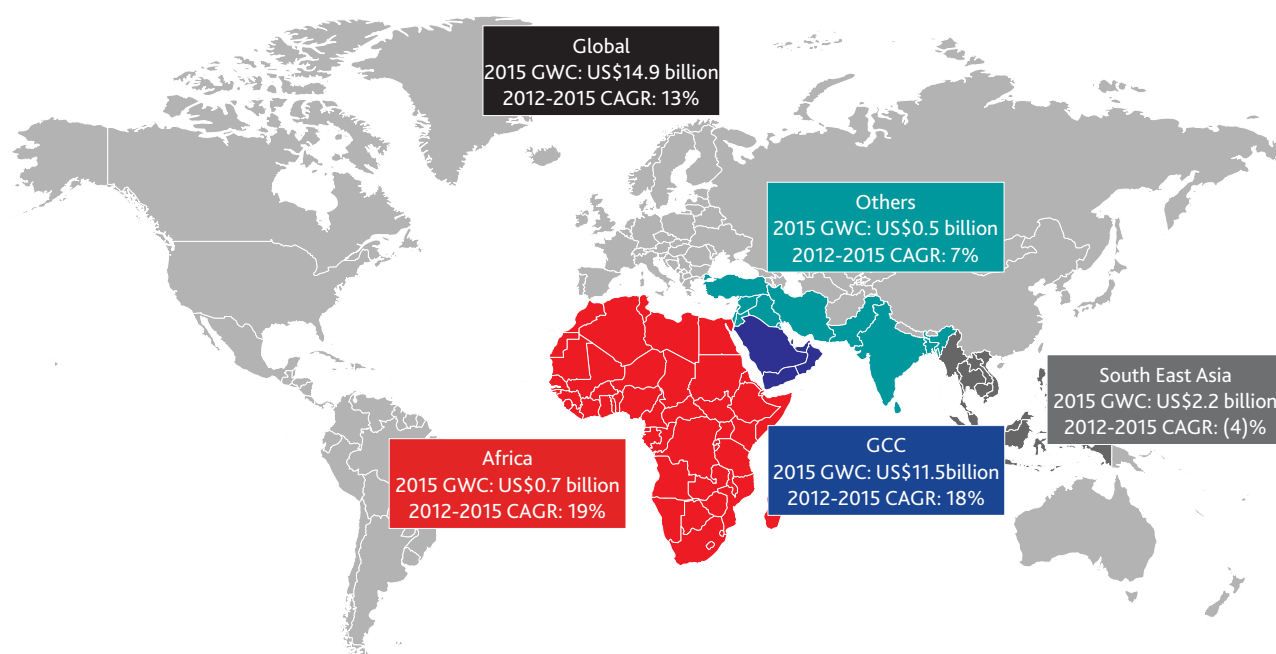
According to Aon (2015) 263 million people worldwide are covered by some form of microinsurance. Although this is up sharply from 78 million people in 2005, the coverage ratio still falls significantly short of its potential of several billion potential policyholders. Coverage ratios remain low, with only 4 to 8 per cent of the eligible population currently insured. Global microinsurance premiums are currently estimated to amount to USD 2.2 billion, less than one per mille of the global insurance market.

Developing Takaful insurance

Conventional insurance may contain elements that are incompatible with Islamic principles. For this reason, Takaful insurance, which is compliant with Sharia law, was developed. Under such policies, policyholder and shareholder funds are separated, and a Sharia-compliant investment strategy is pursued. As a rapidly growing business, Takaful has arguably helped to overcome objections against insurance that are rooted in Islamic law. On the back of double-digit growth rates, the global Takaful market in 2015 was estimated to generate premiums of about USD 15 billion (see Figure 28). At a 77 per cent share the Gulf countries dominate, especially with non-life products, as growth on the life side is held back by generous government provisions. In Asia, on the other hand, life insurance accounts for the biggest chunk of Takaful business, benefitting from a stringent regulatory framework, favourable demographics, and a growing middle class. In terms of major country markets, Saudi Arabia and Malaysia alone generate three quarters of global Takaful premiums (Milliman (2017)).

⁴ <https://www.willistowerswatson.com/en/press/2017/04/Willis-Towers-Watson-launches-innovative-new-cyber-product-for-global-airlines>

Figure 28: The global Takaful insurance market



Source: Milliman (2017)

Note: In some Takaful markets, "gross written contribution" (GWC) is more commonly used than "gross written premiums" (GWP).

4.2. The role of governments

Mandating risk communities

In certain situations, governments can help improve the availability and affordability of retail and wholesale insurance by introducing compulsory schemes which create sufficiently large risk communities and risk pools. In addition, mandatory schemes can mitigate adverse selection by standardising premium rates across risk types, enabling the cross-subsidisation of higher-risk policyholders with the premiums from lower-risk policyholders. Such schemes can be accompanied by premium subsidies for low-income households (Kousky and Kunreuther (2014) and Kunreuther (2015)).

Compulsory insurance is universally used but almost exclusively as part of social security schemes covering

health, old age and unemployment, or as compulsory (motor) liability insurance. In property insurance, however, mandatory regimes are rare (Swiss Re (2015b)).

In some developing markets, such as India and the Philippines, crop insurance is compulsory for farmers who seek loans from banks or other financial institutions. Loan-linked insurance can be used as collateral by farmers (Holzheu and Turner (2018)).

Providing public insurance programmes

Many public sector entities are increasingly utilising new forms of risk transfer, especially for natural disaster losses, in order to relieve their balance-sheets.

Countries in Africa, the Caribbean and the Pacific have always been particularly exposed to extreme weather

events such as hurricanes, droughts and floods, but in recent years this exposure has grown further on the back of population growth, urbanisation dynamics, overexploitation of natural resources, environmental degradation and changing climate and weather patterns.

Partially building on mature markets' experience with public and private-public pooling schemes, some of these vulnerable countries, supported by development agencies and donors, have joined forces by pooling their scant financial resources in regional risk-sharing vehicles. The best known examples are the Caribbean Catastrophe Risk Insurance Facility (CCRIF) established in 2007, the African Risk Capacity (ARC) set up in 2012, and the Pacific Catastrophe Risk Assessment and Financing Initiative (PCRAFI) launched in 2016. In exchange for an annual premium, these facilities offer participating countries limited parametric payouts designed to cope with the immediate aftermath of major disasters. The payouts cover public expenditures for disaster-related emergency and relief measures only, rather than large-scale reconstruction measures. The maximum payout per country is capped at USD 100 million for CCRIF and USD 30 million for ARC.

Another example is Mexico. The country issued its first sovereign catastrophe bond with the assistance of the World Bank in 2009. The objective was to take some of the likely costs of earthquake and hurricane damage off the government's balance-sheet and into the capital markets, thereby reducing its fiscal vulnerability to future disasters. The most recent bonds, issued by the World Bank Group's multilateral development bank and facilitated by the International Bank for Reconstruction and Development (IBRD) has recently proven its usefulness in the aftermath of the Chiapas earthquake in September 2017, as a result of which the Mexican government is expecting to receive a payout of USD 150 million.

Promoting risk mitigation

As a complement to improving risk transfer, protection gaps also need to be addressed through the prevention and reduction of losses. Government-sponsored building codes, for example, are essential to establishing and enforcing risk reduction measures. According to Deryugina (2013), stricter building codes reduce the fiscal burden on the U.S. federal government in the aftermath of

hurricanes. Governments can also effectively discourage development of high-risk areas through zoning.

The insurance industry can encourage the public sector to take risk-mitigating measures. Insurers will only insure against floods in the presence of properly enforced flood prevention measures. By the same token, insurers will not provide fire insurance in the absence of fire brigades. A particularly interesting example is flood-prone Northern Queensland in Australia where insurer Suncorp has successfully encouraged municipal governments to build levees in order to reduce disaster losses. In some municipalities, following the completion of levees, average insurance premiums dropped massively, with some homeowners experiencing decreases of up to 80 per cent (Swiss Re (2015b)).

For most weather-related and other natural catastrophe risks, the private sector has the data and expertise to allow robust modelling—a key enabler of insurance coverage. When the private market can ultimately provide coverage, the public sector should focus on facilitating the availability and affordability of insurance schemes as well as creating a conducive framework for risk reduction and mitigation.

Addressing limits to insurability

In many countries, governments step in as insurers or reinsurers of last resort for certain risks which defy the most fundamental criteria of insurability. Under such circumstances, government backstop programs can facilitate private-sector insurance solutions which at least offer partial coverage. Terrorism for catastrophic scenarios is an example. As human acts without a regular historical pattern terrorism risk is inherently ambiguous and unpredictable.

The spectrum of terrorism insurance arrangements is broad. On the one hand, there is Israel which has historically faced high costs of terrorism, providing complete government coverage with no private sector involvement. At the other end of the spectrum, Germany has established Extremus, a private insurance company jointly owned by leading German (re)insurers. Extremus insures terror risks above EUR 25 million and is endowed with a government backstop to cover aggregate losses in excess of EUR 2 billion (Kunreuter and Michel-Kerjan (2004), Swiss Re (2015b)).

Other public sector funded insurance programmes focus on increasing consumer affordability and access rather than on market efficiency. Examples include the U.S. National Flood Insurance Program, the California Earthquake Authority, or state-based windstorm pools such as Citizens Property Insurance in Florida.




4.3. The role of public-private partnerships (PPPs)

PPPs are of particular use in emerging markets as a means of leveraging existing public sector infrastructure to enable wider distribution, to roll out products more quickly and to achieve benefits from pooling and diversification. For example, insurance penetration can increase rapidly if governments require borrowers from public sector banks to purchase insurance as a prerequisite to loans. In addition, through PPPs government-subsidised insurance programmes can promote insurance penetration. For example in India, crop insurance has grown rapidly in recent years. The government PPP scheme Pradhan Mantri Fasal Bima Yojana (PMFBY) made crop insurance the third largest non-life insurance segment in 2016. Since inception, the scheme has provided protection for many farmers and has generated substantial premium volumes for insurers (Swiss Re (2017c)).

But in mature insurance markets as well, PPPs have an important role to play. In the context of the U.S., Kunreuther (2015) shows that PPPs can encourage investment in protective measures prior to a disaster, deal with affordability issues and provide coverage for catastrophic risks. Risk-based insurance premiums are essential for providing signals to individuals and businesses regarding the hazards they face and for enabling insurers to lower premiums if steps have been taken to reduce risk. Public interventions (e.g. subsidies linked to loss reduction measures) can enable this beneficial mechanism to work even for those who cannot afford insurance.

Figure 29 summarises the remedies discussed and illustrates their respective main (not exhaustive) relevance by country group, based on a review of the cited empirical references and our own assessment.

Figure 29: Remedies to insurance protection gaps—main areas of relevance

	Frontier markets	Emerging markets	Mature markets
 Insurers		<i>Technology</i>	
		<i>Product innovation</i>	
	<i>Microinsurance</i>		
	<i>Takaful insurance</i>		
 Governments		<i>Risk mitigation</i>	
	<i>Public insurance</i>		
	<i>Mandatory schemes</i>		
			<i>Backstop provider</i>
 PPP		<i>Subsidised programmes</i>	

Source: The Geneva Association

5. Conclusions

This report proposes three main conclusions: first, when assessing the relevance and value contribution of insurance to society, what really matters is the adequacy of cover judged against its effectiveness in relieving insureds (and ultimately society at large) from severe or even unbearable financial hardship. Due to its normative character, “adequacy of cover” usually escapes quantification. Therefore, in this publication general risk protection gaps are used as a gauge of societal exposure and the potential contribution of insurance to mitigating it. Genuine insurance protection gaps, as opposed to general protection gaps, are very difficult to quantify. The former describe the gap between the amount of insurance that is economically and socially beneficial and the amount of insurance actually purchased. This notion is fundamentally different from the simple gap between economic and insured losses.

Second, *while protection gaps in the areas of natural disasters and pensions are well researched and widely covered by stakeholder debates, this is not necessarily the case for healthcare and cyber risks*, even though the proportions of the respective protection shortfall are even more dramatic than in the area of natural catastrophes (based on uninsured losses as a share of economic cyber losses and the GDP share of OOP expenses, respectively). *More research, commercial and public policy efforts need to be deployed in these highly relevant segments of the societal risk landscape.* Arguably, cyber, as a genuinely global risk, presents the insurance industry with a fundamental strategic challenge that could even prove to be existential. The product suite and risk appetite of insurers increasingly fall short of the pace at which the digital economy of the future is emerging. Pessimists contend that insurers are set to lose their relevance to society if they fail to make more meaningful contributions to the protection of the virtual space of economies and societies. The health protection gap too is bound to widen in light of rising customer expectations and unabated medical inflation.

Third, our research demonstrates *the importance of carefully distinguishing between developing (frontier), emerging and mature markets* when exploring the scope and root causes of protection gaps as well as potential remedies. It is striking to note, for example, that progress in narrowing natural catastrophe protection gaps has largely remained confined to advanced economies. In addition, the potential for OOP healthcare expenses to reach catastrophic dimensions is particularly pronounced in low- and lower middle-income countries. Against this backdrop, it is absolutely plausible that international policy efforts designed to address protection gaps generally focus on developing and emerging economies.

A diligent differentiation according to stages of economic development is also crucial when analysing the root causes of protection gaps which can range from attitudinal, economic and cultural reasons to supply-side factors such as institutional shortcomings and a fundamental lack of insurability. The configuration of root causes is the basis for designing remedies and determining the most promising ‘split of responsibilities’ between insurers, governments and other stakeholders. As it is imperative to address both demand- and supply side-issues holistically and simultaneously, a joint stakeholder effort in combination with a perspective that cuts across lines of business and geographical silos appears to be a necessary condition for effectively narrowing protection gaps.

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This report offers an updated quantification of insurance protection gaps in the areas of natural catastrophe, cyber, healthcare and pension risk. The paper discusses root causes and potential remedies, taking into account commonalities and differences across various lines of business and country income groups.