

Global protection gaps and recommendations for bridging them

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About GFIA

The Global Federation of Insurance Associations (GFIA), established in October 2012, represents through its 40 member associations and 1 observer association the interests of insurers and reinsurers in 68 countries. These companies account for 89% of total insurance premiums worldwide, amounting to more than US\$4 trillion. GFIA is incorporated in Switzerland and its secretariat is based in Brussels.

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Glossary

AI	artificial intelligence
CAGR	compound annual growth rate
EIOPA	European Insurance & Occupational Pensions Authority
GDP	gross domestic product
GWP	gross written premiums
KPIs	key performance indicators
OECD	Organisation for Economic Co-operation & Development
P&C	property & casualty
p.a.	per annum
p.p.	percentage points
PPPs	public-private partnerships
R&D	research & development
SMEs	small & medium-sized enterprises

I. Introduction

As we live through times of change and uncertainty — implying higher levels of risk — individuals and organisations worldwide are increasingly experiencing situations in which their health, wealth and income are not adequately protected. Similarly, organisations can be concerned about the safety of their property and assets and whether their financial performance will be stable in the future. The direct consequences of gaps in protection¹ represent a major challenge for the well-being and economic prosperity of both individuals and societies. These protection gaps are driven by supply-side factors (eg, insufficient protection from governments and insurers) and demand-side factors (eg, lack of mitigation or adaptation efforts, individuals not seeking protection due to spending preferences, unaffordability or lack of risk awareness).

Private and public stakeholders from various domains already address protection needs. Insurers, for example, play an important role in protecting people against the many risks in their lives. They work directly with individuals and organisations, provide risk-transfer solutions and ensure financial stability if the risks materialise. However, insurers alone cannot address all protection gaps. Public stakeholders have a vital role to play in building appropriate regulatory frameworks or running large-scale public awareness campaigns, enabling private stakeholders to offer their innovative capabilities. Furthermore, some risks are inherently uninsurable by the private sector, making public-sector involvement crucial.

Narrowing protection gaps is therefore the shared responsibility of private and public stakeholders: the affected individuals and organisations themselves (through prevention measures and insurance coverage); insurers (through their risk management expertise, modelling capabilities, distribution channels and partnerships); and public stakeholders (through an appropriate policy framework, public awareness campaigns or public-private partnerships).

In recent years, narrowing protection gaps has become even more important due to the rise of four global megatrends that affect them either directly or indirectly:

- **Technology**, especially digitisation and automation, is driving sweeping changes in how business is done and how humans are connected. There has been an exponential increase in, and usage of, data. The resulting interconnected and complex digital world comes with an increasing number of cyber attacks and data breaches — an issue faced by most businesses worldwide.
- **Climate change** is having major, visible effects on human lives and livelihoods, and is expected to increasingly affect entire societies and economies.
- Increasing **demographic and societal change**, such as ageing populations and the growing middle classes in emerging markets, is creating a greater need for financial security and insurance.
- **Macroeconomics and politics** accelerate the changes observed in today's world due to multiple, parallel, partly interconnected trends such as inflation, supply-chain disruptions and the evolution of the globalised world order.

These megatrends cause dynamic changes in the risk landscape, giving rise to new, rapidly increasing risks and reinforcing existing ones, thereby affecting global protection gaps. Four of these protection gaps are particularly relevant due to their size, global presence, impact on lives and livelihoods, and expected evolution:

- **Pension** protection gap (US\$1trn annual gap)
- **Cyber** protection gap (US\$0.9trn)
- **Health** protection gap (\$0.8trn)
- **Natural catastrophe (natcat)** protection gap (\$0.1trn)

¹ See p30 for the definitions of the protection gaps covered in this report

Totalling approximately US\$2.8trn, these four protection gaps are equivalent to about 3% of global GDP — and this does not even touch on the severe impact on human lives and related suffering.

This report dedicates a chapter to each of these risks, assessing their size and impact, analysing their key drivers, identifying the range of potential levers available to reduce them and providing a wide range of case studies to facilitate fact-based discussions between different stakeholders on how to address them effectively.

The Executive summary includes summaries of each chapter and ends with GFIA's recommendations for policymakers on the actions that can have the largest potential impact globally on the cyber, pension and natcat protection gaps.

II. Executive summary

“The pace of change has never been this fast — yet it will never be this slow again.” This statement by Canadian prime minister Justin Trudeau in 2018 describes the pace at which megatrends disrupt the world we live in, implying high levels of change and uncertainty for both individuals and organisations.

Four megatrends are particularly relevant given their global economic relevance and their impact on human lives:

- **Climate change**, which impacts lives and livelihoods around the globe. The World Economic Forum estimates it will create costs equivalent to between 4% and 18% of global GDP by 2050 if no adequate preventive actions are taken.
- **Technological acceleration** and the use of data, which has increased exponentially over recent years, with the amount of data stored globally expected to reach an unprecedented 180 zettabytes² by 2025.
- Changing **demographics** leading to ageing populations (in the USA, for example, 21% of the population is expected to be above 65 by 2030, up from 17% in 2020). At the same time, GDP productivity will shift towards emerging countries, which will account for 35% of global GDP in 2040, up from 25% in 2020.
- Disruptive developments in **macroeconomics and politics**, which will increase the level of uncertainty and volatility across the globe as supply-chain disruptions, inflation and other developments hit economies worldwide (eg, inflation in Europe was at almost 10% in July 2022 compared to 2.5% in the previous year).

These megatrends also change today’s risk landscape by reinforcing existing risks and creating new ones, increasing the vulnerability of both individuals and organisations. Among the newly emerging risk areas are cyber risk, supply-chain disruptions and environmental liabilities.

The risk landscape impacts:

- individuals (such as pensions, health, mobility and homes, as well as disability, morbidity and death);
- businesses (such as business continuity); or,
- both individuals and businesses (namely personal and business liability, property, financial markets, natural catastrophes (natcat) and war and terrorism).

The risks vary in terms of economic relevance, speed of growth, direct impact on human lives (whether they cause major hardship or death) and insurability (whether private insurers or public systems can at least partially cover them).

Of these risks, **pensions, cyber, health** and **natcat** stand out due to their growing economic importance, impact on human lives and insurability. Exploring the current protection landscape and analysing the protection gaps related to these risks is particularly relevant due to their substantial economic and human impact.

While the insurance industry can contribute to reducing these protection gaps when the underlying risks are insurable, a single stakeholder group alone cannot narrow the gaps. Close collaboration between private and public stakeholders is necessary, as governments and other public entities can help build the appropriate regulatory environment, create fiscal incentives or conduct public awareness and prevention campaigns, among other actions.

Below we describe these four protection gaps in more detail and summarise the possible levers that private and public stakeholders can use to reduce them. We end this Executive summary with GFIA’s own recommendations to policymakers for reducing the protection gaps in cyber, pensions and natcat.

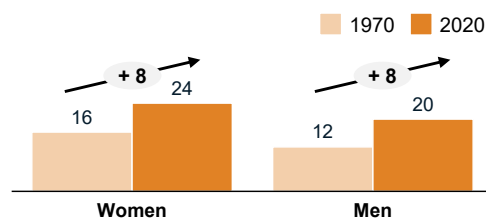
² 10²¹ bytes or a trillion gigabytes

Four major protection gaps

Accelerated by current trends

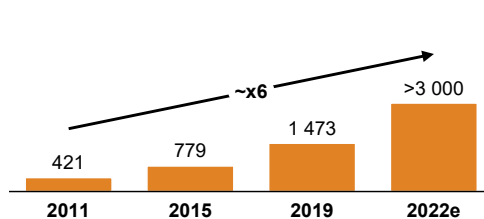
Pension

Expected life years after labour market exit (OECD countries)



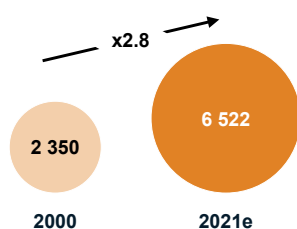
Cyber

Number of breaches with >50 000 files lost



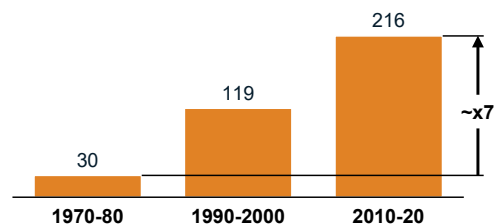
Health

Health spending¹ in OECD countries (US\$ per capita)

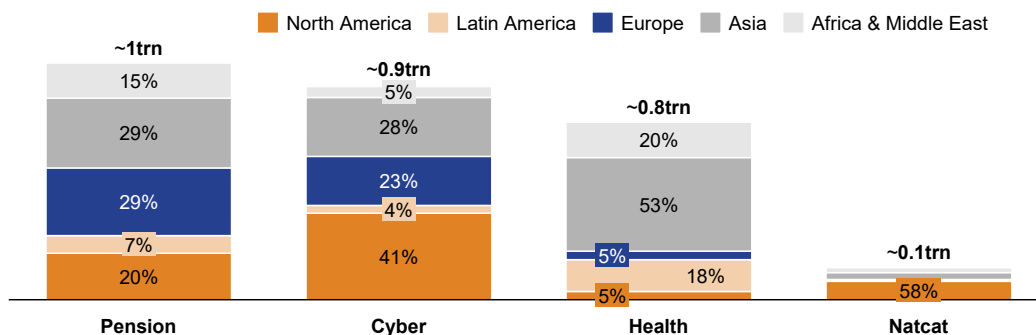


Natcat

Average annual natcat losses per decade² (US\$bn)



Annual protection gaps (US\$trn) and geographic split



<p>Cumulative gap of US\$51trn after deducting pay-as-you-go, converted into an annuity of US\$1trn p.a. with a 1% interest rate over 40 years</p>	<p>First-order cyber losses (US\$0.95trn) minus paid cyber claims (US\$0.06trn)</p>	<p>Stressful out-of-pocket spending³ only. Gap could reach up to US\$4.0trn if spending avoided due to financial constraints is included</p>	<p>~60% of natcat losses not insured between 2011 and 2020</p>
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e = estimate

- Including personal healthcare (curative care, rehabilitative care, long-term care, ancillary services and medical goods) and collective services (prevention and public health services and health administration), excluding investments
- Events caused by natural forces triggering insurance policies, eg, floods, storms, earthquakes, droughts, forest fires, frost, hail and tsunamis
- Spending by individuals that puts pressure on their finances

Cyber protection gap — risks are growing in frequency, severity and variety

The increasing presence of technology and exponential use of data in almost all aspects of life is a global phenomenon. While it might create many opportunities — from remote working and driverless cars to the seamless delivery and automated dispersal of fertilisers in agriculture — it has also significantly increased exposure to cyber risks.

The number, severity and types of cyber attacks have grown globally. Insurers and other private and public stakeholders have started addressing the increasing need for cybersecurity and related financial protection. However, the market is still relatively nascent, especially in terms of the evolving regulatory environment and the developing awareness among individuals and organisations of cybersecurity and prevention measures and in terms of the rapidly evolving nature of both the technological landscape and the nature of the threats (such as the emergence of ransomware attacks in recent years).

We define the cyber protection gap as the difference between the total economic exposure of first-order losses from cyber attacks (eg, damaged industrial facilities, bodily injury, software replacement and ransom payments) and the losses currently covered (approximated with the global premium volume for cyber insurance). Second-order losses that are a frequently observed, indirect consequence of cyber attacks (eg, reputational damage) are difficult to quantify and are not included to ensure comparability with the other protection gaps.

Insurers currently only cover approximately US\$6bn in paid claims annually, with the USA being the largest cyber insurance market, accounting for roughly 70% of global cyber GWP. Although increased loss ratios in recent years have made insurers reconsider their cyber underwriting policies and risk appetite, the supply of cyber insurance in terms of GWP is growing and is expected to reach US\$13-25bn by 2025. With the increase in technology and digitisation, annual economic losses from cyber incidents are estimated at over US\$0.9trn, having seen substantial growth in 2020 as a result of the COVID-19 pandemic. However, due to the small share of insured losses, the estimated protection gap remains at approximately US\$0.9trn.

Although the supply of cyber insurance is expected to grow, it is unlikely that the cyber protection gap will be closed soon due to the small share of insured losses today and the rapid speed of digitisation, making businesses increasingly vulnerable to cyber attacks. Furthermore, since they are dependent on the regulatory environment (eg, incident-reporting standards) and public cybersecurity infrastructure, insurers will not be able to narrow the cyber protection gap alone (particularly for potentially systemic cyber risks), meaning private and public stakeholders need to collaborate to address the fast-growing cyber protection gap. Individuals and organisations need to seek cyber protection and proactively engage in prevention.

Various potential levers exist for private and public stakeholders to use to address the protection gap. These include: incentivising and supporting prevention; conducting awareness campaigns; developing incident-reporting frameworks; and fostering adaptation measures.

- The incentivisation and support of prevention measures can potentially decrease the cyber risk of an organisation by 70%. For example, insurers offer *ex-ante* risk-mitigation services in the form of risk engineering and include financial incentives in their policy clauses, which can reduce an organisation's premiums or deductibles if security measures are implemented.
- Awareness campaigns by both public and private stakeholders are a way to address the protection gap by educating individuals about cyber insurance and explaining the importance of security measures.
- Public policies that define a clear regulatory incident-reporting framework with necessary security could facilitate risk modelling by insurers. For example, analyses show that the introduction and enforcement of the cyber-incident reporting legislation in the USA correlates with the growth of its cyber insurance market, thus potentially reducing the protection gap.

- Public stakeholders may also foster prevention and adaptation measures that help reduce the number and severity of cyber incidents. For example, there are several existing initiatives fostering IT skills among professionals. In addition, regulatory frameworks and requirements supporting prevention and adaptation, such as minimum cybersecurity standards, have improved cybersecurity. The establishment of cyber-attack response units is another lever employed by governments.

The suitability of these levers for addressing the cyber protection gap needs to be assessed individually for each country, as countries may have different regulatory environments for cyber risks and insurance.

Pension protection gap — growth exacerbated by demographics

Demographic changes are putting unprecedented pressure on pension systems globally, requiring them to sustain more people as the expected lifespan after retirement increases alongside the number of people entering the systems. And public pension schemes are under pressure as fewer people in the workforce support the inflow of funds into the schemes due to falling birth rates coupled with the increasing number of people receiving disbursements. The increasing living standards of societies worldwide also accelerate the need for higher pensions.

Together, these rising pension needs and decreasing monetary inflows into pension systems result in an increasing pension protection gap. This pension gap differs between countries due to different funding schemes (eg, self-funded versus pay-as-you-go), the role of property ownership, the wealth of the population, life expectancy, the regulatory environment, the need for (long-term) healthcare and the role of the family.

We define the pension protection gap as the difference between the savings needed to sustain a reasonable standard of living (65-70% income replacement) for the next generation of retirees and the currently projected inflows into the system. The cumulative pension gap is approximately US\$51trn today (excluding pay-as-you-go pension payments and disbursements). We converted this amount into an annuity over 40 years (ie, a typical work-life duration) to identify the annual protection gap (ie, the annual sum that would be necessary to compensate for the future pension protection gap) to ensure comparability with the other gaps.

The global pension gap is estimated at US\$1trn annually and is expected to grow even further, impacted by several drivers. The global share of people over 65 grew from 6.8% in 2000 to 9.3% in 2020, increasing the demand for pension disbursements. Similarly, real GDP per capita is expected to continually increase until 2050, pointing towards increased living standards, which are accompanied by increased pension needs and expectations.

Given that pension needs are likely to continue to grow faster than the available funds, the gap will further increase, especially because decreasing investment returns are expected to hit pension schemes worldwide. While the past decade has brought significant positive returns on both equities and bonds, these key asset classes are unlikely to maintain this level of return in the next decade. As the pension gap has reached a significant size, close collaboration between public and private stakeholders is necessary. While public stakeholders play an important role in building the appropriate regulatory environment, private stakeholders could help address the gap by, for instance, introducing new products.

There are various potential levers for private and public stakeholders to use to address the protection gap. These include: offering innovative and flexible products; creating awareness of the need to save for retirement; encouraging automatic enrolment in pension schemes; and introducing tax incentives.

- To meet evolving customer needs, insurers have developed a range of innovative and flexible products, including:
 - Products proposing a customisable balance between variable and fixed returns
 - Products providing access to new types of investments (eg, renewable energies)
 - Offers enabling customers to turn illiquid wealth, such as real estate, into liquid assets (eg, reverse mortgage schemes)
- Pension needs and options are often difficult to understand. Thus, promoting pension savings and educating people, especially the young, could increase retirement provision. For example, the Singaporean government launched a dedicated campaign in 2009 when implementing a national pension income reform (CPF Life). Approximately 90% of those who attended the campaign's educational events said they could apply what they had learned.
- Furthermore, governments can introduce automatic enrolment for all citizens in the formal labour force (as done in Australia, New Zealand and the UK) or encourage it through enterprise-level regulation (as in Canada and the USA). Implementing automatic enrolment is effective; for example, participation in the USA 401k pension plan increased by at least 50% due to automatic enrolment.

- Lastly, many countries have implemented tax incentives to encourage employees' and employers' pension contributions.

The suitability of these levers for addressing the pension protection gap needs to be assessed individually for each country, as countries differ structurally and culturally, for instance in terms of their overall level of wealth and the affordability of pension savings.

Natcat protection gap — accelerated by climate change

The last decade of natcat events has been the costliest in recorded history, with substantial losses that inhibit economic growth and severely impact individuals' well-being.

Natcat events are catastrophes caused by natural phenomena (eg, floods, earthquakes, tsunamis). Accelerated by climate change and global development patterns (people living in high-risk areas), natcat events and related losses are expected to increase, thereby creating significant risks to the health and financial viability of individuals and organisations. Against this background, insurers are likely to play an increasing role in natcat protection in the coming years. However, individuals and organisations often struggle to access adequate natcat protection (eg, insurance coverage), primarily due to challenges related to affordability, availability or the ability to appreciate the risk. Levels of awareness and engagement in prevention also remain insufficient, thus causing the protection gap to increase.

The current natcat protection gap is estimated based on the economic losses from natcats currently not covered by insurance. The number of natcat losses has increased by an average of 5% a year over the last 50 years and is a focus for governments and the private sector, especially due to the link to climate change as well as to limited adaptation and mitigation. In absolute numbers, average annual natcat losses increased from US\$126bn between 1990 and 1999 to US\$219bn between 2010 and 2020.

Natcat losses have remained stable as a share of inflation-adjusted GDP over recent decades, despite an increase in the frequency and severity of events and the higher economic value of assets in high-risk areas. Among other reasons, this relatively stable share is caused by the increasing GDP of intangibles (eg, data-driven business models), which are less affected by natcat events.

While the average share of insured losses has increased (between 1990 and 2000, the average share of insured losses was approximately 22%, compared with 33% between 2010 and 2020), this has not been sufficient to decrease the natcat protection gap in absolute numbers. The current natcat protection gap stands at roughly US\$139bn per annum.

A driver contributing to the acceleration of the protection gap is the movement of populations and their valuable assets to high-risk areas. The share of insured losses (and therefore the natcat protection gap) differs significantly by region, which can be partly explained by each region's risk situation and economic exposure. While the gap stands at 30-40% of losses in some regions and countries (Europe and North America), it has been consistently large — indeed close to 100% — in some low- and middle-income markets, making them particularly vulnerable to long-term economic hardship and reliant on international aid in the case of major natcat events.

Although a joint effort by private and public stakeholders is needed to address the natcat protection gap, insurers can play a crucial role in addressing it due to their specialist capabilities (eg, dedicated natcat risk modelling).

There are various potential levers for private and public stakeholders to use to address the protection gap. These include: setting up parametric insurances or other innovative forms of risk transfer; revisiting distribution models; prevention and adaptation; government-backed programmes; and facilitated access to global reinsurance.

- As a first lever for reducing the protection gap, new distribution models for natcat insurance coverage are evolving. Technology is key to creating new distribution methods, such as embedded insurance products. These distribution methods may allow private insurers to increase the accessibility of coverage, increasing the share of insured losses in the case of a natcat event.
- Another important lever to use to address the gap is to decrease the losses (both insured and uninsured) by implementing prevention and adaptation measures in various contexts, such as land-use or building codes and not incentivising rebuilding in high-risk areas.

- Further levers, depending on the jurisdiction and local insurance industry framework, could include government-backed programmes, public-private partnerships, mandatory contributions to natcat funds or pooling solutions to alleviate the financial burden on governments and speed up economic recovery from natcat events by, for instance, increasing insurance market penetration.
- Access to global reinsurance markets to reduce the geographic concentration of natcat risks can also be facilitated. International risk diversification may help build (re)insurance risk portfolios that are more resilient and less affected by losses in single countries or regions.

The suitability of these levers needs to be assessed individually for each country, as countries have exposures to different geographical risks.

Health protection gap — particularly prevalent in developing economies

The topic of health protection was on the minds of individuals, organisations and governments long before the COVID-19 pandemic began. Private and public entities invest large amounts of money in advancing medical capabilities (including the automation of medical examinations) each year and substantial progress is being made, including new treatments and medical technology. However, in times of demographic shifts — including an ageing population, increasing morbidity and rising healthcare needs in emerging markets — this topic is gaining importance and is a priority for entire regions, with some societies benefitting more than others from medical advances and enhanced access to healthcare.

The health protection gap can be estimated by looking at stressful out-of-pocket (OOP)³ health expenditure and estimated avoided costs. It is valued at US\$0.8trn to US\$4trn annually. The lower end of this range only includes stressful OOP health expenditure, which represents a narrower definition of the gap and is particularly relevant in emerging markets. The higher end of the range also includes estimated avoided costs, which represent the largest share of the health protection gap at up to US\$3.4trn (although these costs are difficult to quantify as they are not officially reported). Looking at the geographical distribution of the gap in more detail, we find significant differences: upper-middle-income countries constitute approximately 73% of the gap (US\$2.9trn), while low- and lower-middle-income countries constitute approximately 14% or US\$0.6trn. The rest of the gap is split between the USA, at approximately 7% (US\$0.3trn), and the EU, the UK, Canada and Australia (6%, US\$0.2trn). The growth in the gap shows no sign of slowing, as the decrease in the share of OOP spending in most emerging markets does not seem to be fast enough to address the issue, especially because the populations and the middle classes in those countries continue to grow. A combination of public health infrastructure/security and private health offers (eg, private health insurance) is needed to narrow the protection gap.

There are various potential levers for private and public stakeholders to use to address the protection gap. These include: new distribution channels; awareness campaigns to foster preventive treatments; the promotion of complementary private insurance; and the establishment of add-on healthcare services (eg, prevention services as part of a health ecosystem).

- Using a full set of distribution channels can help deliver coverage to previously underserved groups. In Thailand, for example, multiple insurers started to distribute microinsurance policies through 7-Eleven convenience stores, with four million microinsurance policies being sold through this new distribution channel in 2017.
- Raising awareness, fostering prevention and promoting early detection (eg, via technology and automation) can help avoid or manage illness and severe medical conditions. In Germany, a financial incentive scheme to promote dental prophylaxis helped decrease dental replacements' share of dental treatment costs from 36% in 1997 to 22% in 2020.
- Complementing public health insurance and social security with private insurance can help narrow the protection gap by covering treatment costs otherwise unaddressed by public health systems. Finding the right balance between private and public systems is a key challenge for governments worldwide. In France, 95% of the population has complementary private insurance. As the French public healthcare system covers 70% of the most common treatment costs, complementary insurance reimburses defined percentages of the remaining costs.
- Lastly, offering integrated, add-on healthcare services has the potential to make health management a more central and accessible part of peoples' everyday lives. For example, an African insurer established a service whose users have 25% shorter hospital stays and 14% lower overall claims costs than non-users.

The suitability of these levers for addressing the health protection gap need to be assessed individually for each country, as countries have different starting points (eg, the level of advancement in medical technology).

³ Spending by individuals that puts pressure on their finances

GFIA recommendations for policymakers

Introduction

This report has been produced by GFIA to promote greater understanding of the largest protection gaps faced by individuals, businesses and societies globally. Later chapters look into these gaps in more detail, examine the drivers and provide an overview of the wide range of potential levers that could be considered as ways to help reduce each of the gaps. The range of potential levers covered in later chapters include both actions that insurers can take and actions the public sector can take. The potential levers identified for policymakers have pros and cons — some can have unintended consequences and others may work in some jurisdictions but not in others. Nevertheless, all the levers have been included in the report to give as complete an overview as possible.

In this section of the report, GFIA focuses on its own recommendations for policymakers because insurers' ability to help reduce protection gaps is dependent on appropriate actions being taken by regional, national and supranational policymakers. It is they who can design and create the environments in which risks can be best managed and mitigated and so allow insurers to play their key role.

The following sets of recommendations, for cyber, natural catastrophe risks and pension savings, represent “dos” and “don'ts” with which the global insurance industry considers policymakers can have the largest potential impact across the world in helping to address protection gaps.

Recommendations to policymakers for narrowing the cyber protection gap




Promote awareness of cyber risk and incentivise cyber-risk prevention.

- Collaborate with the insurance industry to provide resources and education about the risks of operating online — particularly for consumers and small businesses, as these groups tend to underestimate the risks — as well as to develop easy-to-understand steps that they can take to reduce their cyber exposure.
- Develop guidance on what constitutes good cybersecurity for IT systems, as this would help businesses develop security measures in a cost-effective manner and may positively impact insurance premiums.
- Develop cybersecurity standards and best practices for users to follow and actively support the private sector through public awareness campaigns and training programmes.
- Educate consumers and businesses on the role of cyber insurance as a mechanism of risk transfer and a method of helping businesses recover in the event of a cyber breach.




Promote an improved landscape of cyber resilience, particularly among critical infrastructure firms and assets.


- Consider adopting mandatory requirements on cybersecurity, especially for key economic sectors, subject to existing regional and national frameworks.
- Ensure that the agencies and contractors with whom governments and regulators do business evaluate their cybersecurity according to uniform and regularly updated standards. Look to adopt model systems that impose higher cybersecurity standards on critical national infrastructure, based on its level of strategic importance, so that it is minimally impacted by cyber events and system-wide breaches.
- Continue to evaluate, in partnership with the insurance industry, the merits of a cyber insurance programme to mitigate the impacts of a catastrophic cyber event. Any programme should take into account the downstream catastrophic damage that could result from a massive cyber event.
- Bolster efforts to pursue and prosecute those who are perpetrating cyber attacks.

 **Create a harmonised cyber-incident reporting framework to gain better insight into the frequency and severity of major incidents.**

- Work with the insurance industry to develop a cyber-incident reporting framework to encourage targeted organisations to report incidents including ransomware, phishing, email compromise and other attacks. Such a framework should support automation and ongoing analytics.
- In any effort to design an effective incident-reporting regime, focus on creating a mechanism that is minimally onerous and avoids delaying the delivery of essential services. This is especially important in the immediate aftermath of a cyber attack.
- Prioritise the re-use of existing standards, so any new initiatives should encourage best practices and minimise, to the extent possible, the creation of new requirements.
- Harmonise cyber-incident reporting frameworks as much as possible across jurisdictions, and ensure participation and requirements are tailored and fit for purpose.


 **Facilitate the sharing of aggregated data with insurers and academics for the purpose of risk modelling and risk mitigation.**

- Effective cyber-risk modelling can help quantify the risks associated with a system-wide cyber incident and measure accumulation risk. Additionally, risk modelling can help identify whether a cyber backstop is required.
- Jointly with the insurance industry, determine: the information that can be provided and will be most helpful for risk modelling; the best way to collect this data; who should have access to the data; and what limitations should be placed on how the data can be used/disclosed.
- Implement safeguards in any data-sharing effort to adequately address security and confidentiality concerns.

 **Do not prohibit ransomware payments.**

- Making ransomware payments illegal could discourage the reporting of ransomware attacks and penalise victims. It may also leave businesses unable to deal with the outcome or provide the necessary assistance to customers, who may also be impacted. In some cases, the costs involved could result in the insolvency of the targeted company.
- In the event of a ransomware payment, encourage the targeted organisations to report the incident to the relevant authorities. This ensures that the payment of a ransom is clearly recorded and that the judicial authorities are informed of criminal activity. It also increases the availability of data about ransomware events.

Recommendations to policymakers for narrowing the pension protection gap

 **Promote pension savings and educate individuals, especially young people, on the importance and value of making continuous savings from the beginning of their working life.**

- Improve levels of financial education, as low financial literacy makes it hard for people to understand their needs and pension saving options. Begin financial education at school.
- Help every citizen to understand how much saving they may need for retirement by, for example, developing national tracking systems with clear information about expected future pension benefits.
- For instance, provide disclosures that illustrate savings as monthly lifetime income annuity payments to help individuals better gauge whether they need to increase their retirement savings or revise their investment mix to meet their retirement income goals.
- Integrate behavioural aspects into awareness-raising campaigns, identifying the best ways to encourage citizens to take action.
- Encourage individuals to maintain steady pension contributions even in difficult times.

- ✔ **Ensure that pension policy is based on a long-term and holistic strategy connected to other policy areas, including employment, housing, taxation and healthcare.**
 - These other policy areas can have impacts on the ability and need to save for retirement.
 - Ensure stability and confidence in the pension-saving framework so that individuals are willing to save long-term and providers are willing to establish and operate long-term.

- ✔ **Incentivise employers to offer pension arrangements.**
 - For workplace pensions, avoid high administrative burdens and allow pooled employer retirement savings plans.
 - Consider automatic enrolment schemes, with opt-outs, as a way to encourage savings, but take into account national circumstances (ie, existing schemes, products and providers).
 - Offer incentives, such as tax benefits or subsidies for pension arrangements, to encourage employer and employee pension contributions.

- ✔ **Enable part-time workers, self-employed workers and “gig economy” workers to join retirement saving programmes.**

- ✔ **Ensure good regulation that allows innovation and digital-friendly delivery and formats, as well as enabling providers to meet the evolving needs and expectations of consumers, especially new generations.**
 - For example, remove out-dated requirements in existing regulation, such as the requirement to provide consumers with information on paper as the default method.
 - Replace these requirements with digital-friendly rules allowing consumers to access information or services digitally if they wish and to benefit from the opportunities that digitalisation offers.
 - Limit mandatory disclosure requirements to key information, focusing on the quality of information rather than its quantity.

- ✔ **Aim for a pension policy that covers accumulation and decumulation with the flexibility to meet consumer needs and circumstances throughout retirement, enhancing the objective of maximising retirement income.**
 - Recognise that individuals’ needs change as they age and progress from work to retirement.
 - Ensure solutions, such as annuity products, are available to help individuals cover their longevity risk.

- ✘ **Do not have regulations that create unnecessary barriers or costs preventing insurers from providing effective and efficient pension solutions.**
 - Avoid capital requirements that undermine insurers’ ability to invest long-term or offer long-term products and guarantees.
 - Avoid excessive sales regulation, such as disclosure requirements, that leads to information overload for customers and unnecessary costs.

- ✘ **Do not impose policy measures that inhibit access to financial advice for consumers with limited disposable income.**
 - Eliminating support from financial advice professionals who receive remuneration from pension providers inhibits access to advice for consumers who cannot afford fee-based advice.

- ✘ **Do not implement policy measures that would result in the defunding of private pension schemes, such as retroactive changes to contract terms.**

Recommendations to policymakers for narrowing the natcat protection gap


- ✔ **Support and make efforts to educate and inform the general public, businesses, communities and policyholders about the benefits of insurance.**
 - Protection gaps can arise because people and businesses do not understand the level or potential impact of the natural hazards to which they are exposed.
 - Education and information campaigns and programmes can help ensure that there is a better understanding of the risks faced and the importance of having financial protection. For example, improving the information available about the natcat risks linked to a property would help informed decision-making.

- ✔ **Ensure that strong and enforced land-use controls and building codes are in place to promote the resilient construction of buildings and infrastructure and, where appropriate, the use of green or reconditioned materials.**
 - Restricting construction in high-risk areas (eg, those exposed to major floods), enforcing appropriate building codes and implementing “build back better” programmes will limit and reduce exposure to extreme natcat events. This will reduce the damage and costs of recovery and thus keep more risks insurable, limit the need to increase premiums and help keep insurance affordable.
 - Encourage the use of green or reconditioned materials, as well as building levees and natural infrastructure, etc., which — in appropriate circumstances — will help limit the impact of new building and repairs on the climate and environment.
 - Involve the local insurance industry, which is already using its expertise to help jurisdictions around the world to develop effective land-use planning, flood-control planning and building codes.


- ✔ **Promote close cooperation between public and private sectors to close the protection gap.**
 - Work together with the private sector to take many measures to address the protection gap, including reducing risk and improving resilience.
 - In addition to those efforts, in certain jurisdictions the implementation of insurers’ measures to close natcat protection gaps may require combined risk-sharing efforts with governments and society, and it should be with due regard to the underwriting capacities of insurers.
 - Where steps are taken to address affordability, allow private insurers to price policies on a sustainable basis and accompany them with measures to reduce risk and avoid moral hazard.

- ✔ **Promote insurance products tailored to local needs, in particular by fostering microinsurance when appropriate.**
 - The heterogeneity of markets requires solutions adapted to each territory. Consider and promote solutions such as parametric insurance or cat bonds where appropriate.
 - Microinsurance can be an effective mechanism for expanding protection to a large target population, especially in emerging economies.

- ✔ **Support open markets for (re)insurance. This will ensure the maximum amount of capital is available to close natcat protection gaps and support competitiveness and innovation.**
 - Open markets allow (re)insurers to diversify risks globally, leading to lower costs and more capacity in the long term, which is needed to close the protection gap.
 - Global diversification allows (re)insurers to provide more substantial and affordable coverage, particularly as it increases the capital support available to both cedants and reinsurers to provide natcat cover.
 - Restricting market access not only makes (re)insurance more expensive but also makes it less secure because there may not be enough capacity to cope with major disasters.

 **Do not create a regulatory environment that erects barriers to (re)insurers' ability to provide natcat coverage and to innovate.**

- Support competition and innovation and avoid excessive costs and solvency capital to allow (re)insurers to better provide affordable cover for the widest range of risks.
- Permit risk-based pricing and underwriting where possible.
- Take care to ensure that regulation does not create unnecessary barriers or costs for innovations such as parametric insurance, microinsurance and digitalisation.
- Do not create moral hazard through post-disaster financial assistance that deters people from insuring their properties. Make people and businesses aware of the specific and limited post-disaster financial assistance that would be made available to them and do not go above what is foreseen in terms of the intervention of public authorities after an event.

 **Do not apply excessive taxes and levies to insurance premiums that affect the affordability of cover.**

- Taxes and levies on insurance products and services add to the cost of buying insurance. These can make insurance less affordable and can therefore contribute to widening the protection gap.
- This can especially impact those on low incomes living in higher risk areas, where insurance premiums are already signalling the elevated risk and need for adaptation measures.
- Helping individuals to afford insurance cover can have a positive impact on public finances.

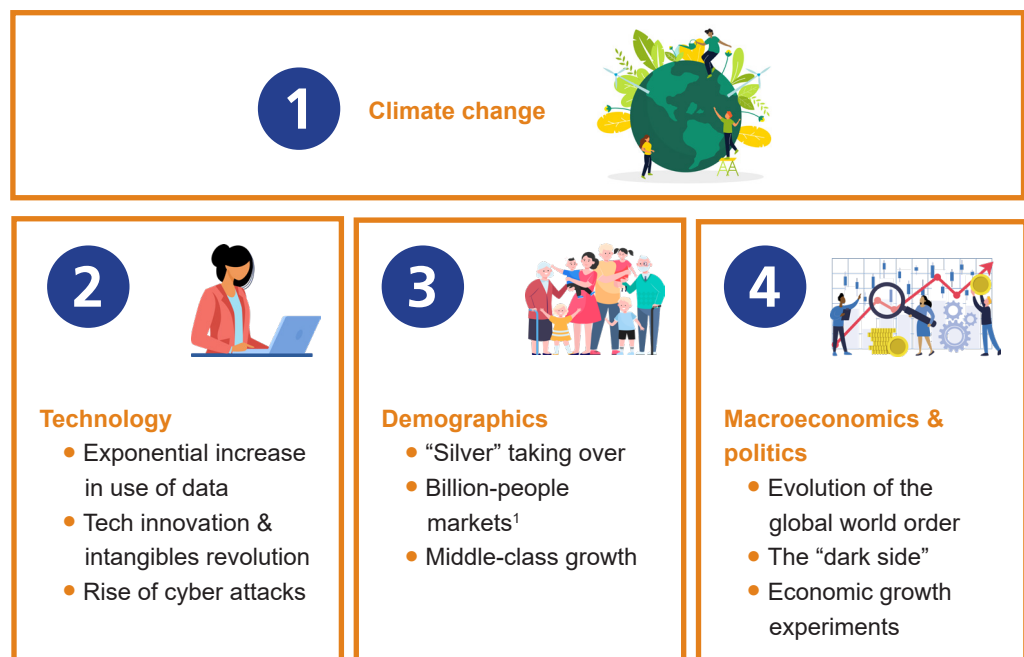
III. Changing world, evolving risk landscape

Four megatrends are affecting societies & economies

The modern world is influenced by several megatrends, including climate change, technological acceleration, changing demographics and the disruption of macroeconomics and politics, all of which affect a wide range of stakeholders (Figure 1).

Climate change influences economic productivity, causes economic damage and affects human health and well-being worldwide. And although new technologies make interactions with consumers more fluid and personalised, they also drive operational and data complexity to previously unseen levels. Meanwhile, demographic shifts generate new power centres, such as rising billion-person markets in Asia and Africa, which create both new challenges and opportunities. And in terms of macroeconomics and politics, we observe a change to the global world order, rising inflation and a trend towards more localised supply chains.

Figure 1: Four groups of megatrends are affecting the world



1. India, China, Africa & south-east Asia

Climate change is influencing organisations, people and the environment. Its impact is already clearly visible.

- The frequency of natural catastrophes between 2010 and 2022 was 28% higher than the previous decade⁴. In 2020, floods in Asia affected more than 50 million people and led to

4 Natural catastrophes 1970–2021, Swiss Re

more than 5 000 deaths⁵. In Australia, the risk of flood events tripled in the 2010s compared to the 2000s⁶. In 2022, the east coast floods in Australia caused A\$5.1bn (US\$3.5bn) in insured damages and were the third costliest extreme weather event in the country's history — total losses, including uninsured losses, result in an even higher number⁷. Research indicates that climate change is also linked to the loss of biodiversity, with approximately one million animal and plant species currently threatened with extinction⁸, which leads to the deterioration of ecosystem resilience and poses a risk to clean water, sites for recreation, oxygen production, the growth of medicinal plants and food production.

- The increasing uninhabitability of some regions caused by more frequent natural disasters and climate change will drive further refugee crises. By 2030, as heat and humidity increase in India, 160-200 million people could live in regions with a 5%⁹ average annual probability of experiencing a heatwave that exceeds the survivability threshold for humans.
- The global economic impact of climate change is severe. The World Economic Forum estimated in 2022 that climate change will create costs equivalent to 4-18% of global GDP by 2050 if no action is taken. The World Health Organisation estimates that, globally, direct damage costs to health (excluding costs in health-determining sectors such as agriculture, water and sanitation) will be US\$2-4bn¹⁰ per year by 2030. Outdoor labour productivity is also expected to be impacted, with a reduction in the number of hours that work can be performed. By 2030, the average number of lost daylight working hours in India could increase to the point where 2.5-4.5% of GDP is at risk annually¹¹.

Climate change is estimated to create costs equivalent to 4-18% of global GDP by 2050

New technologies are driving sweeping changes to the quality of consumer experience, the ease of doing business and the interconnectedness and complexity of the world.

- The use of data is increasing exponentially and is expected to reach approximately 180 zettabytes¹² by 2025. Data storage revenue has grown 1.7 times over the last 10 years. This trend sets the stage for the “data economy”, where large amounts of user data allow organisations to effectively target existing and new customer needs. The trend brings the urgent issue of protecting personal and corporate data to the forefront. It might also trigger the creation of new institutional entities such as data cooperatives — an equivalent to conventional trade unions.
- At the same time, tech innovation and the intangibles revolution have created new opportunities, products and assets. Although they are not yet a commercial reality, driverless cars could create an entirely new user experience. The drone market — which grew significantly between 2015 and 2020 — could create a range of opportunities, such as the seamless delivery and dispersal of fertilisers in agriculture, but also trigger new concerns in terms of, for instance, personal injury, property damage and the invasion of privacy. Ecosystems and tech platforms have grown to address a wide range of consumer needs, as seen in the business operations and products of companies like Google, Facebook, Amazon

5 Weather and climate extremes in Asia killed thousands, displaced millions and cost billions in 2020, World Meteorological Organisation, 26 October 2021

6 Natural catastrophes 1970–2021, Swiss Re

7 “A\$2 billion in flood payments already made by insurers — Floods now Australia’s second costliest weather event 2022”, Insurance Council of Australia, 29 July 2022

8 “Climate change and biodiversity: Twin challenges for today’s business leaders”, Zurich, 16 November 2021

9 “Will India get too hot to work?”, McKinsey Global Institute, 25 November 2020

10 “Climate change”, World Health Organisation, 2021

11 “Climate risk and response: Physical hazards and socioeconomic impacts”, McKinsey Global Institute, 16 January 2020

12 10²¹ bytes or a trillion gigabytes

and WeChat, which have driven the increased interconnectedness of data. As company value is increasingly driven by innovation, intangible assets such as a company's brand, intellectual property and R&D now make up 90% of the S&P 500's total value of assets¹³.

Number of cyber attacks per company grew 30% from 2020 to 2021

- With the volume of data increasing, the number of cyber attacks per company grew by approximately 30% from 2020 to 2021¹⁴. Attacks target diverse victims, from governments to manufacturers, financial service providers and retailers. Over the next few years, attackers will be able to expedite, from weeks to days or hours, the end-to-end attack lifecycle, from reconnaissance through to exploitation. For example, Emotet — an advanced form of malware that targets banks — could change the nature of its attacks; in 2020, it already leveraged advanced AI and machine-learning techniques to increase its effectiveness, using an automated process to send contextualised phishing emails that hijacked other email threads. Ransomware as a service has also substantially reduced the cost of launching ransomware attacks, whose number has doubled each year since 2019. Other types of disruptions often trigger a spike in these attacks. During the initial wave of COVID-19, the number of ransomware attacks in the world increased by 148% from February to March 2020¹⁵. These trends are further influenced by the current geopolitical instability; some regions, such as the Asia-Pacific or Africa are more exposed to cyber attacks than North America or Europe¹⁶. The impact of cybersecurity incidents goes far beyond direct economic losses and includes potential supervisory fines, the theft of sensitive data, and operational and supply-chain disruptions.

Demographic changes, including a notably ageing society, the growing billion-people markets of India, China, Africa and south-east Asia, and the rise of the middle class in emerging and frontier economies, are impacting business operations, as well as consumer needs and their corresponding purchasing behaviour.

In some countries, proportion of population aged 65+ has increased from 5% to 25%

- Changes in the global age structure have led to an increase in healthcare spending and the need for secure pensions and retirement planning as “silver” takes over. The USA, the UK, Europe and parts of Asia and Latin America are going through a longevity revolution; the proportion of people aged 65 and over has increased from 5% in the 1960s¹⁷ to, in some cases, 25% today. In the USA, people aged 65 and over are expected to constitute 20.6% of the total population by 2030, up from 16.9% in 2020¹⁸. This shift will define national health systems, economic development and purchasing behaviour for decades. One of the immediate effects can be seen in pension provision, where fewer contributors and more disbursements are needed than ever before.
- Political, demographic and economic potential is shifting to emerging countries and regions, such as India, China and south-east Asia. Over the past 40 years, Asia's rapid growth has led to a convergence of living standards between Asia and middle- and high-income economies. This trend will most likely continue until 2040. In 2020, China, India and other emerging Asian countries accounted for 25% of global GDP. This is expected to grow to 35% in 2040¹⁹.
- While in developed countries the size of the middle class is expected to remain relatively flat

¹³ Sarah Ponczek, “Epic S&P 500 rally is powered by assets you can't see or touch”, Bloomberg, 21 October 2020

¹⁴ Kelly Bissell, Jacky Fox, Ryan LaSalle and Paolo Dal Cin, “State of cybersecurity resilience 2021 — How aligning security and the business creates cyber resilience”, Accenture, 2021

¹⁵ “Cybersecurity trends: Looking over the horizon”, McKinsey, 10 March 2022

¹⁶ Joshua Frisby, “Cybersecurity exposure index (CEI) 2020”, PasswordManagers.co, 2 June

¹⁷ “World population ageing”, United Nations, 2019

¹⁸ Share of old age population (65 years and older) in the total US population from 1950 to 2050, Statista

¹⁹ “Global trends 2040: A more contested world”, National Intelligence Council, USA, 2021

(eg, in North America, it will grow by 6% by 2030), the middle-class population of emerging economies such as those of China, India and south-east Asia is projected to boom from 250 million in the early 2000s to 1.2 billion by 2030²⁰, accounting for approximately 14% of the total global population. Economic liberalisation reforms have created a platform for new opportunities, leading to wealth and business growth.

Macroeconomics and politics are creating multidirectional developments and trends across the world.

- The global world order may evolve towards more local policies and supply chains. We are seeing a re-examination of globalisation and a shift towards more regionally focused policies and supply chains that may give rise to trade protectionism in selected parts of the world. In contrast, some global tech, social and market platforms are still growing, with an exponential rise in data use and global data flows. Based on a 2022 McKinsey survey, approximately 90% of businesses expect to pursue some degree of regionalisation in the next three years and 100% of respondents from the healthcare, engineering, construction and infrastructure sectors said the approach was relevant to their sector²¹. A growing wealthy population in some regions also contributes to the regionalisation trend; more of what is produced in China is now sold in China, for instance²².
- Negative events, such as the currently nearly 40 geopolitical conflicts across the globe, create unprecedented volatility for businesses and people. With several large humanitarian crises in the last 10 years, refugees worldwide are expected to reach their highest number since the end of World War Two — over 30 million people, with the majority from Afghanistan, Myanmar, South Sudan, Syria and Ukraine²³. The ongoing war in Ukraine presents a particular threat to several key supply chains, such as grain exports.
- Economic growth experiments implemented after the 2008 crisis laid the foundation for a decade of quantitative easing and a prolonged period of ultra-low interest rates. In 2020, to boost investment recovery and consumption after the first waves of the pandemic, the European Central Bank, the US Federal Reserve and the Bank of England implemented a mix of asset purchases and targeted lending programmes, leading to a substantial expansion of the Eurosystem, USA and UK balance sheets. Inflation became “a new normal”, not only driven by monetary-policy decisions but also by other real economic and external factors, such as COVID-19 and the Ukraine crisis. In the USA, the Consumer Price Index rose by 9.1% over the 12 months to June 2022²⁴, faster than at any point in the previous 40 years²⁵. Inflation creates particular concerns for all economic players, most notably businesses operating in an uncertain environment, lower-income households experiencing increases in the prices of basic products that tend to be higher than average inflation and future retirees experiencing inflation as an “uncontrollable X factor”²⁶ in pension planning.

Widespread shift from globalisation to regionalisation

20 Augusto de la Torre and Jamele Rigolini, “MIC forum: The rise of the middle class”, The World Bank, 2011

21 Knut Alicke, Ed Barriball and Vera Trautwein, “How COVID-19 is reshaping supply chains”, McKinsey, 23 November 2021

22 “Globalization in transition: The future of trade and value chains”, McKinsey, 16 January 2019

23 UNHCR statistics, 2021

24 Consumer Price Index – June 2022, US Bureau of Labour Statistics, 13 July 2022

25 Philip Lane, “Monetary policy during the pandemic: the role of the PEPP”, European Central Bank, 31 March 2022










26 Bob Sullivan and Benjamin Curry, “Inflation and retirement: what you need to know”, Forbes Advisor, 28 March 2022

Trends will have significant impact on risk landscape

The trends just described create a dynamic environment, impacting individuals' and businesses' protection needs as they lead to the reinforcement of existing risks and the emergence of new ones.

Figure 2: Megatrends change protection landscape by reinforcement of existing risks or emergence of new ones

 Personal  Commercial  Emerging risk

Needs	Transversal trends	Most impactful trends	Reinforced or emerging risks
 Protecting my health		"Silver" taking over Tech innovation & intangibles revolution Climate change	Health Disability, morbidity & death
 Protecting my wealth & income		"Silver" taking over Economic growth experiments	Pension Disability, morbidity & death Financial markets
 Keeping my business going	Middle-class growth	Rise of cyber attacks Combinatorial tech explosion	 Cyber  Supply-chain disruption
 Protecting financial stability	Billion-person markets ²	Tech innovation & intangibles revolution The "dark side"	Business continuity War & terrorism
 Protecting my property & assets ¹		End of global world order Climate change Economic growth experiments	Home & property (excl. natcat) Natcat Financial markets
 Keeping me safe from liability		Climate change Tech innovation & intangibles revolution	Personal & business liability  Environmental liability

1. Includes personal & business
2. India, China, Africa & south-east Asia

To identify the most important protection gaps, the needs of individuals and corporations were investigated (Figure 2). The core needs of individuals include the protection of health, wealth and income. Protecting health is the need to cover regular medical expenses, such as medical appointments and prescription drugs, and to provide cover for extraordinary events (major medical interventions). Protecting wealth and income is the need to preserve capital, provide for retirement and secure provision for the family in the case of death or long-term disability.

In addition, some needs apply to both individuals and businesses: protecting property and assets and protection against liabilities. For example, protection against liabilities includes claims resulting from damaging another person's health or their personal and/or business property. Other business-related needs include ensuring the continuity or financial viability of the business.

These needs are directly influenced by the megatrends:

- **Middle-class growth and the rise of billion-people markets in India, China and south-east Asia** affect the risks to all needs. The trend means that a growing number of consumers have sufficient purchasing power and a need for health and pension benefits, protection from disability and death, insurance coverage for property and movable assets, and coverage for personal and business liabilities. These trends will also spur the growth of businesses needing protection from cyber risks, supply-chain disruptions and business interruption threats. In other words, these two trends create a growing market with new demand for cover for all aspects of personal and business life.

- **“Silver taking over”** — the other major demographic trend — leads to a growing number of people needing to protect their health, resulting in increased health spending in developed and emerging economies. It also influences the need for pension protection, as more people require pension benefits. In addition, an ageing population increases the current pension gap and leads to a greater need for health-related services due to increased morbidity risks.
- **Tech innovation and the intangibles revolution** influence the daily lives of individuals and businesses, with implications for business continuity, the protection of property and tangible assets, and the need to keep individuals safe from liability. For example, driverless vehicles raise entirely new questions related to motor protection, shifting some risks from individuals to manufacturers of automated systems. And smart homes and the Internet of Things are examples of technological advances that may decrease home and property risk, as they help detect fires, floods and unwanted visitors. In addition, tech innovation is impacting the cost of healthcare services, due to the price of high-tech medical instruments, the use of advanced analytics and developments in healthcare monitoring (eg, trackers), while an increase in personalisation and telemedicine may help decrease some health, disability, morbidity and death risks.
- **Climate change** influences protection needs related to health, assets and liabilities. Changing weather conditions have many consequences, affecting working conditions, agricultural systems and mental health. Climate change, accompanied by other factors such as urbanisation, might also result in changes to biomes, which might produce outcomes such as new pandemics. In addition, many recent natural disasters are linked to climate change, as the probability and severity of floods and wildfires increases alongside global average temperatures. This may make insurance more expensive or even make some natcat risks uninsurable, and some migration trends (eg, coastal migration in the USA) are exacerbating this issue²⁷. The climate crisis also adds corporate liability to the agenda; climate action lawsuits against corporations and directors have been filed in 28 countries, with various cases claiming inaction or insufficient disclosure of information on greenhouse gas emissions.
- **The rise of cyber attacks** translates into cyber risk and the need to prioritise the protection of financial assets and property. The impact of cyber incidents encompasses potential supervisory fines, theft of sensitive data, operational chaos and reputational risks. Cyber risk is reinforced by negative events, such as geopolitical conflicts, that generate instability in property and financial markets. In a 2021 Allianz survey, insurance executives regarded cyber and supply-chain disruption as the two top global business risks for 2022 (with respectively 44% and 42% of respondents mentioning them in their top three)²⁸.
- **The evolution of the global world order**, with a trend towards regionalisation, remains a priority concern for most organisations. Some traditional globalisation measures are slowing and global supply chains are being re-examined to ensure the resilience of business operations. For instance, in response to increasing supply-chain and business-interruption risks, approximately 60% of businesses increased their inventories in 2021, while only 47% planned to do so a year earlier²⁹. This is because business interruptions are causing significant revenue losses and hence the risk of insolvency. Nevertheless, there may be global growth in selected markets, such as tech, social and market platforms that benefit from the exponential growth in the use of data. Overall, business digitalisation is rising, and autonomous systems are used in more and more functions, from sales to logistics.

Climate action lawsuits filed in 28 countries

²⁷ For example, California and Florida are in the top three US states by population and in the top 10 by growth rate. “Fastest growing states 2022”, World Population Review, 2022

²⁸ “Allianz Risk Barometer”, Allianz Global Corporate & Specialty, January 2022

²⁹ “How COVID-19 is reshaping supply chains”, McKinsey, 2021

Overall, 13 insurance protection needs are emerging from or reinforced by the megatrends, affecting the full spectrum of (re)insurance activities: pension; health; business continuity; cyber; disability, morbidity and death; mobility; personal and business liability; financial markets; home and property (excluding natcat); natcat; supply-chain disruption; war and terrorism; and environmental liability.

Four protection needs stand out

The 13 insurance protection needs — emerging from or reinforced by the megatrends — were assessed based on their economic relevance to society, potential for an extreme impact on human well-being, expected growth, degree of coverage by public or private stakeholders and general insurability by private players.

Based on the assessment, four risks in particular stand out due to their significant relevance for economies and human lives, their growth trend and their insurability (ie, these risks can be at least partially covered by insurers).

Pensions and **health** have significant economic relevance and are highly affected by demographic shifts. Health is a particularly fast-moving risk area, as it is also affected by tech innovation and the adverse consequences of climate change. **Natcat** is the risk most affected by climate change, and insured losses stand at less than 40% of total economic losses. And **cyber** is expected to become “the risk of the century” due to its strongly increasing relevance for governments, corporations and individuals, especially in the current environment of geopolitical instability.

Figure 3: Five criteria for assessing significance of risks

Personal/commercial	Risk	Economic relevance	Growth trend	Coverage by public/private stakeholders	Insurability by private players	Human impact
Personal	Pension	Very high	High	Government, insurers, financial institutions	Yes	High
Personal	Health	Very high	High	Insurers, government	Yes	High
Personal & Commercial	Natcat	Medium	High	Government, insurers	Yes	High
Commercial	Cyber	High	Very high	Insurers	Partially	High
Personal & Commercial	Financial markets	High	Flat	Financial institutions, insurers	Yes	Medium
Personal	Disability, morbidity & death	High	Flat	Government, insurers	Yes	High
Personal & Commercial	Mobility	Medium	Flat	Insurers	Yes	High
Personal & Commercial	Personal & business liability	Medium	Flat	Insurers	Yes	Medium
Personal & Commercial	Home & property (excl. natcat)	Medium	Flat	Insurers	Yes	High
Personal & Commercial	Business continuity (incl. pandemic-related ¹)	Very high	High	Insurers, government	Partially	Medium
Personal & Commercial	Supply-chain disruption	Medium	High	Insurers	Yes	Medium
Personal & Commercial	War & terrorism	Medium	High	Government	No	High
Commercial	Environmental liability	Emerging	Very high	Insurers	Yes	Medium

Business lines

Personal Commercial

Coverage/human impact

High Low

Relative economic relevance

Very high High Medium Emerging

Insurability

Yes Partially No

Growth trend

High Flat

Most relevant risks

1. Pandemics are the non-insurable part of this risk

Economic relevance

The economic relevance to society was analysed based on the annual economic exposure of the respective risks, where four groups were observed:

- Pension, health and business continuity (including pandemic-related) risks have a very high economic relevance. Annual health spending constitutes approximately 10% of global GDP³⁰. Annual pension disbursements constitute 12-14% of global GDP³¹, of which 70% are government disbursements³². The pandemic severely affected business continuity, with global sales dropping 27%, on average, from October 2020 to January 2021³³.
- Cyber, financial market, disability, morbidity and death risks have a somewhat lower but still significant economic relevance. Losses caused by cyber risks are estimated to cost more than US\$0.9trn annually, excluding loss of business and reputational damages³⁴.
- Mobility, liability (both personal and business), home and property, natcat, supply-chain disruption, war and terrorism risks have relatively moderate economic relevance. GWP for mobility, for example, total US\$0.75trn annually. Average annual natcat losses from 2011 to 2020 (insured and uninsured) amount to US\$0.2trn³⁵. The move towards regionalisation, leading to higher supply-chain disruption risks, is estimated to affect several export goods valued at US\$3-4.6trn in the next five years³⁶.
- Environmental liability represents an emerging risk that is forecasted to grow strongly in the coming years. Such liabilities include the failure to mitigate greenhouse gas emissions, adapt to the physical impacts of climate change, adapt investment strategies and disclose climate-related risks³⁷. While this risk was non-existent a few years ago, over 1 300 climate-change-related cases have been filed today, with the USA alone accounting for over 1 000 of them.

Annual health spending makes up 10% of global GDP

Over 1 300 climate-change-related environmental liability cases filed

Expected growth

The risks shown in Figure 3 were not only ranked based on their current economic relevance but also by how much their relevance will grow in the coming years. This was estimated based on the expected impact of the megatrends for the respective risk and its historical development. While the economic relevance of all of the previously mentioned risks is expected to grow — driven by climate-related, technological, demographic, macroeconomic and political trends — cyber, environmental liability, pension, natcat and health risks are expected to grow the fastest.

- Spending on, or risks related to, pensions are expected to continue strong growth, driven by an increasing number of people in the over-65 age group, which increased by 40% globally between 2010 and 2020. While the absolute number of people has increased significantly, the increase as a share of the population is also notable. In 2020, people over 65 constituted 9.3% of the total population, while they were only 7.6% in 2010³⁸.

30 "Global spending on health: Weathering the storm", World Health Organisation, December 2020

31 Estimation based on World Bank and OECD data

32 Estimation based on OECD data

33 "Tracking an unprecedented year for businesses, everywhere", The World Bank, 17 February 2021

34 Steve Morgan, "Cybercrime to cost the world \$10.5 trillion annually by 2025", Cybercrime Magazine, 13 November 2020

35 Sigma explorer, natural catastrophes, Swiss Re Institute

36 "Risk, resilience, and rebalancing in global value chains", McKinsey Global Institute, 6 August 2020

37 Francis Kean, "Climate change litigation threats to directors and officers", WTW, 27 November 2019

38 Population ages 65 and above (% of total population), 1960–2020, The World Bank

China's health spending grew 40% between 2015 and 2019

- Health spending is also expected to continue its strong growth. Between 2015 and 2019, global health spending increased 18%³⁹. Asia is leading the way; China's health spending, for example, grew 40% between 2015 and 2019⁴⁰. Dynamics are spurred by economic development and an ageing global population, as mentioned above.
- The cost of natural disasters is expected to continue its growth, notably driven by an increasing frequency and severity of natcat events, as well as an increase in average losses due to global development patterns (eg, migration to high-risk coastal areas). Between 2011 and 2020, average annual losses amounted to approximately US\$210bn, compared to US\$157bn between 2001 and 2010, representing a 35% increase⁴¹.
- Cyber risk and environmental liabilities are projected to grow exponentially in the coming decade. The number of cyber attacks was 125% higher in 2021 than 2020. This growth is also evidenced by cyber insurance claims; for example, Allianz reported a 120% growth in claims from 2018 to 2020⁴².

Degree of coverage by public or private stakeholders

The risks were also assessed based on the protection/coverage available from public or private stakeholders.

- Mobility, personal and business liabilities, home and property (excluding natcat) are risks widely covered by private insurance players. In most cases, appropriate products and sufficient capacity to cover the risks exist, as well as sufficient knowledge among customers.
- For pension, health, natcat, business continuity, disability, morbidity and death risks, some products exist, but the capacity and adoption of these products vary due to pricing, awareness and the regulatory environment. These risks also partially include elements that private players do not cover. Some of these risks have "co-sharing" mechanisms between private players and governments; for example, some governments offer tax relief to private (re)insurers, while others directly cover parts of the risk.
- Financial market risks, supply-chain disruption, war and terrorism, cyber and environmental liability represent risks that are covered by specialists, aiming primarily at sophisticated, commercial clients.

Insurability by private players

Insurability depends on 7 key criteria

Insurability by private insurers indicates whether sufficient coverage could be provided by the private insurance industry based on a review of available reports and expert interviews. This assessment is based on seven insurability criteria:

- Existence of a sufficient number of homogeneous exposures to predict losses
- Losses that can be differentiated and measured based on cause, time, place and amount
- Ability to determine the probability of an event
- Ability to determine the average frequency and severity of an event
- Randomness of events that may or may not occur in the future
- Limitation and independence of losses, so that losses do not all occur at the same time (ie, they are diversifiable in nature)
- Economic feasibility of premiums that are still substantially less than the insured amount

³⁹ Global health expenditure database, World Health Organisation

⁴⁰ Ibid

⁴¹ Natural catastrophes 1970–2021, Swiss Re

⁴² "Allianz Risk Barometer", Allianz Global Corporate & Specialty, January 2022

Among the risks that can generally be covered, three groups emerge.

The first group (pension, health, disability, morbidity and death, mobility, personal and business liability, home and property, natcat) can, in principle, be fully covered by private insurance⁴³.

The second group of risks (cyber, financial markets, supply-chain disruption and environmental liability) can largely be covered by private insurers to a medium to high degree, however, they each entail different challenges (eg, cyber does not currently fully comply with the first and second insurability criteria as predicting losses and the impact of losses is challenging given the dynamic developments in this area). Observing the sixth rule for cyber may also be challenging, as cyber attacks might be global in nature and are already partially addressed by national defence authorities.

The third group that can be covered by insurers includes business continuity, but only to a limited extent, given the vastness and variability of the risks. Finally, war and terrorism, which are also in the group, cannot be the concern of insurers alone, as they are political in nature and mostly depend on political decisions that an algorithm cannot predict.

In summary, some risks are inherently uninsurable by the private sector alone as they violate key principles of insurance. As the insurance industry might be unable to cover the risks of these types of perils (eg, pandemics), the public sector's role and relevance must be examined alongside that of the insurance industry.

Some risks inherently uninsurable

Potential for extreme impact on human well-being

Last but not least, the potential for large-scale, direct human impact was considered, in recognition of the fact that economic losses do not always correspond to the human suffering caused by deaths, injuries, losses and hardship.

- Gaps in pension savings can have drastic personal consequences, as the poverty that potentially results in old age can mean the loss of one's home or inadequate elderly care.
- Natcat events can lead to a high number of deaths and injuries, hardship (in terms of lost housing and infrastructure) and huge consequences for the supply of food and water.
- Health protection gaps can directly cause human deaths, such as when severe illnesses are not treated due to missing or insufficient health insurance coverage.
- Cyber risks can have substantial economic impacts — interrupting economic activity or causing costly data recovery or customer compensation — but do not usually have a significant direct human impact. However, as cyber attacks could, for example, target a hospital or even a network of hospitals, the direct human impact might also be large in some cases.

Measuring protection gaps

Different approaches are used to quantify protection gaps. Some approaches only consider first-order losses (ie, losses directly attributable to a risk), while others also include second-order losses (ie, losses that are only indirectly attributable). This report generally defines a protection gap as the difference between insured losses and total economic losses — a frequent definition

Different approaches used to quantify gaps

⁴³ Albeit still not fully covered, eg, homes in flood zones

in industry reports⁴⁴. To ensure consistency and comparability between the different gaps covered, we look at annual protection gaps, which necessitates transforming the pension gap into an annuity. In addition, we only consider first-order losses, so, for example, we do not consider reputational damage resulting from cyber attacks.

Before we turn to the methodology for calculating each protection gap, we will define some basic terms:

- The element underlying a protection gap is often a specific **hazard** (eg, natural catastrophe) or **risk** (eg, the risk of insufficient pension savings for old age).
- The **exposure** is the value of assets or the potential financial consequences caused by the hazard or risk. For example, the exposure will be low or limited if there are no properties or people living in an area affected by a natcat event.
- The **vulnerability** describes how well people and objects are protected against potential hazards and risks. Besides insurance coverage, people can take additional measures to protect themselves against potential hazards. For example, annual cancer screenings can protect people against potentially serious or even deadly health outcomes.
- **Insurance coverage** describes the amount of money an insurer pays to compensate for losses caused by a hazard or risk covered in the terms and conditions of an insurance contract⁴⁵.

Four protection gap definitions

A protection gap can generally be reduced by decreasing the vulnerability, for instance through prevention and/or increasing insurance coverage. Industry reports, research papers and interviews with industry experts have been used to quantify the four protection gaps in this report. We used the following approaches for each:

- We define the **cyber protection gap** as the difference between the total economic exposure of first-order losses from cyber attacks (eg, bodily injury, software replacement or ransom payments) and the losses currently covered (approximated with global cyber insurance premium volumes). Second-order losses that are a frequent indirect consequence of cyber attacks (eg, reputational damage) are usually harder to quantify and are not addressed in this report to ensure comparability with the other protection gaps.
- We define the **pension protection gap** as the difference between the savings needed to sustain a reasonable standard of living (65-70% income replacement) for the next generation of retirees and the currently projected inflows to the system, including pay-as-you-go. As the gap is usually only projected as a total sum (eg, the present value of the total projected gap), we converted this amount into an annuity to identify the annual protection gap (ie, the annual sum needed to compensate for future pension protection gaps).
- We estimate the **natcat protection gap** as the economic loss caused by natural catastrophes not covered by insurance. This gap does not reflect the often severe human suffering caused by natural catastrophes, which cannot be measured in financial terms. The protection gap and its development over time differs by region, as the share of insured losses depends on the level of insurance penetration (which frequently depends on average income) and the types of natcat events that occur in each region, so we took a specific look at each region to approximate the gap.

⁴⁴ "Understanding and addressing global insurance protection gaps", The Geneva Association, April 2018

⁴⁵ Revised Single Programming Document 2022–2024, EIOPA, 30 September 2021

- The **health protection gap** consists of two parts. First, it includes health-related spending by individuals (eg, when they have insufficient insurance coverage). Second, it includes “avoided” health costs — the amount individuals should have spent to meet their health needs but that was not spent because people could not afford to or had no access to healthcare infrastructure. We estimate the health gap by looking at “stressful” out-of-pocket (OOP) health spending (spending by individuals that puts pressure on their finances, such as borrowing money or cutting down on habitual spending to buy medicine) and avoided costs (ie, unaffordable or inaccessible healthcare). Stressful OOP expenses is a narrow definition of the health protection gap, while the inclusion of avoided costs represents a wider definition albeit with a higher level of uncertainty over the estimate.

The following sections provide an in-depth view of the four protection gaps, including their quantification and the potential levers available to public and private stakeholders to address them.

IV. Cyber protection gap

Risks are growing in frequency, severity and variety

For a summary of this chapter, see the Executive Summary, “Cyber protection gap”, p8. And for GFIA’s recommendations for closing the cyber protection gap, see the Executive Summary, “GFIA recommendations”, p15.

Cyber is among the top three risks on the minds of business executives⁴⁶. The frequency, severity and complexity of attacks are rising, and they are exacerbated by large-scale digitalisation and the shift of traditional business activities to online operations. As employees worldwide shifted to remote working in 2020 because of the COVID-19 pandemic so did organised crime, with the commercialisation of cyber attacks severely disrupting businesses. The increasing geopolitical instability observed in 2022 is expected to bring with it a new and stronger wave of incidents, while technology and automation accelerate the need for cybersecurity, making it a top priority for businesses. At the same time, the supply side — cyber insurance coverage — is still an evolving market, with 2020 losses challenging insurers to find new ways of servicing the increasing demand. Beyond insurers, other private and public stakeholders have started tackling this growing gap.

The Geneva Association defines cyber risk as “any risk emerging from the use of information and communications technology that compromises the confidentiality, availability, or integrity of data or services”⁴⁷. Cyber losses are commonly grouped as first-order losses (bodily injury, physical asset damage, financial theft and fraud, cyber ransom and extortion, business interruption, data and software loss, regulatory and legal defence, and incident response costs) and second-order losses (reputational damage and lost business). When estimating cyber-attack losses, we only include first-order losses to make them comparable with the other risks considered in this report.

Cyber, a multifaceted risk

Ransomware and data breaches are most common cyber attacks

First, a definition is needed of the types of cyber incidents and resulting cyber losses that are included in cyber risk. The attack method creates the incident type: ransomware (23%) and data breaches (13%) were the most frequent types in 2020, followed by vulnerability exploitation (10%) (Figure 4)⁴⁸. These incidents lead to various operational disruptions, such as data confidentiality breaches (of own and third-party data), operational technology or network communication malfunctions, inadvertent disruptions of third-party systems and cyber fraud or theft (eg, illegitimate financial transfers).

The losses resulting from disruptions can be incurred directly by the entity under attack (first party) or by the organisation’s clients and suppliers (third party). In 2020, approximately 25% of all cyber-incident claims in the USA for both stand-alone (covering one specific risk) and packaged (covering several risks) policies were related to third-party losses⁴⁹.

The incidents above can be accidental or driven by malice. Attackers include organised crime and state-affiliated and unaffiliated entities. Organised crime, which had seen a decline between

46 “Allianz Risk Barometer 2021”, Allianz Global Corporate & Specialty, January 2021

47 Martin Eling and Werner Schnell, “Ten key questions on cyber risk and cyber risk insurance”, The Geneva Association, November 2016

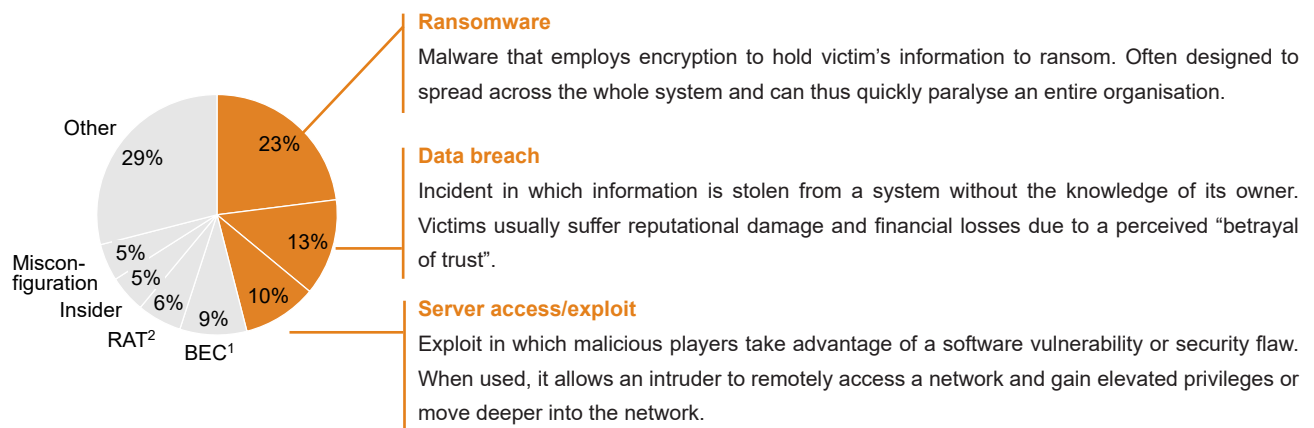
48 “IBM X-Force Threat Intelligence Index 2021”, IBM Corporation, February 2021

49 “US cyber market update: 2020 US cyber insurance profits and performance”, Aon, June 2021

2017 and 2019, came back with full force in 2020 and 2021 as the commercialisation of ransomware occurred. Organised crime was responsible for approximately 40% of incidents in 2018⁵⁰, a share that increased to roughly 80% of breaches in 2020⁵¹. In terms of motive, financial motives prevail and have been growing steadily. In 2020, they were behind approximately 85% of breaches versus roughly 70% in 2018. The second most common motive was espionage (10-15% percent of cases in 2020)⁵².

Figure 4: Ransomware, data breaches & vulnerability exploitation were top three cyber incidents in 2020

Cyber incidents by methodology — 2020



1. Business email compromise: scam targeting companies that conduct wire transfers and have suppliers abroad

2. Remote access trojan: type of malware, a tool used to gain full access/remote control of a user's system so that attackers can silently browse applications and files and bypass common security such as firewalls, intrusion detection systems and authentication controls

Sources: IBM; Trend Micro

Insurers cover US\$6bn in cyber losses annually

Based on the definitions above, we estimated the supply side, ie, how much is currently covered by insurance and trends influencing this coverage.

Potential insured losses can be estimated based on the cyber GWP value and reported loss ratios. According to Munich Re, global cyber insurance premiums reached US\$9.2bn at the beginning of 2022⁵³ and have been growing at 30-50% per annum in its main markets (Figure 5). If USA loss ratios of 65% are taken as an approximation of global loss ratios, the volume of total insured losses paid by insurers can be estimated at approximately US\$6bn in 2021⁵⁴.

Global insured cyber losses around US\$6bn in 2021

The USA is the most developed cyber insurance market, with approximately 70% of global cyber GWP. This is followed by the UK and western European markets. All markets have exhibited strong annual growth of more than 30% since 2017. According to a McKinsey survey, cyber insurance penetration and the average premium per policy show strong growth in the USA and the UK. Penetration, measured as a share of businesses (both SMEs and corporations) covered by cyber insurance, increased from 7% to 13% in the USA and from 2% to 6% in the UK from 2017 to 2020⁵⁵. Penetration in both markets is growing among both SMEs and large

50 2019 Data Breach Investigations Report, Verizon, 2019

51 2021 Data Breach Investigations Report, Verizon, 2021

52 Ibid

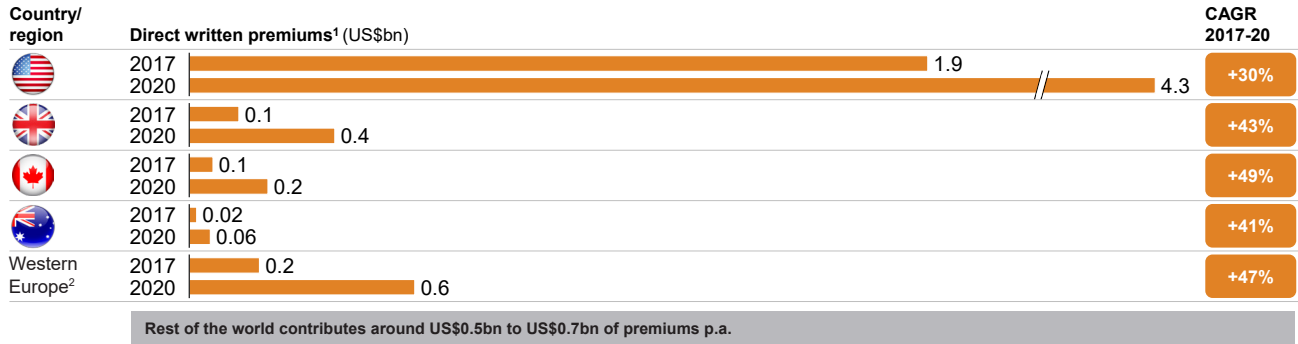
53 "Cyber insurance: Risks and trends 2022", Munich Re, 16 March 2022

54 "US cyber insurance sees rapid premium growth, declining loss ratios", Fitch Ratings, 13 April 2022

55 McKinsey survey, 2021

corporations, with a higher increase among SMEs in the UK and among large corporations in the USA. The average premium per policy also grew 3-5% annually from 2017 to 2020 in both markets.

Figure 5: Cyber is fast-growing service line

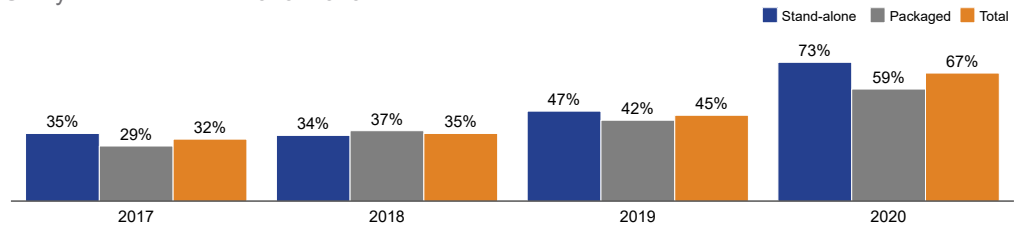


1. Does not include cover for businesses owned or operated by single individuals
 2. Primarily Germany and France

Sources: S&P Capital IQ Pro; MSA Research

Figure 6: Cyber loss ratio massively increased in 2020

US cyber loss ratio — 2016–2020



Source: AON; Fitch Ratings

105% spike in ransomware attacks in 2020

Losses rose continuously from 2017 to 2020, with a spike in 2020 primarily driven by a sharp increase in ransomware attacks (105% year-on-year growth)⁵⁶. In the USA, market loss ratios⁵⁷ increased from 32% in 2017 to 67% in 2020 (Figure 6). The combined ratio has been rising accordingly — in the USA, it increased from 75% in 2019⁵⁸ to approximately 95% in 2020⁵⁹.

The rise in losses revealed the limitations of existing models for cyber risk, with some insurers reassessing their approach to create resilient, sustainable, long-term cyber coverage for their customers. Some insurers decreased the capacity they allocated to cyber, reduced coverage limits per policy for existing and new clients, and limited the cyber insurance included in traditional policies. For example:

- Approximately 80% of 200 commercial insurers from the USA expected they would limit cyber insurance capacity in the first and second quarters of 2021 (Figure 7)⁶⁰.
- Clients previously covered by one large policy now have to seek a panel of insurers, each covering only a 30-50% share of the 2020 coverage⁶¹.

56 US cyber market update, Aon, June 2021

57 Loss ratio + expense ratio

58 US cyber market update, Aon, June 2020

59 US cyber market update, Aon, June 2021

60 Commercial Property/Casualty Market Index, The Council of Insurance Agents & Brokers, USA, 2021

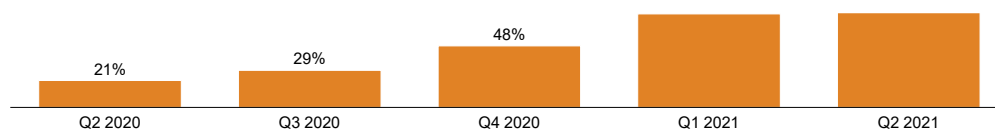
61 John Farley, "2022 Cyber Insurance Market Conditions Report", Gallagher, January 2022

- Insurers are explicitly excluding cyber coverage from traditional policies to reduce the risk of “silent cyber”, ie, cyber losses from traditional property and liability policies where cyber coverage is neither specifically included nor excluded, as these policies were often designed before cyber risks became apparent⁶². As cyber incidents often impact several of the insurers’ lines of business, including property, business interruption, kidnapping and ransom risk, they can be the largest share of insurance losses if they are not explicitly excluded from the policy. For example, the total insured losses resulting from the Petya and NotPetya malware could be almost 90% attributed to silent cyber⁶³. Cyber risk is now covered by insurers in a more transparent way via dedicated and innovative products specifically designed for this purpose.

Cyber risk now covered by dedicated insurance products

Figure 7: Cyber insurance capacities of carriers are being constrained

Global respondents reporting a decrease in cyber underwriting capacity — 2020–2021



Source: The Council of Insurance Agents & Brokers

In line with reviewing cyber-risk appetite, some insurers writing cyber business have also changed their underwriting criteria. The prerequisites for obtaining cyber insurance have become more advanced to reflect the increase in the number and type of losses. Insurers now conduct comprehensive risk and maturity reviews of their clients’ cybersecurity readiness (eg, a lack of data-security controls can potentially result in a 100% to 300% increase in premiums or even no coverage at all)⁶⁴. Furthermore, some underwriters do not offer cyber coverage for specific industries, including municipalities, higher education, technology and manufacturing⁶⁵.

Lack of data-security controls can increase premiums 100-300%

The 2021 USA cyber loss ratio results indicate that the policy changes worked from a profitability perspective. For US stand-alone policies, the loss ratio decreased from 73% in 2020 to 65% in 2021⁶⁶. However, due to the associated increase in premiums needed to reach adequacy or to hardened underwriting criteria, some clients may no longer be able to afford coverage, resulting in an increased cyber protection gap.

Overall, the supply of cyber insurance has seen strong growth in the past five years. In terms of the coverage and services offered, cyber insurance policies are highly varied today and insurers have begun offering additional services beyond mere risk transfer, including *ex-ante* risk-mitigation services and the provision of post-breach resources, which have been identified as important factors besides risk transfer for clients looking for cyber insurance⁶⁷. However, cyber is still an evolving market and the constantly developing risk exposures and often limited and inconsistent data present challenges for insurers. Although risk modelling has improved, it is still subject to high levels of uncertainty compared to other areas in which the data, products and pricing are highly advanced and mature, such as motor insurance. Moreover, the sharp increase in losses in 2020 made insurers cautious about their capacity allocation and operating model for

62 Bethan Moorcraft, “What is silent cyber risk?”, Insurance Business America, 26 November 2018

63 “Making noise about ‘silent’ cyber”, Allianz Global Corporate & Specialty, 2020

64 “Cyber market conditions”, Gallagher, 2022

65 Ibid

66 “US cyber insurance sees rapid premium growth”, Fitch, 2022

67 “Cyber insurance market watch survey”, The Council of Insurance Agents & Brokers, 2016

cyber insurance. If losses stay at the same level of approximately 60-70% of GWP and if global cyber GWP continue to grow at 25-40%, total insured cyber risk exposure is expected to be US\$13-25bn by 2025.

Economic impact of cyber incidents is at least US\$1trn

There is no definitive figure for total cyber losses, as not all incidents are reported and quantified by businesses and national institutions. However, several research papers point toward estimates of more than US\$1trn annually. The most widely used estimate from McAfee puts first-order losses at US\$945bn annually (Figure 8)⁶⁸. This estimate incorporates bodily injury, software and hardware replacement, cyber ransom payments and regulatory fines but excludes second-order losses, such as lost business or reputational damage. However, McAfee recognises that indirect losses (eg, losses due to interrupted business continuity) do also need to be considered⁶⁹.

Second-order losses (lost business and reputational damage) account for at least 60-70% of overall breach costs⁷⁰. When adding these second-order losses to the McAfee estimate, it approaches CyberSecurity Ventures' "all-in cost" estimate of more than US\$6trn⁷¹.

Figure 8: Cyber-incident loss estimates vary, but all show significant volumes

Global annual losses from cyber incidents — 2017–2020 (\$trn)

Assessment of losses	Survey used	Included in calculation	Not included in calculation
Cybersecurity Ventures 2020	Unknown	All first- & second-order losses (incl. lost business, brand & reputational damage) ¹	—
McAfee 2020	1 500 IT & line of business decision-makers (USA, Canada, UK, Japan, Australia, France, Germany) extrapolated to a global number	Some of the first-order losses, which can be described as "monetary", eg, bodily injury, software & hardware replacement	System downtime, intellectual property theft, incident-response costs, legal & consulting costs, reduced efficiency, lost business & reputational damage
McAfee 2018	Published data, interviews & estimates by government agencies & global companies	All first- & second-order losses (incl. lost business, brand & reputational damage)	—
Lloyd's 2017 ¹ (cites McAfee US\$0.4-0.6trn 2014 estimate)	Unknown	All first- & second-order losses (incl. lost business, brand & reputational damage)	—
Cybersecurity Ventures 2015	Unknown	All first- & second-order losses (incl. lost business, brand & reputational damage)	—

1. Cited in "Ten Key Questions on Cyber Risk and Cyber Risk Insurance", The Geneva Association, November 2016

Sources: McAfee; Lloyd's; IBM; Cybersecurity Ventures

Number and cost of incidents push up losses 20% p.a.

All reports agree that losses seem to have been growing at approximately 20% per annum and that this growth rate could be higher in upcoming years due to even more advanced cyber attacks. Growth in estimated losses can be attributed to the increase in the number and cost per incident. The number of cyber incidents has been growing steadily since 2017. The average number of cyber attacks per company grew approximately 30% from 206 in 2020 to 270 in 2021, with the share of successful attacks likewise increasing (from 22% to 29%)⁷². Ransomware

68 "The hidden costs of cybercrime", McAfee, 2020

69 Ibid

70 Taking detailed calculations provided by IBM for data breach as an example in "IBM Cost of Data Breach Report 2021", IBM, 2021

71 Steve Morgan, "2017 Cybercrime Report", Cybersecurity Ventures, 2017

72 Kelly Bissell, Jacky Fox, Ryan LaSalle and Paolo Dal Cin, "State of cybersecurity resilience 2021 – How aligning security and the business creates cyber resilience", Accenture, 2021

frequency also increased in 2021, with SonicWall observing approximately 623 million ransomware attacks globally — a 105% increase on 2020 and a more than 300% increase on 2019⁷³.

The following trends influence the number of cyber attacks:

- **The commercialisation of and innovation in cyber attacks.** AI is now widely used by attackers to send phishing emails. Ransomware as a service (commercialising ransomware) and cryptocurrencies have significantly reduced the cost of conducting ransomware attacks and made them more widespread. At the same time, innovation is also used to prevent and secure a faster resolution from attacks. Organisations with fully deployed security AI and automation seem to be more protected from breaches, since AI and automation help reduce the time required to identify and contain them. These organisations' average data-breach costs are approximately US\$2.9m, compared to around US\$6.7m for organisations without security AI and automation⁷⁴. As the share of organisations with fully or partially deployed security AI and automation is rising (65% in 2021 versus 59% in 2020)⁷⁵, this could indicate a trend towards more resilience.
- **The Internet of Things (IoT).** As more “things” come alive with the power of digitalisation and internet protocols, so do new vulnerabilities and risks. While many of these issues only affect industrial organisations, any organisation that uses the IoT in its infrastructure is also increasingly exposed to risk. The use of industrial control systems or operational technology hardware increases vulnerabilities every year.
- **Remote working.** Remote working has increased the number of cyber incidents and costs. Specifically, the number of ransomware attacks spiked globally during the first wave of the COVID-19 pandemic in February and March 2020, with an increase of 148%⁷⁶. Similarly, where remote work was a factor in causing the breach, the average total costs of data breaches were approximately US\$1m higher than when remote work was not a factor⁷⁷. For 18% of organisations, remote work was a factor in the data breach, and organisations with more than half of their employees working remotely took almost two months longer to identify and contain breaches than those with fewer working remotely⁷⁸.
- **Political instability.** Global instability tends to trigger spikes in cyber attacks. For example, in 2020, Beijing-linked hackers hacked the Vatican's computer networks on the eve of negotiations between China and the Vatican⁷⁹.

Ransomware attacks spiked 148% in first wave of COVID-19

Besides the number of cyberattacks, the costs per incident have increased in six of the last seven years, with a significant uptick in 2021. For example, the cost of a data breach increased by approximately 10% from 2020 to 2021 — the largest single-year cost increase in the last seven years (from US\$3.86m in 2020 to US\$4.24m in 2021)⁸⁰. The cost of ransomware has also reportedly increased — from an average of approximately US\$115 000 in 2019 to around US\$570 000 in 2021⁸¹.

73 “2022 SonicWall Cyber Threat Report”, SonicWall, 2022

74 “Cost of a Data Breach Report 2021”, IBM

75 Ibid

76 “Cybersecurity trends: Looking over the horizon”, McKinsey, 10 March 2022

77 “Cost of a Data Breach Report 2021”, IBM

78 Ibid

79 Cate Cadell, “US cybersecurity firm says Beijing-linked hackers target Vatican ahead of talks”, Reuters, 29 July 2020

80 “Cost of a Data Breach Report 2021”, IBM

81 Ramarcus Baylor, Jeremy Brown and John Martineau, “Extortion payments hit new records as ransomware crisis intensifies”, Palo Alto Networks, 9 August 2021

Mega-breaches are a rising trend

Mega-breaches are a rising trend — with tech giants such as LinkedIn, Facebook and Alibaba targeted in 2020 and 2021 and 0.3 billion to 1.1 billion customer records being breached. The increased costs are expected to be primarily driven by two factors: firstly extortion demands and secondly compliance with national/local privacy laws is becoming more costly. According to DLA Piper, the EU issued US\$1.2bn in fines related to cyber incidents in 2021 — a seven-fold increase on 2020⁸².

Current cyber protection gap is more than US\$0.9trn

Whereas first-order cyber losses are close to US\$0.95trn annually⁸³, supply covers only approximately US\$6bn. This leads to an estimated cyber protection gap of more than US\$0.9trn between losses and what is covered today. While the cyber insurance gap will persist in the future, the overall share of uninsured losses will potentially decrease due to higher growth in insurance supply.

Businesses increasingly invest in cybersecurity

The question remains how businesses, insurers and governments can move towards reducing this emerging and growing frontier of risks. Businesses are already trying to “self-insure” against its rise. Since 2013, the cybersecurity market has grown much faster than the overall IT market⁸⁴ with more than 10% growth annually and close to US\$160bn in revenue in 2022⁸⁵. Businesses are investing in cybersecurity roadmap development and business continuity and are hiring digital forensics organisations as contractors to ensure faster incident resolution. However, these efforts may not be sufficient against the backdrop of rising cyber-attack innovations and geopolitical instability.

In addition, concerns about systemic cyber risk are rising. While the concept of systemic risk is rather vague, it can be described as “the risk or probability of breakdowns in an entire system, as opposed to breakdowns in individual parts or components”⁸⁶. As digitalisation, interconnectedness and cloud services have increased rapidly, cyber risk can potentially become a systemic risk impacting multiple organisations or even nations. For example, the 2020 SolarWinds cyber incident showed how quickly cyber incidents can affect hundreds of organisations⁸⁷.

Due to the lack of diversification in the inherent nature of some risks, insurers have started — and are likely to continue — to exclude some risks from their policies. For example, insurers are acting to address one key cause of cyber risk: war-related activities. Munich Re refined its cyber insurance policies in April 2022 to exclude cyber war⁸⁸ and Lloyd’s requires catastrophic state-backed attack exclusions in all stand-alone cyber-attack policies⁸⁹. Hence, parts of the gap that are systemic by nature (ie, losses from entire system breakdowns) may not be addressed by insurers alone. The increasing frequency, severity and number of different types of cyber attacks and their potential systemic risk requires both public and private stakeholders to assess what role they should play in this fast-moving field and collaborate to sustainably manage the extreme tail risk.

82 Ross McKean, Ewa Kurowska-Tober and Heidi Waem, “DLA Piper GDPR fines and data breach survey: January 2022”, DLA Piper, 18 January 2022

83 James Andrew Lewis, Zhanna Malekos Smith and Eugenia Lostri, “The hidden costs of cybercrime”, McAfee, 9 December 2020

84 “Gartner forecasts worldwide IT spending to grow 3% in 2022”, Gartner, 14 July 2022 and “Gartner says worldwide IT spending is forecast to be flat in 2016”, Gartner, 7 July 2016

85 “Cybersecurity revenues, 2016–26”, Statista

86 George Kaufman and Kenneth Scott, “What is systemic risk, and do bank regulators retard or contribute to it?”, *The Independent Review*, 2003, Volume 7, Issue 3

87 US White House press briefing by press secretary Jen Psaki and deputy national security advisor for cyber and emerging technology Anne Neuberger, 17 February 2021

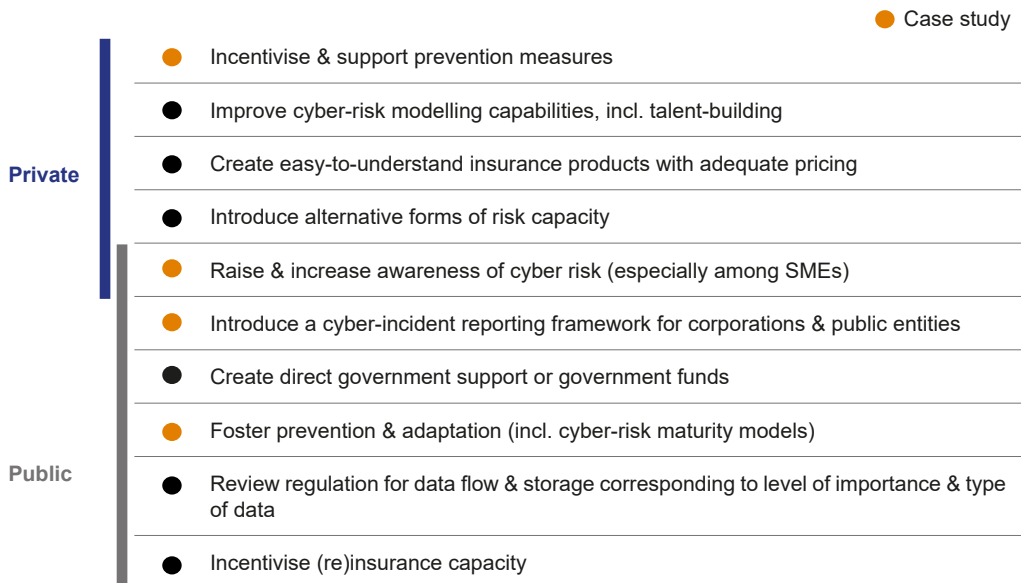
88 Carolyn Cohn and Noor Zainab Hussain, “Munich Re tightens up cyber insurance policies to exclude war”, Reuters, 8 April 2022

89 Tony Chaudhry, “State backed cyber-attack exclusions”, Lloyd’s Market Association Bulletin, 16 August 2022

Variety of levers for public and private stakeholders

To close the cyber protection gap, a toolbox of potential levers that private and public stakeholders can use was identified (Figure 9). It is worth noting that the portfolio of levers chosen is expected to be highly specific to individual countries and will depend, for example, on the position of the insurance industry, past initiatives, the regulatory environment and certain policy choices. This toolbox of potential levers should not be considered as a list of recommendations but as a “menu” of possible actions.

Figure 9: Cyber protection gap — toolbox of potential levers



(For GFIA’s cyber protection gap reduction recommendations, see the Executive Summary, p15.)

We have looked at various case studies (Figure 10) that illustrate how some of these levers have been put into practice in some parts of the world by private or public stakeholders.

Figure 10: Overview of case studies

	Levers	Case studies	Outcomes
Private	Incentivise & support prevention measures	<div style="display: flex; align-items: center;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg); font-size: 0.8em; margin-right: 5px;">Overarching</div> <div> <p>Cyber-risk engineering as part of insurers' product portfolios</p> <p>Financial incentives for prevention via policy clauses</p> </div> </div>	<div style="display: flex; align-items: center;"> <div style="margin-right: 10px;">70%</div> <div> <p>Cyber-risk reduction through training</p> </div> </div>
	Raise & increase awareness of cyber risk (especially among SMEs)	<div style="display: flex; flex-direction: column; gap: 5px;"> <div style="display: flex; align-items: center;"> <p>Government information campaign via TV, social media, newspaper & radio</p> </div> <div style="display: flex; align-items: center;"> <p>Annual cyber awareness poll & campaign for SMEs</p> </div> </div>	<div style="display: flex; align-items: center;"> <div style="margin-right: 10px;"> <p>~2 mn</p> <p>Increased media attention</p> </div> <div> <p>people reached with campaign</p> <p>on cyber threats</p> </div> </div>
Public	Introduce a cyber-incident reporting framework for corporations & public entities	<div style="display: flex; flex-direction: column; gap: 5px;"> <div style="display: flex; align-items: center;"> <p>Cyber Incident Reporting for Critical Infrastructure Act in 2022</p> </div> <div style="display: flex; align-items: center;"> <p>Security of Critical Infrastructure Act 2018 and expansion in 2021 to broaden scope of critical infrastructure</p> </div> <div style="display: flex; align-items: center;"> <p>Network & Information Security (NIS) Directive and General Data Protection Regulation (GDPR), requiring obligatory incident reporting for specific sectors</p> </div> </div>	<div style="display: flex; align-items: center;"> <div style="margin-right: 10px;"> <p>Higher level of transparency¹</p> </div> <div> <p>on cyber incidents, enabling risk modelling</p> </div> </div>
	Foster prevention & adaptation (incl. cyber-risk maturity models)	<div style="display: flex; flex-direction: column; gap: 5px;"> <div style="display: flex; align-items: center;"> <p>Cyber Defence Unit with voluntary members to ensure advanced IT skills against cyber attacks</p> </div> <div style="display: flex; align-items: center;"> <p>Cyber requirements defined as part of the EU Basel III and Solvency II regimes</p> </div> </div>	<div style="display: flex; align-items: center;"> <div style="margin-right: 10px;"> <p>#3</p> <p>Enhanced cyber security</p> </div> <div> <p>most cyber-secure country in the world</p> <p>enforced by regulatory framework</p> </div> </div>

1. Quantitative impact estimate not yet available

Case studies

Prevention measures can eliminate 80-90% of cyber-incident costs

Incentivise and support prevention measures

According to the Ponemon Institute, prevention measures can potentially eliminate 80-90% of the costs of cyber incidents⁹⁰. These measures aim to address human errors — the main contributing factor in approximately 95% of all cyber incidents⁹¹ — and IT system shortcomings. Insurers incentivise prevention by providing value-added, *ex-ante* cybersecurity services and financial incentives through policy clauses. Value-added, *ex-ante* services include cyber-risk-engineering services, where insurers work closely together with their clients to identify potential improvements in their security standards (eg, password defence, phishing simulation, network vulnerability scanning and security benchmarking) and services to develop infrastructure together with the client in a secure environment. Financial incentives through policy clauses require organisations to demonstrate specific security standards to receive favourable insurance terms or even be eligible for coverage. In the following, both approaches to incentivising prevention measures are highlighted based on case studies.

A Swiss Re survey⁹² found that approximately 70% of cyber insurance providers already offer or plan to offer additional value-added prevention services to their clients. Whereas some insurers provide these services through extensive in-house risk-engineering expertise, most insurers cooperate with external advisors such as cybersecurity providers⁹³.

90 "The economic value of prevention in the cybersecurity lifecycle", Ponemon Institute, USA, April 2020

91 IBM Security Services 2014 Cyber Security Intelligence Index, IBM, May 2014

92 "Cyber: In search of resilience in an interconnected world", Swiss Re, 1 October 2016

93 Ibid

Chubb is an example of an insurer that has developed an extensive network of in-house expertise in risk engineering. With over 400 risk-engineering professionals, Chubb provides risk-engineering services to its customers based on three pillars: risk assessment, risk management and risk partnership⁹⁴. It offers a range of services, including a risk assessment of existing IT infrastructure, potential loss calculations in scenario-based analyses and tailored recommendations to build a more secure infrastructure for webinars and training for employees.

Zurich Insurance Group provides *ex-ante* risk-mitigation services through its partnership with CYE, an Israel-based cybersecurity provider, combining advanced AI with an extensive global network of more than 945 experts⁹⁵. These services include a free, technology-based risk assessment and discounted prices for CYE's other services, such as simulations of cyber incidents.

Research shows that risk training can potentially decrease cyber risks by up to 70%⁹⁶. Moreover, data from other insurance areas shows that preventive behaviour might be positively reflected in reduced insurance premiums, thus indicating that insurers consider such behaviour effective. For example, in the auto insurance sector, driver safety training can lower insurance premiums by approximately 5%, and pay-as-you-drive insurance potentially decreases insurance premiums by 10-20%. Additionally, a survey by Swiss Re found that 33% of companies already see these additional services as adding value⁹⁷. Another survey identified them as one of the top three factors in purchasing cyber insurance among large companies⁹⁸. While insurers certainly have incentives that are aligned with their clients' interests to mitigate cyber risk, as they otherwise carry the costs, they need to identify a suitable strategy for providing this expertise. This can be done by intensively recruiting skilled professionals to build their capabilities in-house, by acquiring an existing cybersecurity provider or through partnerships with third-party cybersecurity experts.

Risk training can reduce cyber risks by up to 70%

Besides offering *ex-ante* services and cyber coverage, some insurers also financially incentivise prevention through specific policy clauses. For example, HDI Germany includes an awareness clause in its cyber policies that reduces the deductible by 25% if the policyholder uses HDI's free prevention services that are offered alongside the coverage. Additionally, policyholders can further reduce their deductible by 75% if they conduct a "baseline security check" through HDI's subsidiary Perseus, an IT security service provider⁹⁹.

Similarly, insurers including Allianz, Munich Re and Beazley offer favourable coverage conditions through participation in the "Cyber Catalyst by Marsh" programme. This programme aims to create transparency in the cybersecurity market by bringing together insurers' expertise to evaluate existing cybersecurity products. Organisations adopting products certified by the Cyber Catalyst may receive enhanced coverage from their insurer. While these policies motivate organisations to consider investing in prevention, they might incentivise companies to only invest in security measures when applying for their cyber insurance coverage. Thus, insurers must continuously ensure adherence to security standards and incentivise prevention measures for the entire duration of insurance coverage.

In addition to *ex-ante* services and financial incentives in policy clauses, some insurers have

94 "Cyber risk engineering", Chubb, 2021

95 "Zurich Cyber Security Services", Zurich, 2022

96 Georgios Pouraimis et al., "Long lasting effects of awareness training methods on reducing overall cyber security risk", *Defense & Commercial Sensing*, 7 May 2019

97 "Cyber: In search of resilience in an interconnected world", Swiss Re, 1 October 2016

98 "Cyber Insurance Market Watch Survey", The Council of Insurance Agents & Brokers, 2016

99 "HDI Cyberversicherung für Firmen und Freie Berufe", HDI

expanded their offerings to provide post-event rectification services. For example, Beazley has built a separate business unit, Beazley Breach Response Services, to support its clients in handling cyber incidents. The services provided cover forensic investigations into the scope of the cyber incident, legal responsibility assessments, PR handling and notifying affected individuals. Similarly, Allianz Global Corporate & Specialty offers its clients incident-response services to provide 24/7 access to legal and IT experts, as well as crisis and communication support.

These examples highlight how insurers expand their client offerings to include risk management solutions, *ex-ante* preventive and *ex-post* incident-response services. By incentivising prevention to build cyber resilience in their clients' organisations, insurers can potentially address the cyber protection gap. As research has found, preventive efforts can potentially reduce the likelihood and costs of cyber attacks, thereby increasing insurability, and insurers can foster these by leveraging their capabilities in risk assessment. However, insurers can only support prevention; organisations need to be aware of their exposure to and responsibility for cyber risks.

Raise and increase awareness of cyber risk (especially among SMEs)

Overall, a lack of cyber-risk awareness may increase individual behaviour that puts organisations at risk, such as connecting to public Wi-Fi networks or downloading unauthorised applications¹⁰⁰, and hold back preventive measures and cyber insurance if organisations are unaware of the potential costs. According to the EU Agency for Cybersecurity (ENISA), 84% of cyber attacks rely on social engineering (ie, phishing)¹⁰¹.

SMEs can be particularly vulnerable to cyber attacks

SMEs may be particularly vulnerable to cyber attacks as they invest fewer resources in security while still handling sensitive information such as personnel and customer information, financial data or production details. As digitalisation is increasing rapidly among SMEs, most recently driven by the COVID-19 pandemic, information-security literacy and implementation may not always be able to keep up¹⁰². In a 2021 US SME survey, over 50% of SMEs indicated that cyber risk does not apply to them¹⁰³. Some even showed an "it will never happen to me" mentality and may, therefore, not invest in effective prevention and defence measures^{104,105}. Stakeholders, including public and private players, could address this proactively by educating the public, especially SMEs, on cyber threats and cyber-insurance options and their importance.

- Sweden is one country where awareness initiatives are potentially addressing parts of the cyber protection gap. The 2018 Swedish national strategy for information- and cybersecurity recognised the need for increased awareness. The Swedish Civil Contingencies Agency was tasked with a national information campaign to increase knowledge about information security and identity theft¹⁰⁶. The campaign specifically focused on increasing awareness of the need to protect one's most valuable information to incentivise behavioural change. To achieve this, the Agency worked with external partners and other government authorities to produce information in the form of films, banners, messages and a campaign website. For SMEs, it included new guidance on technical security actions and routines, partner activities

100 Anna Sarri and Radu Arcus (eds.), "Raising awareness of cybersecurity: A key element of national security strategies", ENISA, 29 November 2021

101 Anna Sarri, Viktor Paggio, and Georgia Bafoutsou (eds.), "Cybersecurity for SMEs: Challenges and recommendations", ENISA, 1 June 2021

102 Ibid

103 Ho-Tay Ma, Christopher McEvoy and Andrew Laing, "Cyber insurance – The market's view", PartnerRe, 17 September 2020

104 Ibid

105 Isabel Lopes and Pedro Oliveira, "Applying Action Research in the Formulation of Information Security Policies", 2015

106 Marianne Björkman, "Att stärka allmänhetens samt små och medelstora företags motståndskraft mot it-incidenter", Myndigheten för samhällsskydd och beredskap, 14 January 2019

such as seminars, tests and events, and a new IT security standard that was developed with the Swedish Theft Prevention Association and industry partners. The campaign reached 50% of the target audience (25- to 45-year-olds, who are most likely to be affected by fraud), exceeding its 41% goal. In absolute numbers, 750 000 visitors were exposed to the films via SF Studios cinemas, 1.9 million via Tv4 (a popular TV channel), and 1.1 million via social media¹⁰⁷.

- Another example of a public awareness campaign comes from a national industry association in Canada. The Insurance Bureau of Canada (IBC) also focused its attention on increasing cybersecurity awareness in SMEs after a poll it commissioned in 2019 showed a significant lack of awareness and protection among them¹⁰⁸. In the survey, 44% of SMEs with fewer than 500 employees indicated that they had no defences against cyber attacks and 60% had no cyber insurance. SMEs contributed 51.9% to Canada's private-sector GDP in 2018 and 79.4% to private-sector employment¹⁰⁹, yet, according to the Canadian Federation of Independent Business, 60% of small businesses go bankrupt within six months of suffering a cyber attack, making this a significant economic concern¹¹⁰.

60% of Canadian small businesses go bankrupt within 6 months of attack

To address this problem, the IBC published a series of infographics, videos and social media communications to inform SMEs about cyber risk and cybersecurity measures. In 2020, it published additional resources related to the COVID-19 pandemic's impact on cybersecurity¹¹¹. The campaign is still running and the IBC will continue to track its reach. Already, there has been an increase in the cybersecurity market in Canada. In 2019, GWP for cyber insurance were approximately C\$135m (US\$100m) and they increased to approximately C\$222m in 2020¹¹². While no causality between the awareness campaign and the rise in premiums can be proved, the campaign was most likely to have been a contributing factor to the increase in awareness.

In addition, IBC launched in 2022 the "Cyber Savvy" campaign, polling employees at SMEs on cybersecurity. The survey found that 42% of respondents had seen an increase in scam attempts over the last year. However, only 34% reported that their employers were providing mandatory cybersecurity-awareness training. Also, 72% of respondents reported at least one behaviour that could allow a cybercriminal to access their organisation's computer systems (such as sharing passwords or unauthorised downloading of software).

Globally, the number of cybersecurity awareness campaigns and overall awareness of cyber risks is increasing. For example, the German Insurance Association (GDV) offers an online risk assessment tool for SMEs that includes specific recommendations to improve security¹¹³, the General Insurance Association of Korea offers educational projects (discussions, seminars and leaflets)¹¹⁴ and the USA Cybersecurity and Infrastructure Security Agency runs a national public awareness campaign¹¹⁵. The French Insurance Association, France Assureurs, has published a digital-risk awareness kit for assessing, anticipating and minimising cyber risk¹¹⁶. And GFIA has

Worldwide cyber-risk awareness is rising

107 Ibid

108 "Towards a safer cybersecurity environment: Insurance industry cyber-awareness initiatives", GFIA, January 2021

109 "Key Small Business Statistics — 2021", Innovation, Science and Economic Development Canada

110 "Facts about cyber crime", Insurance Bureau of Canada, 9 October 2018

111 "Towards a safer cybersecurity environment", GFIA, January 2021

112 Bethan Moorcraft, "Cyber security needs to be 'democratized' for small businesses", Insurance Business Canada, 15 October 2021

113 Christian Siemens and Melina Maier (eds.), "Cyberisiken im Mittelstand 2020", GDV, 2020

114 "Towards a safer cybersecurity environment 2021", GFIA, January 2021

115 "About the CISA cybersecurity awareness program", US Cybersecurity and Infrastructure Security Agency

116 "Anticiper et minimiser l'impact d'un cyber risque sur votre entreprise 2021", France Assureurs, 15 January 2021

published a report giving an overview of cyber-awareness campaigns by various insurance industry associations worldwide to foster learning from successful initiatives¹¹⁷.

While causality is hard to measure, this increase in awareness campaigns is likely to be one factor contributing to the overall increase in cybersecurity awareness, another one being the increase in the frequency and severity of attacks. Munich Re's "Global Cyber Risk and Insurance Survey 2022" measured an increase in respondents who are "extremely concerned" about a potential cyber attack on their company from 30% to 38% within a year¹¹⁸. The number of companies that are aware of cyber insurance is also increasing. In Germany, the percentage of medium-sized companies that took up cyber insurance in 2022 (44%) was double that in 2018, while the percentage that did not know about cyber insurance fell from 37% to 22%¹¹⁹.

In summary, the case studies show a large amount of effort from the public and private sectors to increase cyber-risk and cybersecurity awareness. To reliably assess the impact of such campaigns, more empirical evidence is required, such as by defining impact KPIs ahead of the implementation of awareness campaigns and continuously monitoring them. Global developments in cybersecurity awareness and the growth of the cybersecurity market suggest the effectiveness of awareness campaigns and, consequently, their potential as a tool to address the cybersecurity gap by improving general cybersecurity behaviours, increasing cyber resilience and rendering access to insurance easier.

Introduce a cyber-incident reporting framework for corporations and public entities

Incident reporting remains low

According to US Senator Mark Warner, only 30% of US cyber incidents are currently being reported¹²⁰, leaving the majority of incidents undetected by public authorities. Estimates from the Crime Survey for England and Wales even indicate that the number of reported cyber incidents is below 2%¹²¹. As a result, governments, security agencies and insurers face challenges estimating the frequencies, magnitudes and probabilities associated with cyber incidents. Consequently, the market for cyber insurance is relatively small, as insurers cannot make reliable loss predictions and perform consistent and risk-adequate pricing. To gain transparency over cyber threats and effectively mitigate risks, governments across the world are starting to introduce regulations that enforce standardised incident reporting, such as the three described below.

- In the USA, laws obliging the notification of cyber incidents have been implemented at state level for around 20 years. The California Senate Bill 1386 — the first cyber-incident reporting law — was enacted in 2002 and became effective in 2003. Under the law, companies are required to notify any Californian resident whose data has been compromised in a data breach. Furthermore, the law obliges organisations to report larger breaches that affect more than 500 individuals to the attorney general¹²².

Following California, multiple states introduced similar legislation shortly afterwards and today all US states have cyber-incident reporting laws in place¹²³. An Aon analysis demonstrates that the number of cyber incidents reported in the USA strongly correlates

117 "Towards a safer cybersecurity environment", GFIA, January 2021

118 "Munich Re Global Cyber Risk and Insurance Survey 2022", Munich Re, 1 August 2022

119 "Im Mittelstand steigt das Interesse an Cyberversicherungen", GDV, 19 July 2022

120 "Cyber in the Ukraine invasion", US Center for Strategic & International Studies, 14 March 2022

121 Nick Stripe, "Crime in England and Wales: year ending September 2020", UK Office for National Statistics, 3 February 2021

122 Data security breach reporting, US State of California Department of Justice, Office of the Attorney General, 2022

123 "Cyber incident reporting requirements & notification timelines for financial institutions", Bank Policy Institute, USA, 30 April 2022

with the growth in its cyber insurance market, thus indicating that such legislation has the potential to address the cyber protection gap¹²⁴.

Number of US incidents strongly correlates with insurance market growth

Following the 2020 SolarWinds hack — one of the largest cyber attacks that affected at least 100 private-sector companies and nine federal agencies¹²⁵ — in 2022 the USA introduced the Cyber Incident Reporting for Critical Infrastructure Act as the first federal cyber-incident reporting law. The new law will require critical-infrastructure companies to report any substantial cybersecurity incidents or ransom payments to the Cybersecurity and Infrastructure Security Agency within 72 and 24 hours respectively¹²⁶. In total, 16 sectors currently fall under the Agency's definition of critical infrastructure, including the chemical, communications and financial services sectors. While the Act was signed in 2022, the Agency has until 2025 to publish the final rules. In the meantime, it encourages companies to share their incident data voluntarily and aims to publish it anonymously in a report to help other organisations manage their risk. Additionally, in March 2022, the US Securities and Exchange Commission proposed a new regulation that — if enforced — would oblige all publicly-listed companies to report any cyber incidents¹²⁷. These new regulations are intended to provide more transparency than state-level legislation.

- In Australia, the first regulation covering standardised cyber-incident reporting was established with the Security of Critical Infrastructure Act 2018 (SOCI Act). The original regulation covered four sectors: water, electricity, gas and ports¹²⁸ but it was extended in 2021 to broaden the definition of critical infrastructure to 11 sectors, including financial services, transportation and communications¹²⁹. Similarly to the Cyber Incident Reporting for Critical Infrastructure Act in the USA, the SOCI Act requires critical infrastructure companies to report any significant or relevant incidents to the Australian Cyber Security Centre within 12 and 72 hours respectively¹³⁰. The Centre has also published a template on its website, which simplifies the reporting process for organisations and facilitates the standardisation of incident data¹³¹. Since 2020, the Centre has published collected incident data in an annual report highlighting trends, statistics and strategic assessments of cyber threats.
- In the EU, the Network and Information Security (NIS) Directive came into force in 2018. This first EU-wide cybersecurity regulation aims to harmonise the cybersecurity regulation for critical sectors, as member states previously had different levels of regulation in place. The NIS Directive introduced cyber-incident reporting rules for digital service providers and operators of essential services, including energy, transportation, finance and health, which member states were required to incorporate into national law. It further required member states to set up dedicated Computer Security Incident Response Teams, to which major cyber incidents should be reported¹³². In addition to the NIS Directive, the EU General Data Protection Regulation, which also came into force in 2018, includes an obligation for every

124 "Global Cyber Market Overview: Uncovering the Hidden Opportunities", Aon Inpoint, June 2017

125 US White House press briefing by press secretary Jen Psaki and deputy national security advisor for cyber and emerging technology Anne Neuberger, 17 February 2021

126 "Cyber Incident Reporting for Critical Infrastructure Act of 2022", Cybersecurity and Infrastructure Security Agency, 2022

127 "SEC proposes rules on cybersecurity risk management, strategy, governance, and incident disclosure by public companies", US Securities and Exchange Commission, 9 March 2022

128 "Security of Critical Infrastructure Act 2018", Australian Government, 2018

129 "Security of Critical Infrastructure Act 2018", Australian Government, 2021

130 Ibid

131 "Report a cyber security incident", Australian Cyber Security Centre, 2022

132 Directive (EU) 2016/1148 of the European Parliament and of the Council of 6 July 2016 concerning measures for a high common level of security of network and information systems across the Union, Article 1

organisation to notify the relevant data protection authority of any incident involving personal data breaches within 72 hours¹³³.

Insurers need incident data to develop and price products

To adequately address the protection gap, it is crucial that the information on cyber incidents is shared with insurers (in an aggregated and anonymised format) to enable the provision of adequate products and pricing. Some countries have started to publicly share anonymous data on cyber incidents. For example, the US National Association of Insurance Commissioners (NAIC) has been collecting cyber-incident data from insurers annually through the Cybersecurity and Identify Theft Supplement of its Property/Casualty Annual Statement since 2016. These findings and alien surplus lines data collected through the NAIC's International Insurers Department are published in an annual report, together with an analysis of developments in the cyber insurance market. In 2022, 152 insurance groups submitted data to the cyber supplement¹³⁴.

To summarise, public players are taking an active role in cybersecurity by introducing regulations aimed at increasing cybersecurity, helping to understand cyber threats and developments, and, to a lesser extent, providing more market transparency. Recently introduced national legislation might have the potential to increase transparency over the probabilities, types and economic costs of cyber incidents. However, as these regulations have only been introduced recently and some will only be enforced in the coming years, their actual impact is still to be assessed. Moreover, governments and public authorities need to find ways to securely share data with insurers to address the cyber protection gap effectively.

Foster prevention and adaptation (including enacting cyber risk maturity models)

Governments worldwide have put cybersecurity on their national agenda, introduced cybersecurity strategies with clearly defined national cybersecurity objectives and set up related public support initiatives to build national cyber resilience and educate people about safe data usage and storage. The efforts include prevention and adaptation measures.

- On 27 April 2007, Estonia was hit by a severe cyber attack that was part of a larger conflict resulting from a public disagreement over relocating a Soviet-era bronze statue of a soldier from the centre of Tallinn to the city's outskirts¹³⁵. The cyber attack lasted 22 days¹³⁶, took down multiple banks, news agencies and public authorities, and was the first cyber attack on an entire nation¹³⁷.

Following the attack, Ülo Jaaksoo, an Estonian computer scientist and CEO of a leading Estonian R&D and manufacturing software solutions company, proposed the introduction of a Cyber Defence League¹³⁸. At around the same time (May 2008), the Estonian government's Cyber Security Strategy also highlighted the importance of public-private sector cooperation to build cyber resilience¹³⁹. As a result, the Estonian Cyber Defence Unit was officially established in January 2011 as a sub-unit of the existing Estonian Defence League. The unit is based on active voluntary membership, for which Estonian citizens can apply if they fulfil a set of requirements, including knowledge of information security, and it aims "to protect

133 Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data, Article 33

134 "Report on the Cyber Insurance Market", National Association of Insurance Commissioners, USA, 18 October 2022

135 Damien McGuinness, "How a cyber attack transformed Estonia", BBC News, 27 April 2017

136 Rain Ottis, "Analysis of the 2007 cyber attacks against Estonia from the information warfare perspective", NATO Cooperative Cyber Defence Centre of Excellence, 2008

137 Damien McGuinness, "How a cyber attack transformed Estonia", BBC News, 27 April 2017

138 Anna-Maria Osula, Kadri Kaska and Jan Stinissen, "The cyber defence unit of the Estonian Defence League", NATO Cooperative Cyber Defence Centre of Excellence, 2013

139 "Cyber security strategy", Republic of Estonia Ministry of Defence, 8 May 2008

Estonia's high-tech way of life by protecting information infrastructure and supporting the broader objectives of national defence"¹⁴⁰.

The Estonian Cyber Defence Unit is built on three pillars. The first is focused on fostering cooperation among IT professionals and provides an expert network for information-sharing between private and public players. The second is concerned with the improvement of critical-infrastructure security, focusing on increasing awareness and sharing best practices on IT security and developing contingency plans for operating during crises. The third pillar concentrates on improving education and expertise by continuously providing training to all members. The Unit has been widely recognised as an innovative cybersecurity model. Estonia has entered into agreements with Austria, Luxembourg, Singapore, South Korea and NATO on sharing cyber expertise¹⁴¹. Moreover, in 2021 Estonia was recognised as the third-most cyber-secure country in the world and the most secure in Europe by the Global Cybersecurity Index¹⁴².

While the case study from Estonia illustrates how a nation has built up its cyber resilience through a dedicated governmental unit focused on cybersecurity, other countries are fostering cyber resilience on a legislative level by introducing minimum security standards. Moreover, besides fostering prevention, several governments have also introduced adaptation measures that ensure risk mitigation in the event of an attack.

- To address gaps and fragmentation in cybersecurity regulation, the European Commission proposed the Digital Operational Resilience Act at the end of 2020. The Act¹⁴³ entered into force in January 2023 and aims to strengthen the IT security of EU financial institutions and harmonise digital operational resilience.

Other countries are also introducing forms of cyber-risk maturity models. For example, in 2021, the South African Financial Sector Conduct Authority and the Prudential Authority published a draft joint standard, "Cybersecurity and Cyber Resilience Requirements"¹⁴⁴. The standard aims to define minimum standards for financial institutions to ensure cybersecurity and resilience practices.

In summary, governments could implement regulations focusing explicitly on cyber risk *ex-ante* to ensure resilience and stability in the event of a cyber incident. Government support can take various formats to foster prevention and adaptation. These range from national cybersecurity strategies and preventive efforts to legislation on prevention and adaptation measures in the form of minimum standards based on a risk maturity model or required risk capital. Together, these efforts could effectively address the cyber protection gap by providing resources and a regulatory framework for the market.

Governments have variety of levers to foster prevention and adaptation

Additional levers for private players

Below are additional levers that can be used by private players to address the cyber protection gap. They aim to build a basis for creating appropriate products through standardised incident-data collection and improved modelling capabilities.

140 "Estonian Defence League's Cyber Unit", Estonian Defence League, 2022

141 "Estonia and Singapore concluded a cyber cooperation agreement", Republic of Estonia Ministry of Defence, 18 January 2018

142 Global Cybersecurity Index, International Telecommunication Union, 2021

143 Regulation (EU) 2022/2554 on digital operation resilience for the financial sector

144 Mark Bechard, "Draft standard on cybersecurity published for comment", Moonstone, 6 January 2022

Modelling cyber risk is crucial for insurance products and pricing

Create easy-to-understand insurance products with adequate pricing

Cyber insurance products will need to continue to evolve to match the risks that customers face. Currently, some cyber protections may be offered as part of P&C packages, while some need to be purchased separately. A prime example is insurance for state-sponsored or terrorist cyber incidents, which is excluded from packaged P&C offers and has to be purchased separately¹⁴⁵. Coverage of cyber attacks causing physical damage could also further be explored. In addition, the pricing of these products might need adjusting to align with insurers' risk appetite and strategy.

While pricing could be fixed by providing more transparency over losses and incidents, clear affirmation or exclusions of cyber coverage could provide certainty for both the insurer and the insured and significantly increase penetration and combat "silent cyber" risks. Underwriters are working on several pricing aspects to enhance overall resilience: improved assessment of cyber-risk controls; improved pricing tools; clear statement of exclusions of cyber cover; management of systemic risk; development of new products that match customers' evolving needs; and development of risk-management solutions.

Improve cyber-risk modelling capabilities, including talent building

As the frequency and variety of cyber incidents gain momentum, insurers must find sustainable ways to insure cyber risk. Modelling cyber risk becomes crucial to ensure the right products and pricing. Insurers investing in new solutions and building up talent to keep up with technological advancements could thus ensure a greater supply of more appropriate cyber coverage and address the protection gap.

Introduce alternative forms of risk capacity

Cyber insurance-linked securities (ILS), including cyber bonds — an equivalent to natcat bonds — could be an alternative to cyber insurance and pass the risk to a broader pool of investors¹⁴⁶. While several forms have already been considered, better risk modelling is needed before these can become widely available. In addition, this lever's danger of causing moral hazard¹⁴⁷ should be assessed, as cyber incidents are human-made and could therefore be manipulated.

Additional levers for public players

In addition to private players' efforts, governments can use the following levers to enforce cybersecurity and reporting regulations:

Create direct government support or government funds

Government funds similar to natcat funds could be set up to manage the consequences of cyber incidents. Given the size of some recent cyber incidents, a discussion will be required on the types of incidents that would trigger the support of government funds. Overall, this could be used as a "last resort" for losses above a certain threshold or certain types of incidents.

Review regulation for data flow/storage

There are indications that regulations forcing data localisation within country or regional geographic boundaries make data less secure and more vulnerable to cyber attacks. For

145 "Encouraging Clarity in Cyber Insurance Coverage: The Role of Public Policy and Regulation", OECD, 2020

146 Nathan Bruschi, "Maybe Wall Street has the solution to stopping cyber attacks", Wired Magazine, 2 June 2016

147 Moral hazard is the lack of incentive for a person to guard against risk when they are protected from its consequences

example, such laws could curtail the ability of organisations to establish integrated cyber risk-management systems or outsource cybersecurity management to suitable service providers¹⁴⁸. Yet many legislators and jurisdictions are reluctant to allow the free flow of data because they are concerned about the differing levels of data protection outside their borders¹⁴⁹. While drafting data-localisation laws, legislators might need to consider cyber risks as an unintended consequence and review data-flow regulations corresponding to different data types and levels of importance for data security.

Incentivise (re)insurance capacity

Due to the potential systemic risk in cyber threats, insurers face challenges insuring all losses. Public-private partnerships could therefore help manage the extreme systemic tail risk inherent in cyber. Similar to natcat funds, cyber funds could increase the overall supply of cyber insurance and stabilise coverage prices. As cyber insurance matures, it is important for all stakeholders to collaborate to understand existing and emerging policies and what they cover. Governments could then take proactive steps by setting up pooling mechanisms for the systemic part of cyber risk, which insurance cannot cover.

Additional levers that some public players may consider — despite their potentially controversial nature — are the prohibition of ransomware payments, mandated cybersecurity coverage and reinforcement of law enforcement:

- **Prohibit ransomware payments**, eg, for medium and large corporations. Since 2021, a number of legislative initiatives have been implemented to prohibit ransomware payments, starting with government entities¹⁵⁰. However, such measures could have unintended consequences for private and public entities, and thus the risk-benefit balance of such a lever needs to be assessed. In an environment where many organisations do not have the capacity to defend themselves, not being able to pay a ransom could result in insolvency, given that they have no other options. And public entities could lose oversight and control of ransomware payments, as affected organisations could pay them without involving public entities. Alternatively, legislative bodies could remove the tax deductions for ransomware payments that currently exist in some US states¹⁵¹.
- **Mandate cybersecurity coverage**, eg, for large corporations in crucial economic sectors. For example, South Korea requires all financial institutions to buy cyber-liability insurance policies¹⁵². Mandatory coverage is a possible measure that needs to be weighed against unintended consequences, ie, increased insurance coverage costs for SMEs and potentially less motivation to take preventive measures and incentivise good behaviour against cyber attacks, particularly if prices are not directly linked to each company's risk exposure, which also limits the ability of insurers to offer a diverse range of products.
- **Reinforce law enforcement** to increase the risk for cyber criminals and thus discourage some of them, despite potential barriers to implementation given the cross-border nature of cyber attacks and difficulties in attribution.

Prohibiting ransomware payments could have unintended consequences

148 DeBrae Kennedy-Mayo and Peter Swire, "The effects of data localization on cybersecurity", Georgia Tech Scheller College of Business, Research Paper No. 4030905, 24 June 2022

149 Anupam Chander, "Is data localization a solution for Schrems II?", *Journal of International Economic Law*, September 2020

150 "Cybersecurity Legislation 2021", National Conference of State Legislatures, USA, 1 July 2021

151 Ciaran Martin and Tarah Wheeler, "Should ransomware payments be banned?", *Brookings Tech Stream*, 26 July 2021

152 "Towards a safer cybersecurity environment", GFIA, January 2021

The case studies provide examples of how private and public players in different regions address the cyber protection gap. The initiatives aim to incentivise and support cybersecurity measures to build resilience across organisations, increase awareness of cyber threats and insurance, mandate incident reporting for increased transparency over economic exposure, and foster prevention and adaptation through governmental support and regulatory frameworks. The highlighted case studies show that these levers have the potential to (at least partially) address the cyber protection gap. Given the current size of the gap, additional levers from the toolbox can be used depending on their suitability for a particular region, weighing their potential unintended consequences against their likely impact.

Concluding remarks

Post-pandemic remote working has increased cyber risk

The increase in digitisation and automation and the shift to remote working due to the COVID-19 pandemic have significantly increased cyber risk in recent years, while the market for cyber protection (including but not limited to insurance coverage) is still nascent, resulting in a protection gap of more than \$0.9trn.

An increasing number of insurers are trying to find sustainable ways of ensuring cyber coverage in order to grow cyber coverage supply in the coming years. Firstly, insurers have been able to gather more data over the past few years and hence refine their approach to this risk. Pricing and underwriting are thus more accurate today than in the past. Also, more and more insurers are entering the cyber insurance market, which translates into an increase in the supply. Finally, clarity has been brought to coverage and exclusions. All of this has allowed insurers to propose a more robust answer to the increase in the frequency, severity and types of cyber incidents.

As the current supply covers less than 1% of cyber losses, it can be assumed that the cyber protection gap will most likely grow in absolute terms in the next few years, despite possibly decreasing in relative terms. Moreover, concerns about cyber incidents becoming a systemic risk challenge insurers to provide appropriate products. To address the cyber protection gap, public and private players must thus assess their roles and collaborate by using the levers that are most suitable for the individual country or region.

V. Pension protection gap

Growth exacerbated by demographics

For a summary of this chapter, see the Executive Summary, “Pension protection gap”, p10. And for GFIA’s recommendations for closing the pension protection gap, see the Executive Summary, “GFIA recommendations”, p16.

Pension systems across the globe are experiencing unprecedented pressures. The severity of these pressures depends on a range of parameters, such as the type of funding scheme, the wealth of the population, the role of the family, the role of own real estate and the regulatory environment. Pension systems need to sustain more people for longer as life expectancy after retirement increases. Moreover, in the future there will be fewer workers (in relation to retired people) to support pension spending, as in many countries large cohorts are reaching retirement age as birth rates and labour participation rates are declining¹⁵³.

In terms of supply drivers to the pension system, contributions as a share of GDP, have, on average, been stagnant in OECD countries since the 2008 crisis¹⁵⁴. In addition, while the past decade has brought positive investment returns, both equities and bonds are unlikely to provide the same yields in the next decade, thus returns might cause an additional concern.

OECD pension contributions stagnant as share of GDP since 2008

To analyse the pension protection gap, we started by first examining the contributions and disbursements side, then assessing the needs side. Finally, we estimated the severity of the gap. The gap estimations assume that neither the retirement age in most countries nor contributions to Pillar I pension plans (as defined below) will change substantially in the future. A higher retirement age would significantly reduce needs, while higher contributions to Pillar I would have a positive effect on the funds available for disbursements, but both could be expected to vary greatly by country.

Building on the Geneva Association definition

The pension gap, as defined by the Geneva Association, is the difference between the present value of the yearly lifetime income needed to sustain a reasonable standard of living (estimated to be 65-70% of income) and the actual amount saved for retirement plus the present value of pay-as-you-go (PAYG) contributions over 40 years. The pension consists of public and private pension plan disbursements (including PAYG and US 401(k)) and, partly, private savings. A PAYG pension plan describes a pension system in which current payments are used to fund current disbursements.

When looking at the pension disbursements, we include Pillar I, Pillar II and Pillar III from the World Bank pension framework (Figure 11). The key objective of the World Bank’s pension framework is to illustrate the importance of a policy framework that is sufficiently flexible to address diverse country conditions.

Pillar 0 is a non-contributory pillar, providing a minimal level of protection for low-income families and is financed by the government. Pillar I includes public pensions, usually to cover basic needs, and is often financed on a PAYG basis. Pillar II is a (usually) mandatory individual savings account of private or public origin and is linked to employment. The benefits are paid in the

¹⁵³ ILOSTAT database, labour force participation rate, total (% of total population aged 15+) (modelled ILO estimate), 1990–2021, World Bank

¹⁵⁴ “Pension markets in focus — 2020”, OECD, 2020

form of monthly payments for life (defined benefit plans) or contributions to a savings account (defined contribution plans). Pillar III consists of voluntary private savings accounts. Pillar IV is the voluntary, non-financial, informal part of pension savings, consisting of, for example, family wealth, real estate and reverse mortgages¹⁵⁵.

Figure 11: World Bank five-pillar pension framework

Pillar	Contributions	Examples	Form	Financed by	Providers
0	Non-contributory	“Grundsicherung” (German basic income pension)	Monthly payment	Taxes	Public
I	Mandatory	US Social Security Canada Pension Plan	Monthly payment	Pay-as-you-go Partially funded	Public
II	Usually mandatory	401(k) Pension funds	Monthly payment for defined benefit plans Contributions to savings for defined contribution plans	Individuals	Private
III	Voluntary	Savings plan such as the individual retirement account in the US Insurance	Can be defined benefit or contribution Cash, bonds, stocks, mutual funds, real estate	Employers Individuals	Private
IV	Mainly non-financial	Family support Home-ownership	Family support Home-ownership	Individuals	Public Private

US\$56-58trn of assets in global pension system

At the end of 2020, there were US\$56-58trn in total assets¹⁵⁶ in the pension system worldwide. In addition to the value of pension funds and the benefits they pay, the PAYG system contributes at least the same amount of contributions a year and adds to the disbursements side of the equation¹⁵⁷. The overall level of financial viability of a pension system is thereby influenced by PAYG and non-PAYG contributions, returns pension funds receive on assets and disbursements.

Modestly positive trend in contributions and investment returns

Contributions to pension plans in absolute terms increased in most OECD countries from 2010 to 2020¹⁵⁸. However, they were stagnant as a share of GDP at approximately 2.2% (Figure 12). Global GDP is forecasted to increase by approximately 70% from 2020 to 2050 and contributions are expected to grow at a similar pace¹⁵⁹.

Contributions to pension plans are driven by several factors, namely the number of people contributing to the system and the average contribution rate per member.

- The number of people in the global workforce has grown at around 1% a year since the 1990s. From 2000 to 2020, for example, the workforce increased by 24%¹⁶⁰:
 - The overall working-age population increased by 27%¹⁶¹.
 - The labour participation rate fell from 64% to 59%¹⁶² during this period, which somewhat lowered the growth of the number of people contributing to the pension system. The share of the informal economy (ie, the “unofficial” workforce) in most emerging markets decreased in the last 10 years, which increases the workforce actively contributing to the plans¹⁶³.

155 “The World Bank pension conceptual framework”, World Bank, 2008

156 “Pension markets in focus — 2021”, OECD, 2021

157 If looking at the present value of PAYG contributions

158 Based on “Pension markets in focus”, 2015 and 2021, OECD

159 Estimation based on Oxford Economics’ 2030 GDP growth rates projection

160 Population ages 15–64, total, 2000–20; population ages 65 and above, 2000–20, World Bank

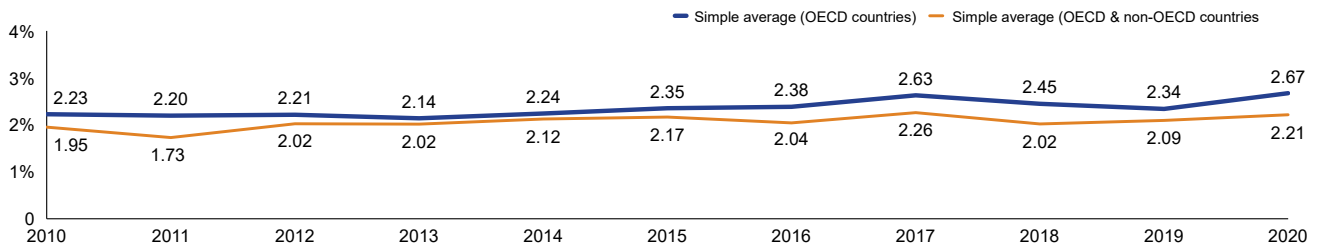
161 Population, total, 1960–2020, World Bank

162 ILOSTAT database, labour force participation rate, total (% of total population aged 15+) (modelled ILO estimate), 2000–2020, World Bank

163 Based on the World Bank’s informal economy database

Figure 12: Pension contributions have remained stable, with an uptick in 2020

Contributions to pension saving plans — 2010–20 (% of GDP)



Source: OECD

- Contribution per person was, on average, 15% of annual income for public schemes and 3% for private schemes¹⁶⁴. While there is limited information on trends on a per-member basis, it can be assumed that contributions have been stagnant as a share of annual income. Voluntary contributions, which could have been a driver of changing savings behaviour, increased until 2000 as a share of GDP but showed no further increase from 2000 to 2020¹⁶⁵. Multiple factors, such as personal income, may significantly affect participation in voluntary private pension schemes.

The other major source of contributions, ie, PAYG pension contributions, are driven by similar factors, such as demographics and political decisions (eg, retirement age).

Although private household savings rose sharply in the wake of the COVID-19 pandemic, it is reasonable to assume that this will only marginally address the pension gap. The reasoning is that the various countermeasures against COVID-19 severely limited household consumption options (for example, restaurant visits, travelling and hotel stays), while the government cushioned adverse effects on incomes (for example, those resulting from reduced wages) through support payments resulting in increased private savings, especially for middle- and high-income households¹⁶⁶. However, surveys by the Federal Reserve Bank of New York and from the UK suggest that only a small share of savings from COVID-19 have been used for individual pension plans, as households anticipate future tax and price increases in response to high government spending during the pandemic^{167,168}. Additional research in the coming years will provide more evidence of the net effect of COVID-19 on the pension gap.

Only small share of savings during COVID-19 restrictions put into pensions

Investment returns are unlikely to be as strong as they were in the decade of post-2008 recovery. During the 10 years from 2010 to 2020, average real pension investment returns were positive for 33 out of 35 OECD countries, with an average real geometric return of 3.1% from 2009 to 2019 and 3.6% in 2020. The returns were lower on average from 2015 to 2019 (2.7%) than from 2010 to 2014 (4.0%). Currently, pension fund managers are concerned about growing headwinds; seven out of 10 are expecting returns to be significantly lower in the years to come,

¹⁶⁴ “Pensions at a glance — 2021: OECD and G20 indicators”, OECD, 8 December 2021

¹⁶⁵ “Pension markets in focus”, OECD

¹⁶⁶ “The implications of savings accumulated during the pandemic for the global economic outlook”, European Central Bank, 2021

¹⁶⁷ “Survey of consumer expectations”, Federal Reserve Bank of New York, 2021

¹⁶⁸ Charles Nourse, James Tasker and Marco Garofalo, “How has Covid affected household savings?”, research blog, Bank of England, 25 November 2020

according to a 2021 Amundi poll¹⁶⁹. It can hence be expected that returns will not see the same level of growth as during the previous decade, adversely impacting the stock level and benefits paid by funded pension schemes.

Equities becoming more popular in pension saving

Bonds and equities are the two most popular asset classes for pension savings, with equities rising in prominence (Figure 13). They account for over half of investments in 35 of the 38 OECD countries¹⁷⁰.

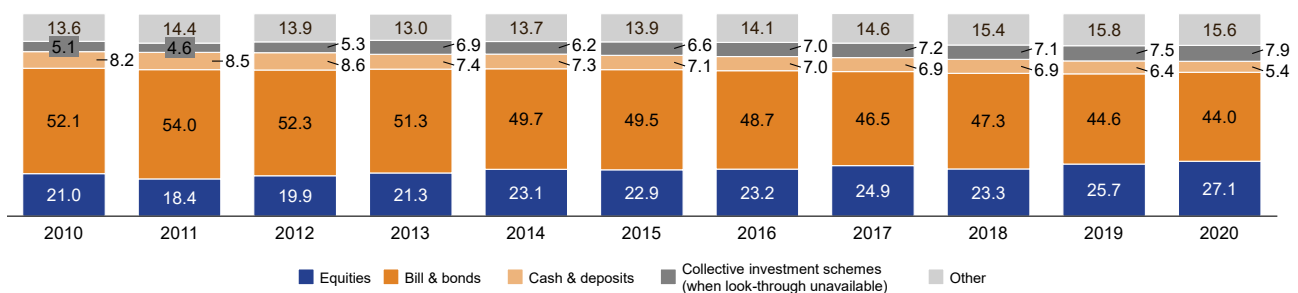
- High equity returns from 2010 to 2020 combined with low returns offered by bonds shifted asset allocations towards equity. Indeed, equity valuations, as measured by the Shiller price-earnings ratio, rose from 20.34 in October to December 2011 to 38.53 in October to December 2021¹⁷¹. However, they are unlikely to yield the same level of returns in the next 10 years. While the S&P 500 saw 13.6% growth per annum from 2010 to 2020, it is projected to increase by 6% per annum in the next decade¹⁷².
- The ultra-low interest rate environment post-2008 has led to positive returns on portfolios of corporate and government bonds with long durations. However, given the likely increases in interest rates in the USA and the EU, bond portfolio returns are likely to decrease in real terms, creating a challenge for pension managers.

Through pension schemes, individuals can access alternative asset classes

- As a means of diversification, most of the pension schemes around the world substantially expanded their allocations to alternative asset classes, ie, assets that are usually more illiquid and often not easy for individual investors to acquire. Large pension plans now hold 10-15% of assets in these investments. Holdings of alternative assets — which include private debt, private equity, real estate and infrastructure — are expected to grow further, with a projected 60% increase between 2020 and 2025, surpassing US\$17trn in assets under management, according to UK investment-data company Preqin. A large share of this is expected to continue to be held by pension scheme providers. However, even with an illiquidity premium, alternative and private assets are unlikely to entirely solve the investment returns issue of most pension schemes.

Figure 13: Asset allocation has shifted towards equities since 2010

Pension fund investments by type — 2010–20 (% of total investment)



Source: OECD

169 Amin Rajan, “DB plans in their end game in the post-pandemic era”, Amundi Asset Management, 2021

170 “Pensions at a glance — 2021”, OECD, 2021

171 Shiller PE Ratio by Month, NASDAQ

172 Brian Scheid, “S&P 500 returns to halve in coming decade – Goldman Sachs”, S&P Global Market Intelligence, 15 July 2020

Together, the amount of public (including PAYG) and private pension disbursements is approximately US\$9-10trn¹⁷³. According to the 2021 OECD report on pensions, among OECD countries, pension expenditure increased alongside the GDP by, on average, 1.5% of annual GDP between 2000 and 2017¹⁷⁴. While the moderate growth in contributions and investment returns over the last decade is expected to slow or decline in the future, disbursements are expected to grow further to match the increasing needs of an ageing population.

Without the increase in employment among OECD countries, which, in a way, finances disbursements (by 1.1% of GDP on average), the increase caused by the demographic change would have been even higher (approximately 2.5% of GDP¹⁷⁵). Financing these disbursements will be a challenge for both private and public stakeholders (eg, pension funds) in the coming decades as this trend continues.

The OECD is forecasting pension spending to continue to gain a more prominent share of GDP. Disbursements are forecast to make up at least 12.4% of GDP by 2050 — versus 10.7% in 2020 — if private pension expenditure stays relatively constant as a share of forecasted public expenditure. This estimate is based on the OECD model and takes into account:

- The number of people over 65 versus the population of 22- to 65-year-olds
- The labour participation of people over 65
- A proxy for average pension

Pension needs grow strongly

Future growth in pension needs in absolute terms will continue to be driven by two factors: an ageing population and growing standards of living. More people will expect to receive higher pension benefits for longer periods.

The global share of people over 65 grew from 6.8% in 2000 to 9.3% in 2020¹⁷⁶. The number of people over 65 is further expected to double from 0.78 billion to 1.55 billion over the next 30 years¹⁷⁷. This is due to a combination of the age distribution of the population and life expectancy, which is predicted to continue increasing. While life expectancy at labour market exit was approximately 16 years for women and 12 years for men in 1970, it was 24 years for women and 20 years for men in 2020 (Figure 14). Meanwhile, fertility rates are expected to further decrease from 2.4 births per woman in 2019 to approximately 2.2 in 2050 and the retirement age has stayed largely the same. In the next 30 to 40 years, the OECD suggests that, based on legislated measures, the normal retirement age will increase on average by approximately two years, while life expectancy is projected to increase by around four years in OECD countries.

Over 65s expected to double in next 30 years and live much longer

Growing living standards are the second driver of the rising need for pensions. GDP per capita doubled from 2000 to 2020¹⁷⁸ and is expected to further increase by approximately 50% by 2050. Quality of life expectations also increased alongside growing disposable income. Currently, three-quarters of people are concerned about their quality of life after retirement¹⁷⁹ based on expectations related to living costs, health and social care.

¹⁷³ Based on World Bank and OECD estimates

¹⁷⁴ "Pensions at a Glance — 2021", OECD, 2021

¹⁷⁵ Ibid

¹⁷⁶ Population ages 65 and above (% of total population), 2000–2020, World Bank

¹⁷⁷ Population by broad age group projected to 2100, world, 1950–2100, Our World in Data

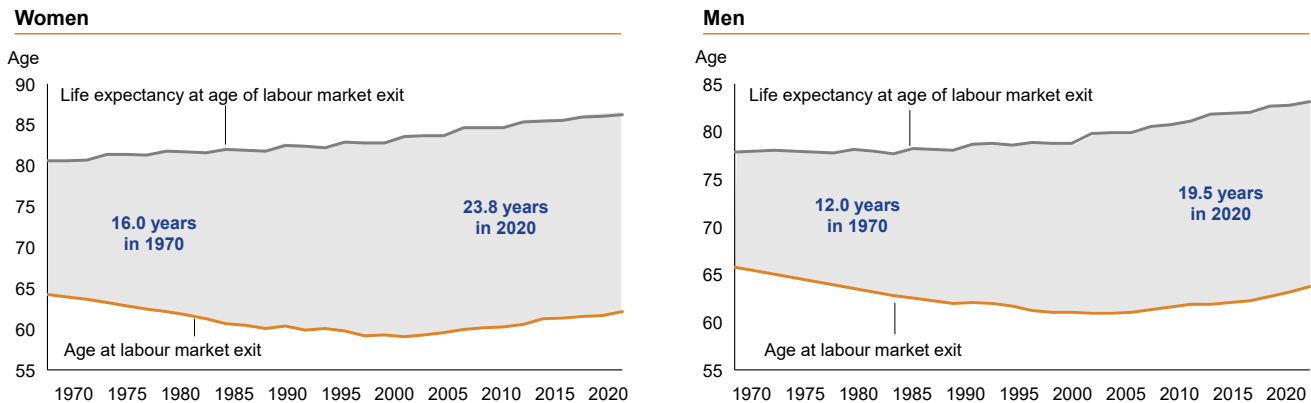
¹⁷⁸ GDP per capita, PPP (current international US\$), 2000–2020, World Bank

¹⁷⁹ Kate Murray, "Almost three-quarters of people fear living standards will fall in old age," The Guardian, UK, 26 February 2014

Some countries will face a sharper increase in pension needs. For example, China's society became an ageing one in 2000¹⁸⁰ and the proportion of retirees to the contributing population will continue to grow, spurred by a range of factors, including the one-child policy of the pre-2018 period. Over the last 10 years, China's total population increased 5.4%, while the number of people over 65 increased by 60.3%.

Figure 14: Life expectancy after labour market exit has increased by 8 years for men & women

Life expectancy after labour market exit in OECD countries — 1970–2020



Source: OECD

Additional US\$1.0trn/year needed to close current pension gap

Estimated aggregate pension gap is US\$51trn ...

To quantify the current pension gap, we calculated the difference between the present value of the funds needed to cover 65-70% of the pre-retirement income and the currently projected disbursements of pension funds. The Geneva Association estimates the aggregate global pension gap (after deducting PAYG-covered disbursements) at approximately US\$51trn based on existing pension gap calculations¹⁸¹ and OECD estimates of PAYG pension funding. The existing pension need is estimated at approximately US\$100trn when PAYG is not deducted, implying that PAYG schemes currently account for 49%.

... which equates to an annual requirement of US\$1trn

Closing a gap of US\$51trn would require an additional annuity payment of approximately US\$1trn per year, assuming an interest rate of 1% and a period of 40 years (ie, assuming that the gap is closed during one working-life generation). According to the World Economic Forum, the gap may be even more significant than the Geneva Association estimates, as it put the gap at as much as US\$70trn (including government-provided pension, employer pension and individual savings) in 2015, based on eight countries (Australia, Canada, China, India, Japan, the Netherlands, the UK and the USA)¹⁸².

Variety of levers for public and private stakeholders

We have identified a list of potential levers for private or public stakeholders to use to address the pension protection gap (Figure 15). It is worth noting that the portfolio of levers chosen by each country will differ depending on elements such as the role and positioning of the insurance industry, past initiatives and policy choices. This long list of potential levers should not be thought of as a list of recommendations but as a “menu” of possible actions.

180 Lou Feipeng, “‘Third pillar’ of pension cover can help aging society”, The State Council of the People's Republic of China, 31 March 2021

181 Richard Marin, “Global pension crisis: Unfunded liabilities and how we can fill the gap”, Wiley, 2013

182 “We'll live to 100 – how can we afford it?”, World Economic Forum, May 2017

Figure 15: Pension protection gap — toolbox of potential levers

	● Case study
Private	● Introduce innovative, flexible products
	● Decrease operational & distribution costs
	● Drive awareness of the need for pensions (incl. pension gender gap & long-term implications of individual saving behaviour)
	● Encourage more people in the formal labour force to opt in to pension schemes (incl. automatic enrolment)
Public	● Introduce tax incentives for asset allocation & savings
	● Encourage labour force participation
	● Increase contributions per person
	● Increase retirement age

(For GFIA’s pension protection gap reduction recommendations, see the Executive Summary, p16.)

We have looked at four case studies (Figure 16) that illustrate how some of these levers have been put into practice in some parts of the world by private or public stakeholders.

Figure 16: Overview of case studies

	Levers	Case studies	Outcomes
Private	Introduce innovative, flexible products	<ul style="list-style-type: none"> Products offering a flexible & customisable mix between variable & fixed returns Products enabling customers to invest in new asset classes (eg, infrastructure) Life product in which payout takes the form of residence in a retirement home 	Impact n/a
		<ul style="list-style-type: none"> Campaign to ensure the new pension system is understood by all citizens Campaign to increase overall pension awareness & financial education 	<p>>40 000 Singaporeans switching to CPF Life while still non-mandatory</p> <p>>27pp pension awareness in 4 years</p>
Public	Encourage more people in the formal labour force to opt in to pension schemes	<ul style="list-style-type: none"> KiwiSaver plan, automatically enrolling new employees (with 8 weeks to opt out) Mandatory occupational pensions to which employers must contribute 9.5% of their employees’ wages Automatic enrolment through enterprise-level regulation 	<p>75% of population enrolled after 10 years (vs. 15%)</p> <p>60+% of population aged 65+ receiving pension</p> <p>91% of people enrolled (vs. 28% before)</p>
		<ul style="list-style-type: none"> Plan d’épargne retraite (PER), enhancing & harmonising tax benefits on pension products Tax incentives for both employer & employee contributions, incl. minimum contributions 	<p>10x pension deposits in 2 years</p> <p>2x size of pension assets vs. Iceland’s GDP</p>

Case studies

Introduce innovative, flexible products

Many countries around the globe are currently engaging in pension reforms, often involving an increased use of funded pension programmes managed by the private sector¹⁸³. Insurers are likely to play an increasingly important role in delivering post-retirement income in the form of pensions. To build on these market dynamics and meet evolving customer needs (eg, generating returns in an environment of low or uncertain interest rates), insurers are developing new pension offerings. These emerging products differ in their investment structure and the types of underlying assets, but all aim to provide a more tailored asset allocation and set of investment options to suit individual pension needs, including:

- Next-generation guarantee products offering a customisable balance between variable and fixed returns
- Products providing access to new types of investments
- Products enabling customers to turn illiquid wealth, such as real estate, into liquid assets

- **New customisable products**

Customisable products allow customers to define their own balance between the need for protection and the desire to achieve certain levels of returns. They provide solutions to address possible low-interest environments and fit the individual risk appetite, offering a flexible mix between variable returns and insured capital/fixed returns. Customers can balance their need for the security of guaranteed returns with their desire to generate additional returns.

These kinds of products have been developed by European insurers, among others¹⁸⁴. In Germany, insurers allow policyholders to choose their own share of guaranteed capital (eg, 60%, 80% or 100%) with a guaranteed interest rate and more risky assets (eg, Euro Stoxx 50 or S&P 500 assets). In France, the Eurocroissance fund is composed of bonds and risky, or illiquid, assets (eg, equities, real estate, infrastructure, unlisted companies) that could perform better than fixed-return investments over the long term and hence yield higher pension returns¹⁸⁵. The savings are protected, as the capital invested is guaranteed after a period of eight years. If decumulations occur during this eight-year period, there is a risk of capital loss. So far, the number of subscribers to Eurocroissance life insurance policies remains relatively low at only around 0.15% of total life insurance savings in 2020¹⁸⁶. This may be explained by the complexity of the product and the lack of clarity in terms of returns. If so, this indicates how important it is for insurers to establish product offerings with clear structures that can be well understood by customers.

- **Products providing access to new types of investments**

A new generation of insurance products now enables customers to invest, via their pension plan, in new asset classes that are not typically easily accessed by private individuals (eg, infrastructure) due to a lack of knowledge or to entrance barriers that are too high (eg, minimum investment amounts)¹⁸⁷.

In Switzerland, for example, there is an insurance product that allows customers to divide their investment into both a real estate fund and a more secure asset class or investment

Customised products can balance security and returns

183 "Pension markets in focus: Preliminary 2021 data on pension funds", OECD, June 2022

184 Major European insurers' websites

185 Ibid

186 Ibid

187 Ibid

vehicle. In Germany (and other parts of the world), alternative investment opportunities are available for private individuals, including investments that are not traded on the stock exchange, such as in roads, wind farms or shopping centres. These alternative investments are often designed to generate recurring income in the future, for example, through rental income, interest or toll income. This regular income ensures visibility and continuity for the investor as opposed to the fluctuating returns and market-value changes they may face in capital markets. Insurers have also developed a set of customisable products in which the policyholder chooses between different portfolios and strategies. Changes can be made based on different options, both in terms of invested capital and new premiums.

- **Products turning illiquid wealth into liquid assets**

Real estate pension products allow customers to convert their illiquid wealth (eg, housing) into liquid, directly useable cash or services. These can, for instance, take the form of access to retirement homes (housing options offering resident services such as meals, activities and healthcare) as well as other options.

Reverse mortgage schemes, for example, are provided by both specialised reverse mortgage players or some banks. They provide older people with a way to monetise their housing to receive a regular monthly or annual income while staying in their homes. Overall, the ageing population and regulatory and market trends (eg, a stabilising regulatory landscape and improved market perception of such products) are favourable for the development of the reverse mortgage market. In the USA, penetration of the population over 60 is less than 0.1%, indicating room for growth. Currently, out of 0.9 million Americans eligible for reverse mortgages every year (citizens turning 62 with an income below US\$100 000 per year and a minimum of 50% equity in their home), only approximately 50 000 buy them. Approximately 95% of the relevant population does not use these products due to a lack of awareness (resulting from a low level of financial education on the topic and their limited reach) and a limited willingness to buy them (due to negative public perception)¹⁸⁸. However, despite these factors, volumes of mortgage-backed securities grew by approximately 63% between 2019 and 2021 from US\$8bn to US\$13bn¹⁸⁹.

Room for growth
in reverse
mortgage market

In China, the life product payout can take the form of access to residence in a retirement home¹⁹⁰. Individuals can buy a life insurance policy and gain access to a retirement home. When moving into the retirement facility, they are required to pay monthly fees of US\$2 000 to cover meals, cleaning and other services. For now, these developments are targeted at the wealthy — those able to pay a minimum single premium of US\$300 000 (payable upfront or in annual annuities over 10 years).

A third of China's 1.4 billion people will be 60 or older by 2050, and some Chinese counties have only recently started thinking about their pension systems¹⁹¹. This is why China's insurance regulator began actively encouraging insurers to implement such developments in 2014. Between 2015 and 2018, Chinese insurers spent more than US\$10bn on building retirement communities¹⁹². Concurrently, several Chinese players have invested in US retirement housing assets to gain management experience and to earn additional returns¹⁹³.

188 2019 Survey of Consumer Finances, US Census Bureau, US Federal Reserve

189 HMBS Issuer League Tables, National Reverse Mortgage Lenders Association

190 Chuin-Wei Yap, "China's insurers try novel approach to elderly care: Building retirement homes", Wall Street Journal, 14 February 2018

191 "World Population Prospects 2022, United Nations

192 China Insurance Regulatory Commission

193 "China's insurers try novel approach to elderly care", Wall Street Journal, February 2018

The development of innovative and flexible products is a global trend that can be observed in many other places. In Mexico, for example, the “Miles for Retirement” programme is a saving-through-spending fintech helping people grow their retirement savings via an app¹⁹⁴. Every member defines a percentage to automatically save from their own account related to how much they spend. In Colombia, the “Pensión Kids” product allows parents to make payments to build the foundation of their children’s pension savings. Contributions are directed to the mandatory pension fund of the parents’ choice¹⁹⁵.

In summary, one potential lever to narrow the pension gap is product innovation and offering customers additional flexibility. While customisable products offer the prospect of greater returns, their complexity is still a significant barrier to market acceptance. A similar conclusion can be drawn in relation to the new, more unconventional asset classes now available in emerging products. Despite their clear value proposition, products offering customers the possibility to convert illiquid wealth into liquid assets remain a niche market, only relevant for a (small) subset of the population.

Drive awareness of the need for pensions (including the gender pension gap and the long-term implications of individual savings behaviour)

**Women receive
25% lower pension
payments than men**

Across OECD countries, consumers have generally low understanding of pension savings plans because they are complex and financial literacy is low¹⁹⁶. Awareness is even lower among women, who receive, on average, 25% lower pension payments than men¹⁹⁷. Pension planning requires an advanced level of financial literacy as it involves tax considerations, the valuation of assets and liabilities, and assumptions about future wages and individuals’ longevity. Insurers might consider playing a role in promoting pension savings — providing clear and transparent information and guidance on the types of savings plans available. However, governments also have to take part in educating the public about the importance of and need for pension savings. The examples below illustrate how public campaigns could raise awareness of pension mechanisms.

- In 2009, the Singapore government introduced the Central Provident Fund Lifelong Income for the Elderly (CPF Life) annuity scheme to centralise longevity risks and provide Singaporeans with a lifelong pension income¹⁹⁸. One of the main challenges the government faced in enrolling its citizens was a widespread lack of financial literacy. To counter this, it started promoting the new pension scheme in 2007, two years before its official launch. During this initial phase, citizens could familiarise themselves with the new system, leaving time for the government to address concerns and gaps in information.

Currently, the system allows individuals to receive monthly payouts from retirement age (currently 65) to the end of life. In addition, CPF Life offers individuals various choices to tailor their annuity. Members can choose the desired amount of payout they wish to receive when retiring and the premium they are required to pay is adjusted accordingly. The programme started in 2009 on an opt-in basis and became mandatory in 2013. During the opt-in period, members were encouraged to join with a financial incentive of up to S\$4 000 (US\$2 800). To maximise enrolment, efforts were made to ensure that the CPF Life system was explained in a way that was understandable to all users. For example, technical terminology was

194 Millasparaelretiro.com

195 Fernanda Salas, “Miles for Retirement”, Pensions Benefits & Social Security Colloquium presentation & paper, June 20217

196 “Financial education and saving for retirement”, OECD

197 “Wide gap in pension benefits between men and women”, OECD, March 2020

198 Rachel Wheeler, “Case studies in retirement system reform”, World Economic Forum, May 2017

replaced by basic concepts (eg, “longevity insurance” was replaced by “lifelong income” due to the negative public perception of the word “insurance”). In addition, an extensive public engagement campaign was launched with a total budget of S\$3m, including approximately 90 outreach events, a dedicated website, various call centres, online advertising, seminars and cartoons in public places.

To assess the impact of the campaign, an independent survey was conducted. It found that a daily average of 800 citizens reached out to CPF Life service centres, 100 contacted CPF Life call centres and 25 sent an email. Advertisement recall rates indicated that 69% of those surveyed had heard about CPF Life via the media. Approximately 90% of event participants said they could apply what they learned to real life. At the time of the survey, 40 000 Singaporeans — 1% of the total population¹⁹⁹ — had switched to CPF Life. In 2012, the number of CPF life policies (lifetime annuities) was 40 times higher than under the previous scheme²⁰⁰.

- In Ireland, the Department of Social Protection launched a campaign between 2003 and 2008 to increase pension awareness among the population and, more broadly, to provide citizens with a robust educational foundation for pension planning. The campaign targeted specific groups, especially 25- to 39-year-old women (who historically had lower pension coverage than men), new graduates, workers in sectors with low pension coverage (eg, hospitality, farming), and international workers. The government allocated a budget of €500 000 per year over the first two years of the campaign, then increased the budget to €1m per year.

The programme aimed to make pensions education as consumer friendly as possible. By using television as its primary means of communication, it achieved broad coverage and it was possible to ensure that a wide demographic was reached. Radio appeared to be the most cost-effective way to spread key campaign messages broadly. Cinema, out-of-home marketing and internet banners rounded out media coverage, regularly reaching young adults on a daily basis. The press provided the public with more details of the importance of pension plans.

Pension awareness across the country increased from 60% in 2003 to 87% in 2007. However, despite an increase in pension coverage rates over the period of the campaign (from 58% of 35- to 65-year-olds in 2002 to 61% of the same group in 2012), coverage rates have not yet reached the targets initially set by the government. This might suggest that although public campaigns are necessary, they might not be the only measure needed to significantly improve pension coverage.

There are several other examples of public campaigns across the globe:

- More than two-thirds of citizens in the UK have multiple pension plans with different providers²⁰¹. In April 2020, the Pensions Dashboard Programme was launched to enable users to access centralised information about their pensions online. After an ID check and consent approval, pension providers send pension information to dashboard providers that aggregate the data. The programme aims to support UK citizens in their pension planning²⁰².
- In Sweden, an orange envelope was introduced in 1999 as part of a reform of the national pension system. These annual statements, arriving by mail in an orange envelope, provide

199 A. Atkinson et al., “Lessons from national pensions communication campaigns”, OECD Working Papers on Finance, Insurance and Private Pensions, Number 18, 2012

200 Ibid

201 PensionsDashboardsProgramme.org.uk

202 Ibid

pension contributors and retirees with a fully comprehensive picture of their pension status, including the current value of different pension accounts, changes in value since the last update, latest contributions and a forecast of pension installments.

Between 2010 and 2018, the percentage of respondents that found the system difficult to understand decreased from 41% to 21% for those employed and from 33% to 20% for retirees²⁰³. Since introduction, the content and format of orange envelope letters have constantly evolved to suit the population's needs. In 2013, the Swedish Pensions Agency and private insurers jointly launched a website dedicated to individuals' pension monitoring, complementing the information shared in the printed version²⁰⁴.

- In Denmark, an online tool, PensionsInfo, was launched, providing a comprehensive overview of all pension and insurance options available to citizens²⁰⁵. In 2021, 1.7 million users logged on 5.1 million times in total.
- In Poland, the government launched a campaign in 1999 to introduce and promote the mandatory pension system in the country. In the first two years of the campaign, public awareness went up from 40% to 60%.
- The Canadian Foundation for Economic Education (CFEE) publishes "Money and Youth", a guide to encourage the financial literacy of individuals aged 14 and above, distributed to homes and schools²⁰⁶.

Lack of financial literacy hampers pension planning

For the most part, citizens often lack financial literacy and, as a result, do not get involved proactively in pension planning, which partly explains the existing pension gap. To reduce this gap, public institutions also have a role to play, as has been demonstrated by successful public awareness campaigns.

Encourage more people in the formal labour force to opt into pension schemes (including automatic enrolment)

Worldwide, there are typically two types of pension plans: voluntary plans and mandatory plans. Voluntary plans include both voluntary occupational plans, in which employers have the choice of whether to set up a pension plan for their employees, and voluntary personal plans, in which individuals can freely decide whether to join.

Coverage of voluntary occupational pension plans varies widely between countries (eg, 5% in Greece and 40% in Japan)²⁰⁷. 19 out of the 38 OECD countries have implemented mandatory pension plans. In 12 of those, the share of the working-age population now registered in such a plan exceeds 75%²⁰⁸. Two factors can explain this relatively low coverage rate. First, informal workers (who are not officially registered) do not contribute to pensions. Second, despite their mandatory nature, some industries are excluded from mandatory plans in some countries²⁰⁹. In certain countries, obligation is not determined at national level but at industry level: employers in particular industries establish pension schemes that employees must join.

203 Arne Paulsson, "Pension information in Sweden", Social Insurance Agency, Sweden

204 Ibid

205 "Financial literacy and transparency initiatives and tools in life and pensions", Danish Insurance Association, 2008

206 "Financial education and saving for retirement", OECD

207 "Coverage of retirement savings plans", OECD, 8 December 2021

208 Ibid

209 Ibid

As a trade-off between voluntary and mandatory pension plans, automatic enrolment programmes are becoming increasingly popular to accelerate participation in pension plans²¹⁰. They offer an alternative to voluntary programmes without automatic enrolment, which citizens might not be aware of due to limited financial literacy, and compulsory mechanisms, which could be politically infeasible²¹¹. Since 1992, nine countries have implemented such schemes²¹². A few examples that have shown the potential to be effective are detailed below.

- New Zealand

Before the introduction of automatic enrolment, the pension savings market was underdeveloped: only 15% of the population actively saved in a private pension scheme²¹³. In July 2007, KiwiSaver, an automatic pension enrolment programme, was introduced. It offers flexible solutions for pensions savings. When starting a new job, employees are automatically enrolled in the system with a minimum contribution of 3% of their pre-tax salary unless they opt out. Employers must contribute a minimum of 3% of their employees' pre-tax salary as the default level of contributions. The scheme's eligible plans are chosen from existing offerings from private companies.

By June 2016, KiwiSaver had 2.6 million members or over 75% of the population aged 18 to 65²¹⁴. Despite the programme's popularity, many employees and employers have continued making contributions only at minimum levels. There are concerns that those levels of contribution may not offer an adequate outcome for future citizens' pensions. Nevertheless, contribution levels have been kept low to encourage higher participation²¹⁵.

- Australia

Australia's retirement system is based on three complementary pillars and is ranked as the sixth-best retirement system in the world²¹⁶. The pillars are a universal public pillar, an automatic enrolment pillar for employees and a voluntary pillar.

The first pillar, Age Pension, is a public pillar financed by general tax revenues, which provides basic benefits on individual revenues and assets for those over 65²¹⁷. As of 2021, around 2.6 million Australians — approximately 62% of the population aged 65 and over — regularly received Age Pension installments²¹⁸.

The second pillar consists of funded individual pension accounts provided by superannuation funds²¹⁹. In 1992, Australia introduced compulsion when it made contribution into the superannuation fund system mandatory for all employees between 17- and 70-years-old earning more than A\$450 (US\$310) per month. This system requires a minimum contribution to a superannuation fund. The employers' contributions are set at 9.5% of wages, with a stepwise increase to 12% by 2025, subject to an annual cap of A\$50 000²²⁰. On top of this, employees can make additional voluntary contributions. The country has several different types of superannuation funds, which are offered to individuals and employers by financial

210 Ambrogio Rinaldi, "Auto-enrollment in private, supplementary pensions in Italy" in "Improving financial education efficiency: OECD-Bank of Italy symposium on financial literacy", OECD, 27 October 2011

211 Ibid

212 "Coverage of retirement savings plans", OECD, 2021

213 Hayley James, "The impact of automatic enrollment in Italy, New Zealand and the USA", Briefing Note 99 (PhD Series No.2), Pensions Policy Institute, UK

214 Ibid

215 Ibid

216 Mercer CFA Institute Global Pension Index 2022

217 Pensionfundsonline.co.uk

218 Thenewdaily.com.au

219 Pensionfundsonline.co.uk

220 Apra.gov.au

service providers. As workers are able to choose their pension fund, private funds compete for contributions and have an incentive to outperform their competitors. Employer contributions are tax deductible up to a certain limit.

The third pillar involves additional individual contributions to superannuation funds or to retirement savings accounts (RSAs). RSAs are low-cost pension schemes offered by deposit-taking institutions or life insurance companies. They operate under the same tax rules as superannuation accounts. Overall, the combination of the three pillars has contributed to an increase in the assets under management of 11.3% per year over the past 20 years — the strongest growth rate in pension assets among comparable countries²²¹. These amounts include both fund returns and rising contribution levels made by a growing workforce. For women, average superannuation accounts increased by 50% between 2008 and 2018 (from A\$20 000 to A\$30 000), while they increased by 157% for men (from A\$30 000 to A\$77 000). A substantial gender gap remains, with average female account balances valued at approximately A\$15 000 below that of males²²². Addressing this gap might be the next focus for Australia to further improve its pension system.

- USA

In the USA, 401(k) plans enable citizens to save for their retirement by including tax advantages: both money invested and associated returns are exempted from taxes until they are withdrawn. The capital comes from the savers' deposits, which are deducted from their salary (and not subject to income tax) and from employers' contributions. This capital is placed in an investment portfolio and, once retired, savers withdraw their money, which is then subject to tax. 401(k) savings plans increasingly offer automatic enrolment coupled with higher employee default deferral rates (deferral rate is the portion of an employee's wages deducted from their salary that contributes to the 401(k) pension plan)²²³.

Automatic enrolment was made possible in 1998²²⁴. If employees want to leave, they need to opt out. Between January 2017 and December 2019, 90% of automatically enrolled new hires were still in their employer pension plan after three years²²⁵. In addition, between 2005 and 2021, following the 2006 Pension Protection Act (PPA), the number of companies that implemented automatic enrolment rose from 22% to 74%. The PPA provides a tax incentive for sponsors, automatically enrolling eligible employees at a minimum contribution rate of 3%²²⁶. Among new hires, participation rates increased to 91% in schemes with automatic enrolment compared with 28% in those without²²⁷.

Despite this growth in participation, employees might think that the default rate set by the employer is the right one. Thus, they may not take the initiative of increasing their deferral rate. For example, in 2018, employees engaged in an automatic enrolment programme had an average deferral rate of around 8%, ie, approximately 0.5pp below opt-in participants²²⁸. To mitigate this challenge, employers can trigger automatic escalation, which increases the contribution rate by 1% every year until the employee reaches 8-10% of their pre-tax salary²²⁹.

221 "Global pension assets study", Willis Towers Watson, 2022

222 Apra.gov.au

223 "Automatic enrollment's long-term effect on retirement savings", T. Rowe Price, 7 July 2022

224 Ibid

225 Institutional.vanguard.com

226 "Retirement savings", T. Rowe Price, 2022

227 Jean Young and Jeffrey Clark, "Automatic enrollment: The power of the default", Vanguard Research, March 2018

228 "Retirement savings", T. Rowe Price, 2022

229 Pncorp.com

**Auto-enrolment
increased new-hire
participation to 91%
against 28% without**

- UK

In 2007, the UK government decided to support the millions of citizens not saving enough for their retirement by introducing the Pensions Act²³⁰. As one key measure, automatic enrolment was introduced in 2012 to encourage individuals to save enough money during their working life and thus be able to maintain their desired lifestyle when retiring. The other objective was to limit the burden on employers and pension providers of implementing schemes. The reform requires employers to automatically enroll workers into a pension scheme and to provide a minimum contribution. Employees over 22 years old, earning more than about £10 000 (US\$12 000) per year (thresholds are revised annually) are eligible.

The automatic enrolment scheme was deployed in several phases between 2012 and 2018, starting with the largest employers. Since 2017, all businesses employing at least one person must provide a workplace pension option. Minimum contributions have evolved: since 2019, minimum contributions amount to 8% of employees' wages. At least 3% must come from the employer and the rest from the employee. Employees have one month to opt out of the enrolment and get a refund on contributions²³¹. However, if employees opt out, employers have an obligation to re-enroll them automatically after three years²³². Since the launch of automatic enrolment, approximately nine million workers have been automatically enrolled, and 900 000 employers have had their automatic enrolment duties declared compliant²³³. In 2020, 78% of employees participated in a pension savings scheme compared with 47% before the introduction of automatic enrolment.

With regard to women, pension participation rose from 40% to 73% between 2012 and 2016. Since the introduction of automatic enrolment, two million fewer UK citizens are considered to be undersaving for their retirement. In 2018, the annual total amount saved reached £90.4bn, representing an increase of 8% on 2017 (a £7bn increase). When the launch of this employer obligation was announced, concerns were raised regarding its potential administrative burden. However, a sample of employers interviewed in 2016 and 2018 stated that the costs and time related to implementation were lower than initially expected²³⁴.

2 million fewer UK citizens undersaving since auto-enrolment was introduced

A few other countries have introduced automatic enrolment programmes into retirement savings plans with an opt-out option: Italy (2007), Turkey (2017), Lithuania (2019) and Poland (2019). In Italy, private sector employees have six months to choose one of the following options for their pre-tax severance pay (approximately 7% of pre-tax income): transfer the money to a pension fund; opt out and keep the money; or do nothing, this being considered a tacit agreement of transfer into the fund. As of 2010, 23% of the Italian workforce were enrolled in a pension fund²³⁵.

Voluntary systems are based on the ability of individuals to make informed decisions. Given the complexity of pension products, this requires an advanced level of financial literacy. However, mandatory schemes do not take individual preferences into account and are not always feasible from a political standpoint. Thus, automatic enrolment could be seen as a compromise between the two systems described above, relying on citizens' inertia and tendency to procrastinate²³⁶. They

230 Automatic Enrolment Evaluation Report 2019, UK Department for Work & Pensions, 24 February 2020

231 thepensionregulator.gov.uk

232 Ibid

233 "Automatic enrolment review 2017: Maintaining the momentum", UK Department for Work & Pensions, 18 December 2017

234 "Automatic enrolment: Qualitative research with new employers", UK Department for Work & Pensions, Interim report, February 2019 and "Automatic enrolment: Qualitative research with small and micro employers", UK Department for Work & Pensions, October 2017

235 Hayley James, "The impact of automatic enrollment in Italy, New Zealand and the USA", UK Pensions Policy Institute, PPI Briefing Note Number 99 (PhD Series No 2)

236 Ambrogio Rinaldi, "Auto-enrollment in private, supplementary pensions in Italy", OECD, 2011

**Tax and non-tax
financial incentives
used to encourage
pension saving**

generate higher pension participation rates, resulting in higher savings outcomes. However, these systems include default contribution rates to savings plans (often set by the state) and both employers and employees rarely raise them to fit individual needs. As a consequence, automatic enrolment schemes may result in participants saving less than those who voluntarily opt in and set their own deferral rate.

Introduce tax incentives for asset allocation and savings

One way to increase pension savings on certain asset classes is to offer financial incentives²³⁷. Countries use two types of financial incentives — tax and non-tax — to encourage individuals to save for retirement²³⁸. Tax incentives can vary depending on the contributor (employer or employee), the nature of the contribution (mandatory or voluntary) and the type of pension plan (personal or occupational). In addition, some countries have introduced more direct financial incentives to encourage contributions to pension plans, especially for those on low incomes. Non-tax incentives include direct, fixed contributions from governments or employers to the individuals' pension accounts, ie, without any form of taxes involved.

- In France, new savings products were introduced in 2019, following the reform of retirement savings introduced by the “Plan d'action pour la croissance et la transformation des entreprises” (PACTE) law²³⁹. The PACTE reform introduced “Plan d'épargne retraite” (PER) pension plans, all governed by the same rules and all benefitting from harmonised tax incentives. The objective of this reform is to reinforce the accessibility and attractiveness of long-term savings, resulting in additional funding for companies²⁴⁰.

Before the new law was introduced, pension saving was underdeveloped in France: in 2018, pension saving assets totalled €230bn, compared to €1 700bn for life insurance (excluding pension products) and €400bn for other savings products²⁴¹. This was mainly due to a complex and fragmented range of products subject to different rules and taxes, which was unhelpful for companies that were struggling to offer their employees attractive pension-savings products.

The new PER comes in three forms: the individual PER, the collective company PER and the mandatory company PER. The individual PER can be joined via a bank or an insurance company. The collective company PER is a plan open to all of a company's employees, without any obligation to join. It can be invested in by employees or by employers. The compulsory company PER is a plan that all or certain categories of employees are obliged to join. It can be invested in by the employees or by the employer, on a voluntary or compulsory basis, depending on the company agreements. In the event of a change of employer, rights are transferable from one PER to another, and transfer fees are strictly controlled. In the case of a transfer after five years, the transfer is free. Before five years, the fees charged amount to a maximum of 1% of the savings. Savings can be invested in variable-return products and fixed-return products (through discretionary management by default) and are available for a range of life events (eg, the purchase of a main residence).

At retirement, savings can be paid out as an annuity or as a lump sum. For all types of PER, payments can be deducted from the income tax base up to a maximum of €33 000. For example, if an individual invests €5 000, then taxable income will be reduced by the same

237 “Pensions at a glance 2011: Retirement income systems in OECD and G20 countries”, OECD, 2011

238 “Financial incentives for funded private pension plans: OECD country profiles 2021”, OECD, 2021

239 Start.lesechos.fr

240 Ibid

241 Economie.gouv.fr

amount, resulting in €1 500 in income tax savings (based on a 30% revenue tax rate). When withdrawing the money, the capital and interest are taxed, so the transaction is favourable if the tax rate at withdrawal is lower than that at the time of payment (which is usually the case). For company PER, the employer contributions benefit beyond the income tax exemption limit (10% of gross annual employee income) and the exit annuity after deductions (either 10% or the cap amount) is subject to income tax).

Since the introduction of PERs, deposits grew at 242% CAGR between Q4 2019 and Q4 2021 (from €6bn to €70bn). More than 118 000 companies have adopted the PER scheme²⁴². However, the PER is not a liquid savings product. Savings can be withdrawn before the legal retirement age only under certain conditions, such as buying a main residence or suffering a disability. Financial institutions charge fees on deposits (up to 5% but mostly under 3%) and management fees of around 1% per year.

**More than 118 000
companies adopted
France's PER
pension plans**

- Iceland also offers a range of tax incentives to encourage pension investments²⁴³. The first type of tax incentives are related to occupational contributions. Both employer and employee contributions to occupational pension funds are tax deductible. Employees can deduct pension contributions from their income tax of up to 4% of their salaries. Beyond that 4%, contributions are taxed at the regular income tax rate. For employers, there is no limit to the deductibility.

Regarding personal pension savings, the minimum contribution for individuals is 2% of their wages. This contribution is then complemented by the employer with an additional 2% of the employee's salary. Individual contributions to personal pension funds are deductible from taxable income up to 4% of the salary. The employer's matching contribution is entirely deductible. Pension income is taxed at regular wage income and subject to individuals' income tax rate.

However, since 2014, active members in voluntary personal pension plans can withdraw assets tax free to finance residential housing debt of up to ISK 1 000 000 (US\$7 000) each year for up to 10 consecutive years for couples. Individuals who do not own their main place of residence can withdraw up to ISK 500 000 per year. Authorisations for those tax-free withdrawal exceptions were initially supposed to end in 2019, but were extended for an additional 10 years. In practice, across the country, the most common contribution rate to individual pension plans is 6% of salary, both for the employer and employee.

The tax incentives contribute to making Iceland's pension system one of the most effective in the world in terms of performance (standard of living of retirees), sustainability (long-term financial balance) and integrity (clarity for citizens)²⁴⁴. Pension assets are currently twice Iceland's GDP (the highest ratio in the world) and have doubled since the financial crisis of 2008. Furthermore, the country has the OECD's lowest poverty ratio (measured in terms of income) among people aged 66 and over: 2.8% versus an OECD average of 13.5%. In addition, the gender gap is only 12%, which is among the lowest of the OECD countries. Since it is so successful, the country's pension system is currently facing asset management challenges²⁴⁵. The government is considering allowing investment managers

242 "Observatoire de l'épargne BPCE," France Assureurs, 19 July 2022

243 "Financial incentives for funded private pension plans", OECD, 2021

244 David Knox, "Mercer CFA Institute Global Pension Index: Pension reform in challenging times", Mercer and CFA Institute, 19 October 2021

245 Ragnhildur Sigurdardottir, "Iceland's gigantic pension fund is creating a headache at home", Bloomberg, 6 December 2021

to diversify the portfolio even more, buying more securities abroad. The law currently limits the share of overseas investments in pension assets to 50%.

Many countries have tax incentives for pension saving

Around the globe, many countries offer a range of tax incentives to encourage both individuals and employers to invest in pension systems. All 38 OECD countries have set up tax arrangements. In Chile, workers contribute up to 10% of their salary to mandatory personal pension accounts and these contributions are tax deductible. In Israel, employer contributions up to 7% of salary are not included in the taxable income of the employee. In South Korea, employer contributions into occupational pension plans are deductible from corporate tax. Tax incentives appear to be necessary but not sufficient for a well-functioning pension system.

In summary, a large majority of states contribute to the pensions of their citizens by offering tax incentives to both employers and employees to support pension plans. As seen in the examples above, tax benefits can exist at different stages in the pension system, including contributions during the active life of the worker, returns on investment, funds accumulated and pension income. Beyond tax, incentives can also take the form of other financial incentives such as direct instalments from the state. On top of such financial incentives, public stakeholders can employ additional levers to reduce the pension protection gap, such as increasing the retirement age.

Additional levers

Decrease operational and distribution costs

This can be done, for example, via the digitalisation of back-end processes. According to Oracle, a program to digitise insurance processes can reduce costs by 65%, decrease turnaround times by 90% for key insurance processes and improve conversion rates by more than 20%. This would help to improve cost effectiveness and therefore potentially increase the returns offered by pension plans, which could in turn help reduce the pension gap²⁴⁶.

Encourage labour force participation

Encouraging a higher share of the labour force to enter the formal job sector as opposed to the informal one, hence making a higher share of the working-age population eligible for contributions to Pillar I and II pensions, is particularly important for emerging markets. In some countries, up to 80-90% of the workforce in certain industries do not have a formal contract. Likewise, encouraging higher labour force participation in general — for example, after maternity leave and at post-pension age — can be a lever for developed countries²⁴⁷.

Increase contributions per person

Governments are considering multiple levers such as tax incentives, matching contributions, increasing rates, and auto-enrolment for mandatory contributions²⁴⁸. For example, auto-enrolment has been shown to significantly boost pension coverage. In the UK, the introduction of auto-enrolment into a voluntary plan in 2012 resulted in approximately 20 million more Britons contributing to a pension by 2020²⁴⁹.

246 "Digitizing insurance from the inside out: The back-end solution to winning millennials", Oracle

247 Ronald Klein, "The pension gap epidemic: Challenges and recommendations", The Geneva Association, October 2016

248 Dorothee Rouzet et al., "Fiscal challenges and inclusive growth in ageing societies", OECD, 10 September 2019

249 Sarah O'Connor, "When a pensions policy is a resounding success, we should say so," Financial Times, 25 April 2022

Increase retirement age

In 20 out of 38 countries²⁵⁰, the retirement age for the generation currently entering the labour market is expected to increase from an average of 64.2 in 2020 to 66.1 by 2064, according to the OECD²⁵¹. Some incentives to retire later have already been introduced. In Japan, for example, private firms are obliged by law to retain workers who wish to continue to be employed until the age of 65.

Incentives to retire later are being introduced

Concluding remarks

The peculiarity of the pension gap, sized at approximately \$1trn a year, is that even the most drastic and unpopular legislative measures — such as significantly increasing the retirement age — would only limit the gap but not fully close it²⁵². Tackling the pension gap requires the involvement of a wide range of stakeholders, including both private and public players.

250 “Pensions at a Glance 2021”, OECD, 2021

251 Ibid

252 “Understanding and addressing global insurance protection gaps”, The Geneva Association, April 2018

VI. Natcat protection gap

Accelerated by climate change

For a summary of this chapter, see the Executive Summary, “Natcat protection gap”, p12. And for GFIA’s recommendations for closing the natcat protection gap, see the Executive Summary, “GFIA recommendations”, p18.

Swiss Re defines natural catastrophes as events caused by natural forces, generally resulting in a large number of individual losses involving many insurance policies. The extent of losses depends on the severity of the event, but also on human factors, such as building design²⁵³. Natcats include floods, storms, earthquakes, tsunamis, droughts/forest fires/heatwaves and cold waves/frost/hail.

**Last decade’s
natcats were
most costly in
modern history**

Over the last three decades, 2010 was the year in which natural catastrophes caused the most deaths: nearly 300 000 people died, mostly as a result of the earthquake that struck Haiti²⁵⁴. In terms of financial losses, the last decade was the costliest in modern history for global natural catastrophes on a nominal and inflation-adjusted basis²⁵⁵, as climate change continues to raise the threats from natcat events²⁵⁶. In addition, exposure is increasing in certain high-risk areas due to economic development and population growth (eg, as a result of migration towards coastal Florida in the USA)²⁵⁷. Despite significant progress being made around the world in terms of covering losses (including in emerging markets), over 60% of today’s global losses remain uninsured.

We define the natcat gap as the difference between total economic losses from natcats and the insured part of these losses (not including government relief efforts). According to Swiss Re, “economic losses are all the financial losses directly attributable to a major event, ie, damage to buildings, infrastructure, vehicles, etc. The term also includes losses due to business interruption as a direct consequence of the property damage. Total loss figures do not include indirect financial losses, ie, loss of earnings by suppliers due to disabled businesses, estimated shortfalls in GDP and non-economic losses, such as loss of reputation or impaired quality of life”²⁵⁸. Insured losses are gross of any reinsurance, be it provided by commercial or government schemes. Life insurance losses are not included. The gap also does not reflect the (often severe) human suffering, which cannot be measured in financial terms.

Total natcat losses averaged US\$210bn/year in last decade

Natcat losses increased at 5% per annum from 1970 to 2021. The last decade (2011 to 2020) was the costliest, also on an inflation-adjusted basis, with approximately US\$210bn in losses per year on average (Figure 17)²⁵⁹.

253 In this report, “natural catastrophe” or “natcat” are used to describe events in which natural hazards cause both human and financial losses. Human actions (eg, settlement in earthquake-prone areas), rather than the natural hazard itself, result in disasters and therefore the terms “natural catastrophe” or “natural disaster” do not accurately describe the event. However, we have chosen to use “natural catastrophe” or “natcat”, as they are established terms in the industry.

254 sigma explorer, Swiss Re Institute, 2022

255 Ibid

256 Lucia Bevere and Michael Gloor, “Natural catastrophes in times of economic accumulation and climate change”, sigma 2/2020, Swiss Re Institute, 8 April 2020

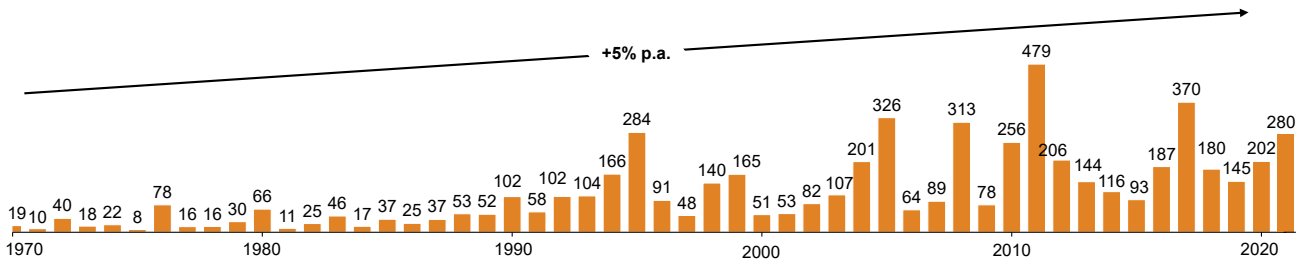
257 Florida Population 2022, World Population Review

258 Lucia Bevere and Andreas Weigel, “Natural catastrophes in 2020: secondary perils in the spotlight, but don’t forget about primary peril risks”, sigma 1/2021, Swiss Re Institute, 30 March 2021

259 sigma explorer, Swiss Re Institute, 2022

Figure 17: Total natcat losses increased ~5% annually from 1970 to 2021

Global natcat losses — 1970–2021 (\$bn)



Source: Swiss Re

Economic losses from natcats have not developed in the same way across all regions (Figure 18). While global growth amounts to approximately 75% between 1991 and 2020, the USA, for example, has experienced an even stronger expansion of its losses (+90%), while Europe’s losses have decreased (-38%)²⁶⁰.

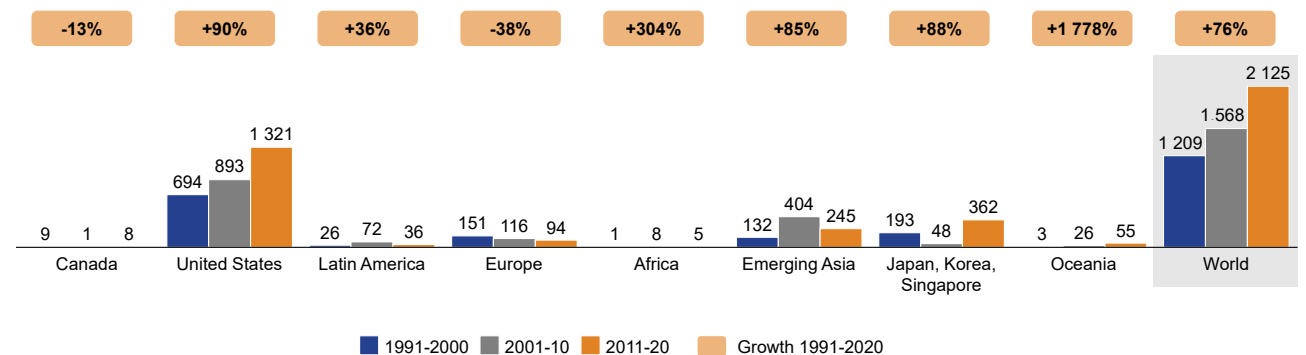
Natcat losses are determined by the frequency and severity of natcat events for various hazards, the vulnerability and exposure of the region, and the value of assets in that region. Whereas climate change may increase both the frequency and severity of events, the vulnerability and exposure of regions is driven by socioeconomic factors, such as increasingly valuable assets, population growth and urbanisation (including decisions to build in particular areas). As these factors might gain importance over the next few decades, losses as a result of natcat events can be expected to continue to increase²⁶¹.

Socioeconomic factors increase vulnerability and exposure

The frequency of natcat events has been increasing by about 3% per annum over the last five decades (Figure 19), from an average of 48 events in the decade from 1971 to 1980 to more than 180 in the decade from 2011 to 2020²⁶².

Figure 18: Natcat losses vary significantly by region

Losses by region — 1991–2020 (sum per decade, \$bn)



Source: Swiss Re

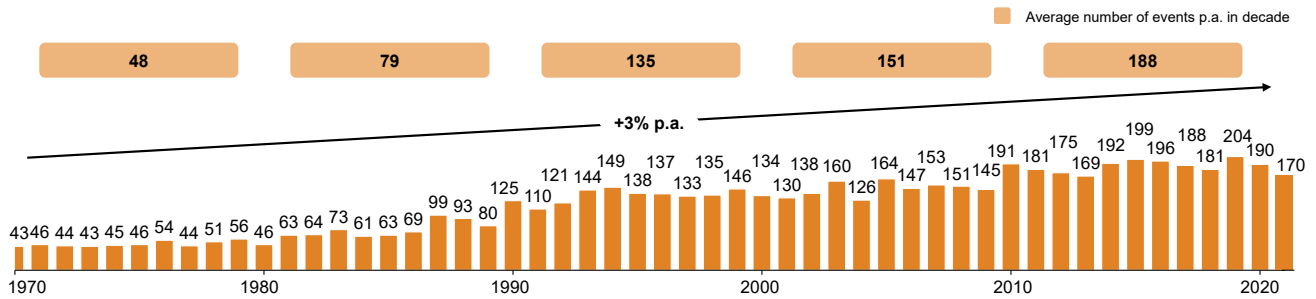
260 sigma explorer, 2022

261 “Natural catastrophes in times of economic accumulation and climate change”, sigma 2/2020, Swiss Re Institute, 8 April 2020

262 sigma explorer, 2022

Figure 19: Average natcat events per year increased from 48 to 188 over five decades

Global number of natcat events — 1970–2021



Source: Swiss Re

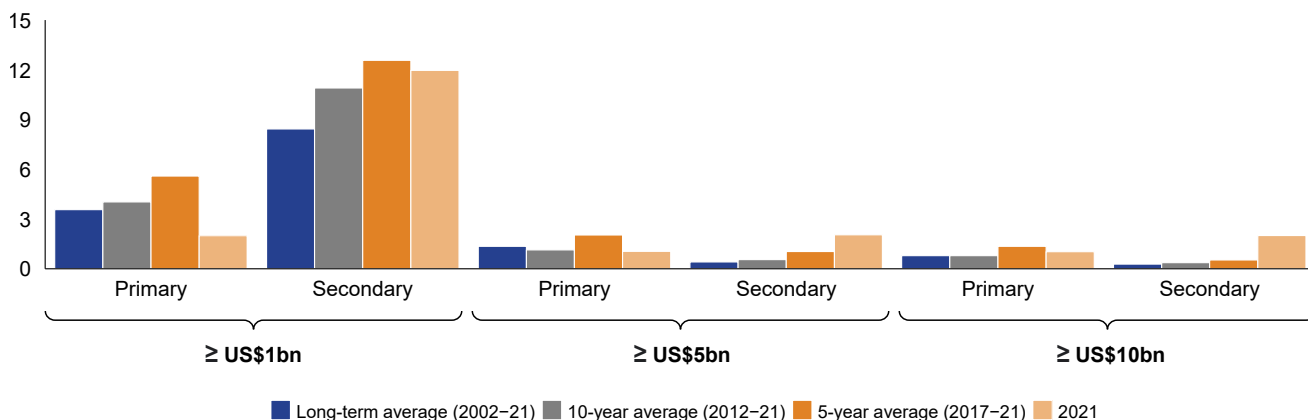
Natcat events result from both primary and secondary perils. Primary perils (eg, tropical cyclones, earthquakes and winter storms in Europe) are typically less frequent events associated with high losses. Secondary perils are more frequent, largely weather-related events (eg, convective storms, tornadoes and floods) with typically small or medium losses per event²⁶³. Due to climate change and the corresponding rising temperature levels, secondary perils have been increasing in frequency and severity²⁶⁴, as demonstrated by the rising prominence of secondary perils in the natcat event mix (Figure 20).

Regional focus makes clear causal link between climate change and natcats

While the impact of climate change on disaster losses can be identified by considering a specific region or peril, it is more complicated on a global scale, as opposing influences partially cancel each other out. Focusing on specific regions or events, the causal link between natcat and climate change is clearer to follow²⁶⁵. For example, rising temperatures have led to an increase in losses from severe thunderstorms with gusts or tornadoes in North America and an increase in the number of severe thunderstorms with hail in Europe²⁶⁶.

Figure 20: Growing prominence of secondary perils

Average number of natcat events with losses exceeding US\$1bn



Source: Swiss Re

²⁶³ “Natural catastrophes in 2020”, sigma 1/2021, Swiss Re Institute, 30 March 2021

²⁶⁴ “Enhancing financial protection against catastrophe risks: The role of catastrophe risk insurance programs”, OECD, 2021

²⁶⁵ Ibid

²⁶⁶ “Natural catastrophes in 2020”, sigma 1/2021, Swiss Re Institute, 30 March 2021

Canada, adjacent regions of the USA and many parts of the Mediterranean experienced record temperatures in 2021, including a new all-time Canadian temperature record of nearly 50°C in a village in British Columbia. The extreme heat was often accompanied by devastating wildfires²⁶⁷. Scientists assessing to what extent each event can be attributed to climate change (as part of a new field of research called attribution science) state that extreme heat in north-west America in recent years would not have happened without the effects of human-generated climate change²⁶⁸.

All-time temperature record of 50°C in Canada

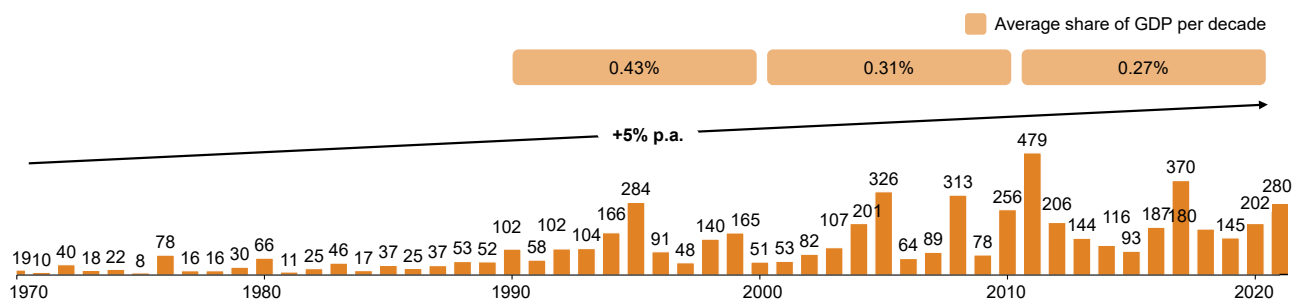
According to Swiss Re estimates, rising losses are also driven by socioeconomic factors. Economic development and urbanisation (population density) have generated higher losses for hazards of the same size and scale²⁶⁹. Asset values have also increased; for example, private property prices tripled between 2000 and 2020, based on a 10-country sample²⁷⁰. The global population grew from approximately 4 billion to 7.8 billion with a CAGR of 1.43% from 1975 to 2020, and population density increased from 32 to 60 people per square kilometre over the last five decades. Therefore, a hazard of the same size, scale and geography occurring in 2020 would generate higher economic losses than in the 1970s, in absolute terms.

Despite this, as a share of inflation-adjusted GDP, the share of losses has stayed relatively stable over the last two decades (Figure 21) despite an increase in the frequency and severity of events. This is partially due to the rising share of intangibles in GDP (eg, intellectual property and computerised information) that is not as strongly affected by natcat events as tangible goods. The share of investments in intangible assets in overall investments increased by about 30% in both the USA and a sample of European countries over the last 25 years. During the pandemic, when social distancing necessitated a shift to remote working and large-scale, rapid digitalisation, investment in intangible assets accelerated even further²⁷¹.

Nevertheless, in addition to the reported direct losses, significant indirect losses and immeasurable human suffering results from natcat events.

Figure 21: Natcat losses increasing in absolute terms, but flat as share of GDP

Natcat losses — 1970–2021 (US\$bn)



Source: Swiss Re

267 “June ends with exceptional heat”, World Meteorological Organisation, 30 June 2021

268 “Western North American extreme heat virtually impossible without human-caused climate change”, World Weather Attribution, 7 July 2021

269 “Natural catastrophes in times of economic accumulation and climate change”, sigma 2/2020, Swiss Re Institute, 8 April 2020

270 Australia, Canada, China, France, Germany, Mexico, Japan, Sweden, UK and USA

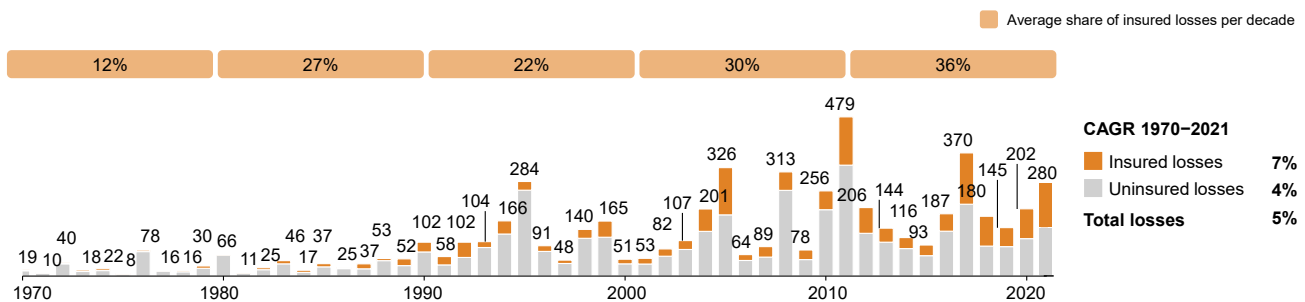
271 “Getting tangible about intangibles: The future of growth and productivity?”, McKinsey Global Institute, 16 June 2021

Protection gap is US\$139bn/year, with significant variation between regions

In 2021, the global natcat protection gap was US\$159bn, with a 10-year average of US\$139bn from 2011 to 2021²⁷². The share of insured losses globally has increased from 22% in the decade 1991-2000 to about 36% in the decade 2011-2020, or a protection gap of 64% of total losses (Figure 22). The gap would be significantly larger if indirect losses were also included.

Figure 22: Insured natcat losses have increased as share of total losses, but gap remains ~64%

Global natcat losses — 1970–2021 (US\$bn)



Source: Swiss Re

Insurers in North America cover 40% of natcat losses, in China just 10%

The protection gap and its development over time differ greatly between regions (Figure 23), as the share of insured losses depends on the level of insurance penetration (and therefore the country income group) and the types of events occurring in the region. For example, while in North America insurers cover approximately 40% of natcat losses, in China this figure is only 10%, although this has increased rapidly over the last 10 years²⁷³. Overall, the share of insured losses has increased in the last few decades, largely driven by increases in the USA, Latin America and emerging Asian economies.

There are several reasons for the low level of natcat insurance. These include:

- Limited public awareness of coverage
- Gap between the perception of potential losses and actual economic losses
- Expected post-disaster aid from governments
- Differences in the way natcat insurance products are offered to homeowners and businesses
- Lower probability of tail-risk events
- Lack of education about risks and likelihood of occurrence

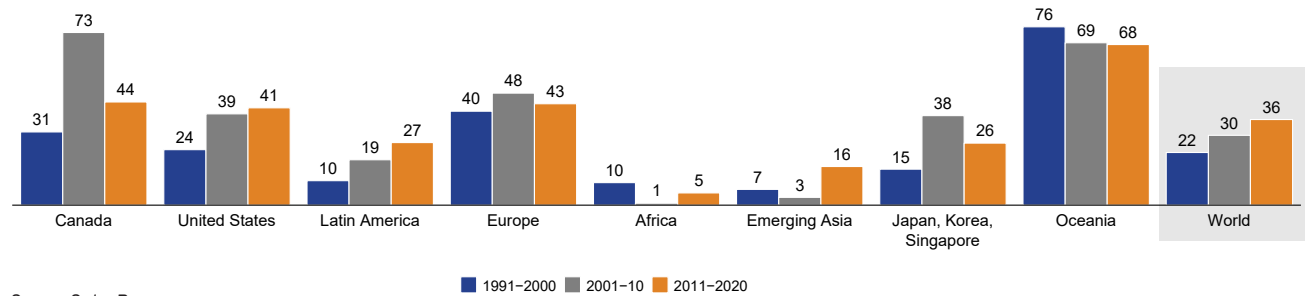
In some countries and regions, insurability challenges are emerging for some perils, as insurers may increase prices or withdraw coverage for high-risk policyholders. In emerging markets, another factor that could influence the level of natcat insurance coverage is the amount of uncertainty in estimating losses. The low frequency of natcat events limits the availability of data on historical experience and therefore results in higher levels of uncertainty in estimates of expected losses and, usually, higher premiums, as insurers are likely to address uncertainty by charging higher prices for coverage.

²⁷² www.swissre.com/risk-knowledge/mitigating-climate-risk/natcat-country-profiles-infographic.html#/

²⁷³ "Natural catastrophes in 2020", sigma 1/2021, Swiss Re Institute, 30 March 2021

Figure 23: Insured share of natcat losses varied significantly by region

Insured share of natcat losses by region — 1991–2020 (% per decade)



Source: Swiss Re

From a demand perspective, this implies that insurance may not be affordable for low-income households and vulnerable groups. Other demand factors that may provide an explanation for a lower insurance penetration in emerging markets include limited financial literacy and trust in the products and reliance on alternative compensation (eg, government aid or help from family structures and local communities). The chances of being insured increase for people with a higher income and formal employment²⁷⁴. Hence, those who are often already disadvantaged within a society (eg, due to poverty) may also be the ones who are the least protected from natural hazards. In low-income countries, the protection gap is close to 100% of losses and has not improved in the last three decades²⁷⁵, which is alarming, given that the effects of climate change will often be felt acutely in those countries.

Natcat losses expected to grow but share of uninsured losses to decrease in next decade

The absolute increase in losses is believed to be on a 5% growth trajectory²⁷⁶. The uninsured gap has been growing at 4%, ie, slower than the total losses. In the future, the relative increases will be driven by multidirectional forces. On the one hand, there is the expected increased frequency and severity of both primary and secondary perils, driven by climate change. In addition, increasing asset values and urbanisation could accelerate the growth of uninsured losses beyond the last decade's growth²⁷⁷. On the other hand, an increasing proportion of incurred losses are covered due to developments in the USA and significant advances in Latin America and emerging Asian markets²⁷⁸. Overall, it is likely that the trend of increasing absolute losses will persist, while the uninsured gap within total losses might continue to decrease, assuming continuing efforts by public authorities and the insurance industry, as well as by households and companies.

Absolute losses forecast to grow 5% p.a.

Levers for public and private stakeholders

To address the natcat protection gap, we have identified a toolbox of potential levers (Figure 24) for private and public stakeholders. It is worth noting that the portfolio of levers chosen by each country is likely to be different, depending on its specific exposures, the position of the insurance

²⁷⁴ "Insuring Sustainable Development: What drives uptake of insurance in developing countries?", UN Capital Development Fund, 2020

²⁷⁵ "Understanding and Addressing Global Insurance Protection Gaps", The Geneva Association, 2018

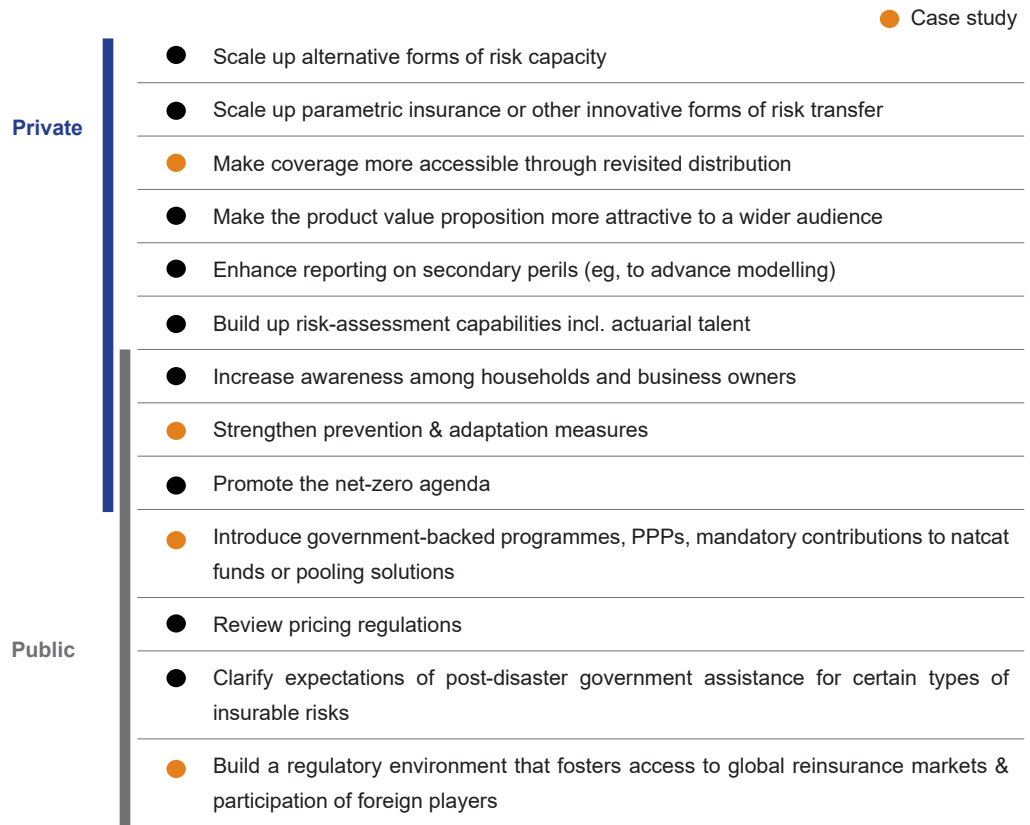
²⁷⁶ "Natural catastrophes in 2020", sigma 1/2021, Swiss Re Institute, 30 March 2021

²⁷⁷ "Natural catastrophes in times of economic accumulation and climate change", sigma 2/2020, Swiss Re Institute, 8 April 2020

²⁷⁸ sigma explorer, Swiss Re Institute, 2022

industry, past initiatives and policy choices. This toolbox of potential levers should not be thought of as a list of recommendations but as a “menu” of possible actions.








Figure 24: Natcat protection gap — toolbox of potential levers



(For GFIA's natcat protection gap reduction recommendations, see the Executive Summary, p18.)

We have looked at several case studies (Figure 25) that illustrate how some of these levers have been put into practice in some parts of the world by private or public stakeholders gap.

Figure 25: Overview of case studies

	Levers	Case studies	Outcomes
Private	Make coverage more accessible through revisited distribution	 Access to crop insurance for Indian farmers via a central crop insurance portal	20m newly insured farmers
	Strengthen prevention & adaptation measures	 "Build Back Better" scheme in New Orleans after Hurricane Katrina	>50% of policies with rate reduction
		 Building codes to limit loss of life & damage from earthquakes	92% of compliant buildings withstood strong earthquakes
Public	Introduce government-backed programmes, PPPs, mandatory contributions to natcat funds or pooling solutions	 Mandatory P&C premium add-on for natcat leading to high coverage	>95% natcat insurance penetration
		 Multi-country parametric insurance scheme to build resilience by pooling risk	3.5m affected people benefited
Public	Build a regulatory environment that fosters access to global reinsurance markets & the participation of foreign players	 Earthquake Commission's reinsurance programme	US\$4.5bn reinsured on international markets
		 Reinsurance incentivised via the Solvency II regulation	Lowered capital requirements

Case studies

Make coverage more accessible through revisited distribution

One potential lever for private insurance companies to use to increase the share of insured losses in the case of a natcat event is to increase the accessibility of insurance schemes by revisiting distribution. New distribution concepts and partnerships might represent a measure for widening reach, particularly in areas with low insurance penetration rates such as emerging markets. Revisiting distribution through, for example, partnerships (including partnerships between established insurers and insurtechs) and embedded insurance could complement today's agent- and broker-dominated distribution channels in both developed and emerging markets to increase the cost effectiveness of distribution and enhance access to insurance coverage in general. In addition, the increasing use of smartphones across the world may facilitate access to population groups in more remote regions.

New distribution methods can widen insurance reach in emerging markets

- An example of the revisited distribution of natcat insurance is the Pradhan Mantri Fasal Bima Yojana (PMFBY) crop insurance scheme, which was introduced in India in 2016 and rolled out in combination with other measures, such as mandatory insurance for seasonal crop loans. In India, which has a significant agricultural sector that contributes 16% of GDP and employs 49% of the labour force, both the government and the private insurance sector have an interest in increasing crop insurance coverage for natcat events²⁷⁹. It usually covers events such as droughts, cyclones, storms, unseasonal rains, flooding, landslide and fire caused by lightning²⁸⁰. Having such cover increases the chances and speed of economic recovery for India's farmers and increases the overall resilience of its economy.

²⁷⁹ "Climate change is a growing concern for insurers of agriculture and property in India", Munich Re, 26 February 2021

²⁸⁰ "Pradhan Mantri Fasal Bima Yojana (PMFBY)", National Insurance Company, India

Voluntary participation in India's crop insurance scheme rose from 5% to 42%

In collaboration with 18 mostly private insurance companies and the Ministry of Agriculture & Farmers Welfare, the PMFBY crop insurance scheme is the most prominent example in India of how insurance coverage can be fostered via innovative, digital distribution. The Agriculture Insurance Company of India and the General Insurance Corporation of India set up the initial infrastructure for a centralised portal, including a corresponding app, which PMFBY uses to provide crop insurance to farmers across the country²⁸¹. Through the portal, farmers can check their coverage options and calculate their premiums with the connected insurers. It also allows them to file claims, manage contracts and contact insurers.

The goal of the portal is to increase the effectiveness and accessibility of insurance, particularly for farmers from remote regions and economically weaker backgrounds²⁸². The insurance premiums are subsidised through state and federal funds to keep them low and, before 2020, participation was further accelerated by making insurance mandatory for seasonal crop loans. Within its first year, coverage reached approximately 22% of Indian farmers and 30% of gross cropped area (GCA) — the highest coverage in the history of Indian crop insurance. In absolute numbers, insurance coverage rose from under 40 million insured farmers in 2014-2015 to nearly 60 million in 2016-2017²⁸³. Even without considering the mandatory requirement for loan-receiving farmers before the 2020 policy change, voluntary participation increased from 5% before 2015 to 42% in 2020²⁸⁴. In 2019-2020, 22.3 million farmers benefitted from insurance claims, resulting in a total of over US\$3.2bn in paid claims²⁸⁵.

Despite these initial successes, the scheme has faced some criticism, mostly due to delays in state governments paying their share of the premium subsidy²⁸⁶. Furthermore, farmers may lose trust in the scheme and view it as a programme that benefits insurers rather than farmers, potentially resulting in lower voluntary participation, which could prevent the government from reaching its goal of 50% GCA insured²⁸⁷.

The Indian PMFBY case demonstrates that revisited distribution methods can play a role in increasing the percentage of insured losses in the case of a natcat event. Despite criticism of the delays in rollout and claims payments, it provides an interesting case study for increased natcat resilience in the agricultural sector. It remains to be seen if similar models of distribution could be successful in other sectors that may benefit from increased insurance coverage for natcat events, such as home and commercial insurance.

Strengthen prevention and adaptation measures

In terms of loss prevention and risk adaptation measures, there are numerous examples from developed, emerging and developing markets that show how public stakeholders are trying to reduce exposure to areas of high natcat risk. For example, some public authorities ensure that future construction and urban expansion take place on safer sites and that highly exposed

281 "Implementation of PMFBY", Press Information Bureau, Government of India, Ministry of Agriculture & Farmers Welfare, 3 August 2018

282 "Pradhan Mantri Fasal Bima Yojana. An Evaluation — 29th Report", Government of India, Ministry of Agriculture & Farmers Welfare, 2021

283 "Crop insurance: Improving business value using technology interventions", Tata Consultancy Services, 2021

284 Harikishan Sharma, "Govt makes crop insurance schemes voluntary", The Indian Express, 20 February 2020

285 State Wise Business Statistics 2019-2020, Government of India, Ministry of Agriculture & Farmers Welfare, PMFBY

286 Vidya Mahambare and Sowmya Dhanaraj, "Has crop insurance helped Indian farmers? Many don't get payments on time", The Print, 28 October 2021

287 Ashwini Kulkarni, "Crop insurance scheme 2.0: Implementation issues and weaknesses," Ideas For India, 26 November 2020

areas remain free of construction. Since prevention and adaptation are approached differently by public authorities, we detail below three case studies illustrating regional initiatives aiming to prevent (or reduce) losses from natcat events.

- One example of how prevention and adaptation measures are adopted *ex-post* in response to severe individual disasters in specific areas is that of the New Orleans region of the USA in the aftermath of Hurricane Katrina. “Building Back Better” establishes a flood-risk management system to adapt to the risk of heavy rainfall and cyclones.

The lives of more than 1 000 people were lost and record damages of more than US\$160bn were caused by Hurricane Katrina in 2005²⁸⁸. The area of New Orleans was affected especially strongly, as the levee and floodwall system failed. Modelling by the US Army Corps of Engineers suggests that approximately 50% of the direct damage in the area and two-thirds of all deaths could have been prevented if the system had been reinforced in time²⁸⁹.

Hurricane Katrina killed 1 000 and caused US\$160bn of damage ...

To ensure that the city will be protected from a one-in-100-year storm in the future, the government commissioned a project to establish a flood-risk management system for the city. The newly built Hurricane & Storm Damage Risk Reduction System (HSDRRS) protects the Greater New Orleans area from flooding and includes, among other infrastructure components, permanent canal closures and pumps, floodwalls and floodgates. The total construction cost amounted to US\$14.5bn²⁹⁰. This led the Federal Emergency Management Agency (FEMA) to adjust its Flood Insurance Rate Maps (FIRMs) for the region in 2016, reclassifying more than half of all properties in New Orleans from Special Flood Hazard Areas (A Zones) to more moderate zones. Owners of approximately 85 000 policies now benefit from lower rates under the National Flood Insurance Program²⁹¹.

A first indication of the effectiveness of the flood-risk management system was provided during Hurricane Ida in 2021, which caused damages totalling US\$65bn. A report by Munich Re found that these losses would have been much higher without the protective system²⁹². And while Hurricane Katrina was responsible for the loss of close to 1 000 lives in Louisiana alone²⁹³, 26 people fell victim to Hurricane Ida in the state²⁹⁴. Nevertheless, the storms are not fully comparable, as Ida differed from Katrina in its path, strength and speed, and may not have hit New Orleans in the worst possible way. Therefore, it is difficult to predict whether the system will withstand a stronger cyclone²⁹⁵, particularly as climate change will intensify hurricanes, resulting in heavier rains and an even greater risk of flooding²⁹⁶. As a result, experts question whether the HSDRRS will be able to protect the area from the next storm, as only legacy data on storms was used to model the protective strength. To address this, additional funding has been raised to improve the system²⁹⁷.

... following action, Hurricane Ida killed 26 and caused US\$65bn of damage

288 “Costliest US tropical cyclones tables updated”, US National Hurricane Center, 2018

289 “Performance Evaluation of the New Orleans and Southeast Louisiana Hurricane Protection System — Final Report of the Interagency Performance Evaluation Task Force”, US Army Corps of Engineers, 2009

290 “The System”, Flood Protection Authority East, State of Louisiana, 2022

291 “FEMA To Hold Flood Insurance Workshop At New Orleans City Hall Friday”, Biz New Orleans, 22 August 2016

292 “Hurricanes, cold waves, tornadoes: Weather disasters in USA dominate natural disaster losses in 2021”, Munich Re, 2022

293 Joan Brunkard, Gonza Namulanda and Raoult Ratard, “Hurricane Katrina Deaths, Louisiana, 2005”, Disaster Medicine and Public Health Preparedness, 8 April 2008, volume 2, number 4

294 “Hurricane Ida storm-related death toll rises to 26”, Louisiana Department of Health, USA, 8 September 2021

295 Marlene Lenthang, “How New Orleans handled Hurricane Ida after post-Katrina changes”, ABC News, 2 September 2021

296 Angela Colbert, “A Force of Nature: Hurricanes in a Changing Climate”, NASA, 2022

297 Jake Bittle, “The levees worked in New Orleans — this time”, Curbed Magazine, 2 September 2021

Japan has long had earthquake-resistant building regulations

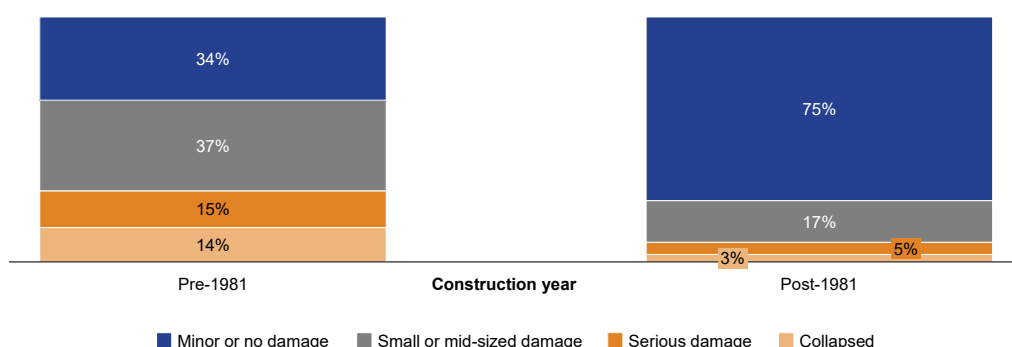
- Whereas the "Building Back Better" programme in New Orleans is an example of a city reacting to a past event by introducing a regional adaptation measure, the following Japanese example shows how the government structurally defined building codes to save lives and reduce the losses from earthquakes.

Japan is a country with a high risk of severe earthquakes²⁹⁸. After the Great Kanto Earthquake of 1923, the first earthquake-resistant construction regulation was introduced by the government as early as 1924. The Building Standard Law providing rules to enforce earthquake-resistant construction methods was passed in 1950 and is regularly updated, for example to take account of regional specifics by applying additional standards or to reflect the effects of technical advances or improved building materials.

The law was extensively amended in 1981, when strict earthquake-resistant building standards (Shin-taishin building codes) were introduced, which are still in force today. Buildings must be able to withstand without damage medium to severe earthquakes of 5.0 to 7.0 on the Richter scale (which occur frequently in the region) and they must remain usable without restriction. In the case of less frequent but more severe earthquakes with a magnitude of over 7.0, the buildings must be designed in such a way that they do not collapse. This is achieved via technical criteria for building materials or construction methods (structural codes), defining, for instance, the size of posts, the thickness of walls or the structure of foundations, depending on the type of building (eg, high-rise or small buildings)²⁹⁹.

Japan's efforts seem effective: only 8% of buildings that complied with the Shin-taishin building codes were severely damaged in the 1995 Great Hanshin-Awaji (Kobe) earthquake, whereas 29% of buildings that were built before 1981 were severely damaged (Figure 26)³⁰⁰. As collapsing buildings are responsible for approximately 75% of all earthquake-related deaths, it can be concluded that the building codes saved numerous lives³⁰¹.

Figure 26: Damage caused by 1995 Great Hanshin-Awaji earthquake, Japan
Buildings by construction period (%)



Source: Japan Ministry of Construction

298 "Your Community's Earthquake Risk 2018", Government of Japan, Tokyo Metropolitan Government, Bureau of Urban Development, 2018

299 "Introduction to the Building Standard Law — Building Regulation in Japan", Government of Japan, Ministry of Land, Infrastructure, Transport & Tourism, 2013

300 "Report on the damage due to Hyogoken-nambu earthquake", Government of Japan, Ministry of Construction, Committee for Building Damage Investigation of Hanshin-Awaji Earthquake Disaster, 1996

301 A.W. Cobum, R.J.S. Spence and A. Pomonis, "Factors determining human casualty levels in earthquakes: Mortality prediction in building collapse", Proceedings of the 10th World Conference on Earthquake Engineering, 1992, volume 10

In addition to tax deductions on earthquake insurance premiums for private homeowners, insurance companies offer a discount of 10-50% on premiums for buildings that comply with the new earthquake-resistant regulations, which incentivises risk-adjusted housing construction and voluntary insurance uptake³⁰². Thus, for example, by building thicker walls or using building materials that conform to standards, higher earthquake resistance is achieved³⁰³.

In contrast to *ex-post* adaptation (eg, in New Orleans after Hurricane Katrina), there are more structural approaches to addressing high natcat risks. Japanese regulations illustrate that such approaches seem to be effective, as they are constantly being further developed and improved. This is supported by continuous target-setting, for instance to increase the share of buildings that meet current earthquake-resilience regulations³⁰⁴. A complement to such approaches could be cooperation between insurers and public institutions, whereby potential high-risk areas for natcat events are jointly identified and *ex-ante* adaptation measures are implemented.

In addition to New Orleans and Japan, there are numerous countries or regions that actively strengthen prevention and adaption efforts. Other case studies include:

- Cambodia — Greater Mekong Subregion Flood and Drought Risk Management and Mitigation Project
- Spain — Project Guardian, creating the largest fire-fighting infrastructure in Europe
- Netherlands — Delta Program and Port of Rotterdam Flood Risk Management Program
- Italy — floodwalls of Venice

It is not only public players, but also private insurers that foster prevention and adaptation, eg, via differentiated pricing, communication (such as on mitigation requirements) and reinforcement measures such as increasing the resilience of buildings against landslides. These may also be levers for private players to increase insurance penetration. Many insurance companies are involved in developing loss-prevention tools and solutions, using advanced analytics or cutting-edge technologies (eg, real-time monitoring of natcat risk or calculating exposure using geocoding). In the event of an impending disaster, messaging services can be used to prepare policyholders and provide loss-mitigation advice. In addition, insurers can actively incentivise individual investment in risk reduction by using frameworks that offer lower premiums for such efforts.

To summarise, although *ex-ante* measures seems effective in protecting regions against certain types of natcat risks, there is a large set of factors (eg, initial costs, expected frequency and level of damage and potential fatalities) that need to be taken into account. In addition, the implementation of adaptation and prevention measures may come with unintended consequences that need to be considered. For example, they may create an incentive to rebuild in high-risk areas rather than to relocate to low-risk regions.

Introduce government-backed programmes, public-private partnerships (PPPs), mandatory contributions to natcat funds or pooling solutions

Public entities might introduce natcat insurance to increase market penetration and create a culture of insurance protection, rather than relying on public aid programmes. Government cooperation with private (re)insurers (eg, through government guarantees) can be a further way to increase coverage for natcat losses.

302 “Outline of Japan’s Earthquake Insurance System”, Government of Japan, Ministry of Finance, 2022

303 “Introduction to the Building Standard Law – Building Regulation in Japan”, Government of Japan, Ministry of Land, Infrastructure, Transport & Tourism, 2013

304 “Report on the damage due to Hyogoken-nambu earthquake”, Government of Japan, Ministry of Construction, Committee for Building Damage Investigation of Hanshin-Awaji Earthquake Disaster, 1996

Insurers are involved in cutting-edge loss prevention

- One frequently cited disaster compensation scheme was set up in France. The scheme combines elements of a government-backed pooling solution (including quasi-mandatory natcat insurance) with elements of a PPP.

The French natcat compensation scheme (“Cat Nat” regime) was introduced in 1982 in response to a December 1981 storm, which caused severe flooding with substantial damage that was, to a large degree, not covered by insurance³⁰⁵. The goal of the legislation was to increase coverage for losses due to extreme weather events that had been considered uninsurable at the time. The scheme was designed as an add-on to existing P&C insurance for residential buildings, vehicles, industrial assets and goods, and business interruption to provide coverage for natcat losses and hence help secure the livelihoods of affected citizens.

France’s “Cat Nat” regime has led to near-universal insurance coverage

The legislator set an additional fee of 12%³⁰⁶ as a natcat premium on top of the premium for all P&C home insurance contracts (6% for motor vehicles)³⁰⁷, which is collected by private insurers³⁰⁸. The additional premium can thus be considered as similar to a tax that all policyholders are required to pay, which led to natcat insurance penetration of, for example, approximately 98% for homeowners and close to 100% on motor insurance, as well as 98% for businesses. The individual risk of being affected by a natcat event is thus indirectly reflected in the initial P&C premium (ie, generally higher P&C premiums in more exposed areas), but is not directly reflected in the predefined percentage share for the add-on natcat premium (ie, 12% regardless of the area)³⁰⁹.

Once the national natcat commission declares a state of catastrophe, the policyholder receives compensation for the losses from their primary insurance provider within three months³¹⁰. The state-owned Caisse Centrale de Réassurance (CCR) acts as reinsurer, with the French state as guarantor of the CCR’s financial solvency (Figure 27)³¹¹. In parallel to the scheme, additional government funds provide immediate food, shelter and clothing to those affected³¹².

The system is perceived as fair by many people, as risks for all hazards are pooled, with every policyholder paying the same share and, in the event of a disaster, the principle of solidarity applies; everyone contributes, while those who suffer from the disaster are eligible for compensation³¹³. In addition, the countrywide risk pooling ensures that all regions benefit, even though they are exposed to different hazards. For example, a property is protected not only against flood hazards, but also against rockfall or subsidence risks³¹⁴. The scheme also seems effective in closing the protection gap: researchers summarised evidence on flood insurance coverage for various countries worldwide and found that for France — as well as

305 Geneviève Decrop and Claude Gilbert, “L’usage des politiques de transition: le cas des risques majeurs”, *Politiques et Management Public*, June 1993, volume 11, number 2

306 Nicolas Boccard, “Natural disasters over France a 35 years assessment”, *Weather and Climate Extremes*, December 2018, volume 22

307 “Fiscal resilience to natural disasters: Lessons from country experiences”, OECD, 20 May 2019

308 Serge Magnan, “Catastrophe insurance system in France”, *The Geneva Papers on Risk and Insurance*, 1995, volume 20, number 77

309 Nathalie de Marcellis-Warin and Erwann Michel-Kerjan, “The public-private sector risk-sharing in the French insurance ‘Cat. Nat. system’”, *Scientific Series*, December 2001

310 Serge Magnan, “Catastrophe insurance system in France”, *The Geneva Papers on Risk and Insurance*, 1995, volume 20, number 77

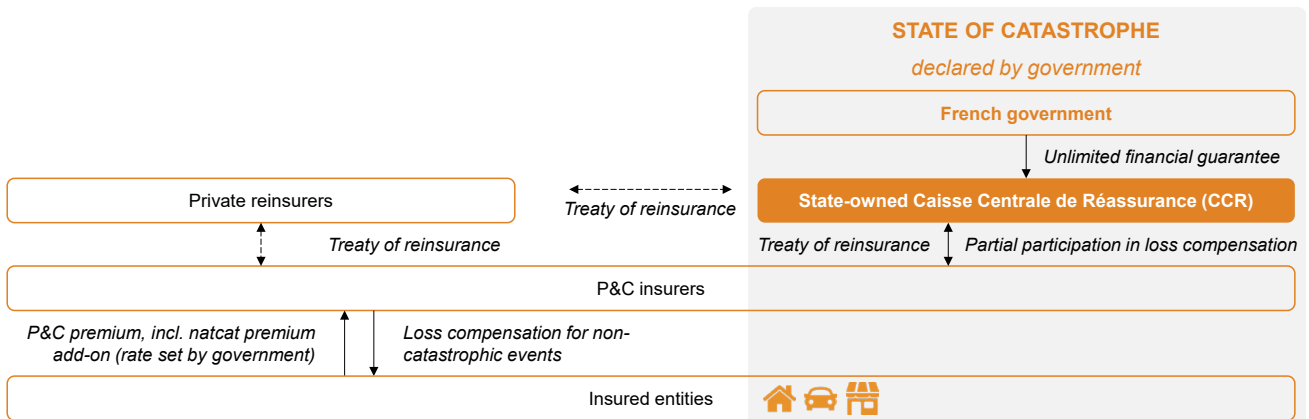
311 *Ibid*

312 “Fiscal resilience to natural disasters: Lessons from country experiences”, OECD, 20 May 2019

313 Nathalie de Marcellis-Warin and Erwann Michel-Kerjan, “The public-private sector risk-sharing in the French insurance ‘Cat. Nat. system’”, *Scientific Series*, December 2001

314 Jessica Lamond and Edmund Penning-Rowell, “The robustness of flood insurance regimes given changing risk resulting from climate change”, *Climate Risk Management*, 2014, Volume 2

Figure 27: France's "Cat Nat" regime



for Spain, which follows a similar approach — there is almost full coverage of losses³¹⁵. In 2016, which was a year of severe flood hazards in France, US\$1.2bn was paid out to affected people by direct insurers, half of which was provided by the CCR³¹⁶. Over the past five years, the annual average amounted to US\$1.8bn. And the CCR highlights additional advantages of the system, such as the reasonable costs for the insured and the operational efficiency. The CCR also suggests that adverse selection can be avoided through the solidarity concept³¹⁷.

Nevertheless, due to the combination of full coverage and not fully risk-adjusted prices, the incentive for individuals to engage in prevention may be reduced. Similarly, the effect of signalling high-risk areas through price may be partly reduced. This could result in prices being perceived as unfair by those living in low-risk areas, as they are subsidising other groups. However, while the prevention incentive is rather low for the individual citizen, it is higher for the government because it is directly impacted financially by the effects of too little prevention and the resulting higher losses through the public CCR and the state guarantee³¹⁸.

Prevention incentive is low for citizens but high for government

As a result, the government established the Plan for the Prevention of Natural Hazards (PPRN) as part of the Barnier Law of 1995. The PPRN defines building regulations for specific regions according to their exposure to natural hazards, but also mandates preventive measures to limit exposure in hazardous areas³¹⁹. In addition, public authorities invest in various *ex-ante* prevention programmes and establish funds based on the scheme, such as the Fund for the Prevention of Major Natural Hazards (FPRNM, also known as the Barnier Fund) with an average annual spend of US\$220m and more than US\$2bn invested in the last 10 years³²⁰. Other initiatives are also underway to enhance national resilience against natcat events. For example, the Association for the Prevention of Natural and Technological Disasters (AFPCNT) was appointed in 2021 by the Ministry of Ecological and Inclusive Transition to implement a state action plan called "Tous résilients face aux risques" (Risk resilience for all).

315 Ibid

316 Clotilde Saint-Martin, "Floods of May-June 2016 in France — modeling the risks and damages", CCR, 2017

317 "Response of Caisse Centrale de Réassurance (CCR) to the European Commission's Green Paper on natural and man-made disasters", CCR, 2013

318 Jessica Lamond and Edmund Penning-Rowsell, "The robustness of flood insurance regimes given changing risk resulting from climate change", *Climate Risk Management*, 2014, Volume 2

319 "Plans de Prévention des Risques naturels et inondations (PPRN - PPRI)", Préfet de L'Isère, 30 September 2022

320 "Fiscal Resilience to Natural Disasters: Lessons from Country Experiences", OECD, May 2019; "Les Catastrophe Naturelles en France", CCR, 2016

While the Cat Nat regime in France is one example of how an individual country is addressing its natcat protection gap by bundling public and private resources to increase penetration, natcat bonds may be another useful tool to support governments' initial relief efforts. Even though private rebuilding efforts are not necessarily supported, the bond return may save lives as it is invested in immediate relief, such as medical aid.

World Bank and others make use of cat bonds

The World Bank, in particular, has been making wider use of catastrophe bonds for developing and emerging markets³²¹. For example, in 2019, the World Bank's International Bank for Reconstruction and Development issued a US\$225m bond to cover the Philippines for losses from earthquakes and tropical cyclones for three years³²².

- With a similar goal to that of natcat bonds, governments from the Caribbean and Central America have established a risk pool to finance government relief efforts to better respond to natcat events.

When Hurricane Ivan hit in 2004, it left the Caribbean region with extensive damage, especially on Grenada and the Cayman Islands; on Grenada, almost all houses were destroyed³²³ and on the Cayman Islands, the storm caused losses equivalent to twice the region's GDP. At the time, the governments of both countries struggled to help those affected quickly due to insufficient liquidity. To overcome this in future disasters, the Caribbean Community (CARICOM) countries³²⁴ founded the Caribbean Catastrophe Risk Insurance Facility (CCRIF) in 2007.

According to the CCRIF's annual report, it is "the world's first multi-country risk pool based on parametric insurance"³²⁵. The mechanism of the CCRIF is similar to that of a mutual insurance company, with CARICOM states as its members. Premiums are paid by members to the CCRIF and are based on members' risk profiles per peril. These profiles are generated using models that predict potential losses based on country-specific exposure (in terms of potential replacement costs), long-term hazards (for earthquakes, cyclones or excessive rainfall), and vulnerability depending on the severity of the natcat event (using scenarios)³²⁶. The risks are then partly borne by the CCRIF itself and partly reinsured on international markets³²⁷. The development of the CCRIF was supported technically by the World Bank and sponsored by the Government of Japan. It was capitalised through fees from CCRIF members and contributions from various international states and institutions, including the World Bank, the European Union and the Caribbean Development Bank.

The instrument provides an effective solution to states' short-term liquidity problems after natcat events by providing parametric insurance against hurricanes, earthquakes and excess rain. Parametric insurance has the advantage that large sums can flow quickly and without delay to the affected states, since a predetermined amount is paid if the insured event occurs. This contrasts with traditional insurance, where compensation is only granted

321 "Catastrophe Bonds", Wharton Risk Center, July 2021

322 "World Bank catastrophe bond transaction insures the Republic of Philippines against natural disaster-related losses up to US\$225 million", The World Bank, 24 November 2019

323 "Twenty-seventh Session (RA IV/Hurricane Committee) — Final Report", World Meteorological Organization, 2005

324 Antigua and Barbuda, Bahamas, Barbados, Belize, Dominica, Grenada, Guyana, Haiti, Jamaica, Montserrat, St Lucia, St Kitts and Nevis, St Vincent and the Grenadines, Suriname, Trinidad and Tobago

325 Annual report 2020-2021, CCRIF, 2021

326 "CCRIF's country risk profiles", CCRIF, 2022

327 Liz Henderson, "The role of insurance in building resilience: Closing the protection gap", Aon, September 2018

after the loss assessment is completed. As a result, the CCRIF is able to provide affected states with liquidity within two weeks of the event³²⁸. To date, the risk pool has paid out a total of US\$245m for 54 natcat events and approximately 3.5 million people in the Caribbean and Central America have directly or indirectly benefitted from it³²⁹. 63% of the payout has gone into immediate post-event activities to provide affected people with essentials such as food, shelter and medical care, thereby bringing substantial relief to the region. Since it is the governments that receive payouts, and not individual households or businesses, the government only supports individual rebuilding efforts indirectly by providing building materials³³⁰.

Despite all the advantages, there may be events where parametric protection is not triggered, as was the case in flooding in Jamaica in 2017. Such events may be perceived as a failure of the system and may weaken the trust of the population and governments in it³³¹. Therefore, triggers should be constantly reviewed, refined and updated if necessary to ensure that the risk pool can withstand a changing risk environment (eg, due to climate change). It should also be noted that the total coverage of the parametric insurance may not be sufficient to cover all losses incurred, as the main objective of the risk pool is rather to ensure sufficient liquidity for the first few months after the disaster³³². CCRIF members plan to significantly scale up the facility, such as by attracting new members, expanding product offerings (eg, providing microinsurance) and services, and covering additional hazards³³³.

Governments of various other countries or regions, eg, the UK (Flood Re), Australia (Cyclone Reinsurance Pool), the USA (Insure Louisiana Incentive Program), and Turkey (Turkish Catastrophe Insurance Pool), also engage in increasing insurance penetration and/or increasing coverage for natcat losses through risk pooling, natcat funds or other governmental programmes. In addition, there are several recently established PPPs to address the natcat protection gap in emerging markets, such as sovereign risk transfer and building a resilience scheme for urban flooding in Ghana, parametric risk transfer to provide insurance coverage to Mexican smallholders or the development of parametric insurance against hurricanes for Jamaican farmers.

Countries and regions engage in risk pooling, natcat funds and PPPs

In conclusion, these examples show how governments can be active players in a natcat insurance scheme and that these measures seem to have a positive effect on reducing the natcat protection gap. Due to differences between developed and emerging markets, there are different design options that governments can choose according to their needs. For example, while liquidity needs following natcat events were a pressing issue for CARICOM, for France the concern was the high volume of uninsured losses due to the exclusion of natcat from insurance contracts. So, CARICOM implemented an insurance solution that provides reinsurance to the state in a simplified way for short-term liabilities after a natcat event, while the French scheme provides reinsurance capacity and a state guarantee for large natcat claims.

While individual countries, such as Belgium, have implemented a scheme similar to the French one, the establishment of a CCRIF-type risk pool requires a critical mass of countries to achieve a certain level of risk pooling and risk diversification, as well as to reduce the administrative costs per member. And, when designing their options, public authorities should consider the potential

328 Annual report 2020-2021, CCRIF, 2021

329 "Who we are", CCRIF, 2022

330 Annual report 2020-2021, CCRIF, 2021

331 "Jamaica questions CCRIF model after floods fail to trigger policy", Artemis, 29 June 2017

332 "Caribbean Catastrophe Risk Insurance Facility (CCRIF)", The World Bank, 2012

333 Annual report 2020-2021, CCRIF, 2021

unintended consequences of their measures and endeavour to prevent them with appropriate mechanisms (eg, avoiding adverse selection as a result of mutualised pricing by mandating insurance).

Build a regulatory environment that fosters access to global reinsurance markets and the participation of foreign players

**Open reinsurance
markets
reduce natcat
concentration risk**

Geographic diversification of natcat risks can be achieved through cross-border reinsurance and the presence of global insurance groups in markets. Access to global reinsurance markets helps to address protection gaps by enabling an increase in insurance capacity, capital, cross-country sharing of best practices/technology and, most importantly, by keeping geographically correlated risks from being concentrated within a market. Governments that seek to close protection gaps might therefore want to review laws and regulations that restrict cross-border reinsurance (eg, domestic placement requirements, mandatory domestic offerings and restrictions on global data modelling), foreign ownership of insurance companies and other measures that may reduce risk diversification benefits and exacerbate concentration risks³³⁴.

- One example that illustrates how access to global reinsurance markets affects resilience in the case of a natcat event is New Zealand's Earthquake Commission (Toka Tū Ake EQC) and the country's ease of access to global (re)insurance markets.

Due to its geographic location where two tectonic plates meet, New Zealand faces the risk of earthquakes and volcanic activity, with — on average — one earthquake of 7.0 to 7.9 on the Richter scale every four years and one earthquake with a magnitude higher than 8.0 every century³³⁵. In terms of economic losses, these earthquakes can cause significant destruction, such as the Canterbury earthquake sequence (four major earthquakes from September 2010 to December 2011) that resulted in overall economic costs estimated to be more than NZ\$40bn (US\$25bn)³³⁶.

Without proper insurance coverage, recovery from such major events would be a significant challenge to the economic viability of the country. However, aware of its high-risk location, New Zealand founded the EQC in 1945, tasked with the management of a Natural Disaster Fund, as well as with research, education and the supplementing of private natcat insurance for residential properties³³⁷. The EQC collects levies as a mandatory part of home insurance premiums and deposits them in the Natural Disaster Fund. Levies are calculated proportionally to coverage rather than depending on risk levels. As of 1 October 2022, the maximum coverage is NZ\$300 000 and the levies are calculated at 16 cents per NZ\$100. As a result, the maximum annual premium payable is NZ\$480³³⁸.

A key advantage for New Zealand in the aftermath of the Canterbury earthquakes was its significant investment in reinsurance — both in the EQC's reinsurance of the Natural Disaster Fund and in the reinsurance of private insurers. The Reserve Bank of New Zealand (RBNZ) acts as the prudential regulatory agency for both insurers and reinsurers (including international ones). The RBNZ licenses insurers before they can operate in the country; insurers must prove they have appropriate governance, financial capacity and risk management programmes, as outlined in the Insurance (Prudential Supervision) Act

334 "The Contribution of Reinsurance Markets to Managing Catastrophe Risk", OECD, 2018

335 GeoNet Geological Hazard Information for New Zealand: Earthquake statistics, Toka Tū Ake EQC, 2022

336 "Canterbury earthquakes", Insurance Council of New Zealand

337 "What we do", Toka Tū Ake EQC, 2022

338 "EQCover Insurers' Guide", Toka Tū Ake EQC, October 2022

of 2010³³⁹. Licensing standards are set at a level that leaves the New Zealand insurance market open to international insurers while ensuring the financial soundness of participants.

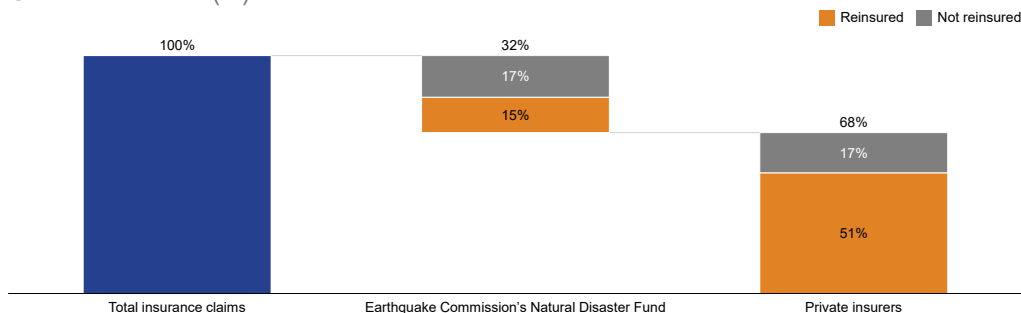
Reinsurance for private insurers is further actively encouraged through additional policies and the example that the EQC sets in reinsuring the Natural Disaster Fund. For example, New Zealand solvency standards require property insurance providers to have reinsurance and capital sufficient for a 1-in-1000-year earthquake³⁴⁰. The EQC negotiates and buys international reinsurance for the Natural Disaster Fund on an annual basis, thereby preventing geographic risk correlation within the New Zealand market. The EQC has continuously increased its level of reinsurance, reaching a record level of NZ\$7.2bn in the international market in 2022³⁴¹. The EQC's public liabilities are met through the Natural Disaster Fund or reinsurance, or through a government guarantee should the first two sources be exhausted.

The impact of these measures can be observed in the example of the Canterbury earthquakes of 2010 to 2011, where reinsurance payments helped the New Zealand economy to recover (Figure 28). Prior to the first earthquake in 2010, the Natural Disaster Fund consisted of NZ\$6.0bn in funds accumulated from levies. In the case of a major event, the EQC covers damages up to a specified cap (NZ\$100 000 per property in 2010-2011)³⁴², while any additional insured damages are covered by private insurers.

**New Zealand's
Natural Disaster
Fund helps
post-earthquake
economic recovery**

Figure 28: Claims from Canterbury earthquake, New Zealand

Claims distribution (%)



Source: Reserve Bank of New Zealand

Total insured losses from the Canterbury earthquakes amounted to about NZ\$34bn, of which 65% was reinsured. Toka Tū Ake EQC incurred losses of about NZ\$11bn, 46% of which (NZ\$5bn) was covered by reinsurance³⁴³. Private insurers incurred losses of about NZ\$23bn, of which NZ\$12bn was related to houses and contents and NZ\$11bn to commercial losses. Of private insurers' losses, 75% (NZ\$17.25bn) were reinsured³⁴⁴.

Today, as a result of the Canterbury earthquakes and the 2016 Kaikoūra earthquake, the Natural Disaster Fund has been depleted and stands at about NZ\$250m. It is currently rebuilding its capital through levies. Although the immediate losses put a strain on the

339 Nick Laing and Jonathan Scragg, "Insurance and reinsurance in New Zealand: overview", Duncan Cotterill, 1 March 2021

340 Robert Cole, "Funding and reserving Canterbury earthquake insurance claims", Analytical Notes, Reserve Bank of New Zealand, 2021

341 "EQC continues to grow its reinsurance programme", Toka Tū Ake EQC, 10 June 2022

342 The EQC announced that the cap would be raised to NZ\$190 000 per property in 2022

343 "Insurance Liability Valuation as of 30 June 2021", Toka Tū Ake EQC, 11 August 2021

344 Insurance Council of New Zealand

economy, as businesses and infrastructure were damaged, the economic development since then has been highly successful and some claim the reconstruction efforts even boosted the economy in New Zealand in the medium to long term³⁴⁵.

Employment in the construction sector in the Canterbury region rose to double the national level by 2015 and nominal GDP growth in Canterbury increased from 3% in 2010 to 10.5% in 2014 during the construction efforts³⁴⁶. Most businesses and private property owners immediately started reconstruction efforts after the 2010 earthquake, indicating a high level of financial capacity as well as trust that they would receive insurance payouts in due course. The good reputation of insurers in terms of solvency can be attributed to the high degree of reinsurance from global reinsurers for both private insurers and the EQC Natural Disaster Fund, and the use of government guarantees should both options fall short³⁴⁷.

While the non-risk-dependent premiums are effective in minimising natcat protection gaps, one critical consideration remains. Non-risk-dependent levies may pose a moral hazard as people may still build in high-risk areas without incurring higher insurance premiums. Although the levies themselves are not risk dependent, conditions regarding where rebuilding efforts take place have been influenced by the government through the establishment of residential red zones. After the Canterbury earthquakes, for example, approximately 8 000 properties in and around the city of Christchurch were deemed uninhabitable and torn down instead of rebuilt³⁴⁸. Furthermore, private insurers are likely to reflect the level of risk of a certain area in their portion of the insurance premium (not passed on as levies) or even limit services to lower-risk areas. Another criticism during the Canterbury reconstruction was the slow pace of reimbursements, as the EQC needed to process a high number of claims. After the Kaikōura earthquake of 2016, private insurers encouraged the Toka Tū Ake EQC to involve them more in claims processing to speed up reimbursements.

Countries are opening their reinsurance markets

Several countries appear to be amending their regulations to facilitate access to global reinsurance markets. Brazil opened up to international reinsurance markets in 2007 but requires 40% of premiums to be offered to domestic reinsurers first³⁴⁹. India has significantly reduced its mandatory placement requirements for the domestic market since 2013 from 20% to 5%, and Indonesia eliminated domestic mandatory placements in 2020 (effective from 2023)³⁵⁰. The effectiveness of such policy changes in fostering natcat reinsurance has yet to be evaluated. Other factors, such as the confidence of international reinsurers in domestic underwriting capabilities must be considered in this context. For example, as reinsurers participate directly in the profits and losses of the primary insurer through proportional reinsurance, they are more likely to become active in the market if they have confidence in the pricing adequacy of the primary insurer.

- While the New Zealand example illustrates the effects of permitting ceding insurers voluntary, unrestricted access to reinsurance, solvency regulation is a potential lever to increase risk transfer through reinsurance. The example of the EU's Solvency II regulatory regime shows

345 Amy Wood et al., "The Canterbury rebuild five years on from the Christchurch earthquake", Reserve Bank of New Zealand Bulletin, February 2016, volume 79, number 3

346 Ibid

347 Goetz von Peter et al., "Unmitigated Disasters? New evidence on the macroeconomic cost of natural catastrophes", Bank for International Settlements working paper, number 394, December 2012

348 "Christchurch residential red zone areas", Toitū Te Whenua — Land Information New Zealand

349 "Decreto-LEI complementar N° 126, de 15 de janeiro de 2007", Presidência da República Casa Civil Subchefia para Assuntos Jurídicos, January 2007

350 "Leveraging the role of property catastrophe reinsurance markets: The case of India, Indonesia, Myanmar and the Philippines", OECD, 2020

that there are supervisory approaches beyond the voluntary, open-market purchase concept that could potentially be adapted and leveraged to further incentivise natcat reinsurance to help spread and diversify natcat risk globally.

Solvency II legislation became effective in 2016 with the objective of harmonising insurance supervisory regulation in the EU and creating a framework that reduces the probability of insolvency for insurance companies. The regulatory framework consists of three pillars: risk capital requirements; a qualitative assessment of own risks; and reporting requirements to the supervisory authority and the public³⁵¹. Insurers are obliged to calculate their solvency capital requirement (SCR) to withstand a 1-in-200-year event for their main risks, covering non-life (including natcat), life and health underwriting, as well as market and counterparty default risk³⁵². They report the sum of their eligible own funds against this, valued on a market-consistent basis. The resulting solvency ratio is a signal to stakeholders of the financial strength of the insurer.

A key feature of the Solvency II framework is the recognition of risk-mitigation techniques, including reinsurance. When an insurer calculates its SCR, the economic effect of reinsurance contracts is taken into account. This results in lower capital requirements for natcat events that are reinsured. Ensuring insurers are given credit for the risk-mitigating effect of reinsurance helps to optimise the capacity available for natcat and the diversification of natcat risks within the European market by facilitating the use of reinsurance.

EU's Solvency II gives credit for risk-mitigating effects of reinsurance

In addition, due to the recognition of diversification, reinsurers subject to the regime may also be incentivised to accept business that further diversifies their natcat portfolio risks in terms of geographic exposure or peril type in order to improve their own solvency ratios. Solvency II may, therefore, create a potentially positive impact on natcat protection gaps by incentivising global reinsurance activities. Nevertheless, there has been some industry criticism of the regulation. Scepticism about the regulation notes that the long-term orientation of the insurance business model should be reflected; that the regulation may create a high operational burden in some circumstances; and that the capital charge under its standard formula should reflect the actual risks.

To summarise, the investment of New Zealand's government in global reinsurance purchases and the country's unrestricted access to reinsurance markets enable New Zealand to transfer risk into a diversified global market. This allowed the country to demonstrate economic resilience and speed in reconstruction following the Canterbury earthquakes. Voluntary reinsurance purchases are not the only lever for achieving risk transfer and diversified risk pooling; the example of the EU's Solvency II shows that beyond avoiding restrictive reinsurance regulation, regulators may have options to actively incentivise reinsurance uptake. Whether the introduction of Solvency II had an effect on the natcat gap is rather difficult to judge, since, for example, any causality between its date of introduction and a potential increase in natcat reinsurance capacity is distorted by the transition period of several years before the law came into force. An investigation of whether Solvency II's introduction has actually contributed to an increase in ceded natcat risk could be conducted to better understand the potential effect on the natcat protection gap.

In addition to the four levers detailed above, there are additional levers that private and public stakeholders can use to address the natcat protection gap.

³⁵¹ "Solvency II", EIOPA, 28 April 2022

³⁵² Directive 2009/138/EC, Article 103, 25 November 2009; Commission Delegated Regulation (EU) 2015/35, Article 119, 10 October 2014

Additional levers for private players

Scale up alternative forms of risk capacity

Since the mid-1990s, when catastrophe bonds emerged, bonds have expanded and broadened in their design and use, and there has been a continuous focus on helping to bring risk-transfer solutions to underserved populations. In countries with poorly developed insurance markets, insurance-linked securities, catastrophe bonds and (green) resilience bonds can be a part of the solution. For example, multilateral development bank bonds can be issued by several sovereign governments on the capital markets. Thus, the capital markets can be used to finance social projects (eg, the construction of natcat prevention systems in emerging markets).

Scale up parametric insurance or other innovative forms of risk transfer

The advantages of parametric insurance are the speed of payout and low dispute risk. One potential advantage of insurance-based risk transfer solutions is the high level of cost transparency, as insurance products are usually characterised by constant premium payments throughout the product's lifetime. Parametric insurance or other innovative approaches, eg, microinsurance, could be an instrument to scale up penetration in emerging markets and may be adapted to the needs and circumstances of individual countries.

Make the product value proposition more attractive to a wider audience

This can be done by improving product design, creating easy-to-purchase bundles and communicating more transparently with customers. Especially for emerging markets, where insurance penetration has historically been lower and insurance is not mandatory, easy-to-use products can help to increase take-up rates. In this context, it is also important to provide information about available products and to educate people about them to generate trust in their effectiveness.

Enhance reporting on secondary perils (eg, to advance modelling)

Given that losses are increasingly caused by secondary perils and that this trend is expected to continue, more robust reporting and data collection may be required. Though the monitoring of primary hazards and corresponding modelling capacities are advanced in the insurance industry, modelling for secondary risks is not yet as well developed, at least in some regions, as it is based on data from a period when these risks were less prominent³⁵³.

Build up risk-assessment capabilities including actuarial talent

Adequate actuarial training is required to assess natcat risks sufficiently, but there is a lack of people with these skills, especially in less developed parts of the world. In Latin America, for example, only Mexico, Brazil, Argentina and Colombia have significant numbers of actuaries, despite the insurance industry's urgent need for them³⁵⁴. Insurers may wish to consider investing in actuarial training, data collection and modelling in areas at high risk of natcat events to better understand their risks and make them more insurable.

Additional levers for public and private players

Increase awareness among households and business owners

There are several examples from emerging and developing markets where private players and the public sector are fostering disaster awareness among households and business owners

353 "Natural catastrophes in 2020", sigma 1/2021, Swiss Re Institute, 30 March 2021

354 Carlos Arocha, "Narrowing the natcat protection gap in Latin America", Society of Actuaries, May 2019, Issue 78

Innovative risk-transfer solutions can increase penetration

Lack of actuaries hampers risk assessment

both in developed and in emerging markets. These initiatives include, for example, establishing educational campaigns in schools, providing information material in high-risk areas, and sharing protection tips via podcasts³⁵⁵.

Promote the net-zero agenda

As both primary and secondary perils have been shown to increase in frequency due to climate change and rising temperature levels, governments and insurance companies could mitigate this trend by committing to zero emissions by 2050 (as many countries, including Canada, Japan, Korea and New Zealand, have already done) and adopting appropriate measures for moving in that direction as quickly as possible³⁵⁶. The insurance industry founded the Net-Zero Asset Owner Alliance to promote a net-zero target in investment and underwriting activities. However, these measures aim for long-term changes and are unlikely to have an impact on the gap in the next five to 10 years. This makes the need for risk mitigation all the more acute.

Additional levers for public players

Review pricing regulations

This could help manage the trade-off between an unconstrained market and the mutualisation of risks. In areas where the market sets an unaffordable premium, public bodies could encourage natcat insurance take-up by subsidising insurance for low-income households. Depending on the target group, such as low-income households or micro, small and medium-sized enterprises, premium subsidies or tax reductions could be used at various scales. The Brazilian government, for example, launched the Rural Insurance Premium Subsidy Program (PSR), which provides financial support to farmers who are willing to insure their crops and livestock against the disasters caused by natural hazards³⁵⁷.

Public subsidies could encourage natcat insurance take-up

In the case of microinsurance schemes, such as agricultural insurance, low-income consumers in many low- and middle-income developing countries are often unable to make (annual) up-front payments, resulting in microinsurance providers not being able to collect enough liquidity to pay claims, particularly for catastrophic events where losses may impact most of the policyholders. In such cases, the subsidising of microinsurance can have a huge impact on the attractiveness of insurance policies for low-income consumers³⁵⁸.

In Ethiopia, studies show that the quantity of insurance purchased falls by 0.58% when the price of insurance increases by 1%. And as a result of pricing regulation, affected areas may become economically unviable from an underwriting perspective and supply may decrease. Pricing regulation might also reduce the risk signals sent out by risk-based pricing, whereas risk-based pricing can potentially create incentives to move to a lower-risk area. For example, already higher-than-average premiums for homeowners' insurance in Florida continued to rise as a result of Hurricanes Irma (2017) and Michael (2018)³⁵⁹.

355 "Disaster resources", US Centers for Disease Control and Prevention, 2019; "How developing countries are addressing hazards, focusing on relevant lessons learned and good practices", United Nations Climate Change, 2020

356 "Net zero by 2050", International Energy Agency, October 2021

357 "Property catastrophe insurance — national examples", GFIA, 2020

358 "Premium support — background paper", MCII Climate Insurance, 26 May 2021

359 Ed Leefeldt, "Why is homeowners insurance in Florida such a disaster?", Forbes, 26 March 2021

Clarify expectations of post-disaster government assistance for certain types of insurable risks

In disaster-prone areas, this may incentivise citizens and businesses to take out more insurance, as there is a clear expectation about the extent of government support. However, the incentive for politicians to communicate clearly on the (lack of) potential government assistance is rather low, as such measures tend to resonate negatively with voters, which may translate into poorer performance in elections.

The levers that have been detailed and illustrated by case examples from several countries represent different ways of addressing the natcat protection gap. Whereas an effect was observed in all the case studies, some measures also create unintended consequences.

For some levers, such as facilitating access to coverage through revised distribution or free access to global reinsurance, unintended consequences were barely evident from the case studies. However, indications were found suggesting that shortcomings in implementation (eg, delayed claims payments) could reduce confidence in a measure and thus potentially reduce its effect.

Potentially negative impacts of some levers must be evaluated

For the two case studies of government efforts to strengthen prevention and adaptation and of active government engagement in insurance schemes, it was evident that these measures address the natcat protection gap. Nonetheless, both levers potentially prevent the reallocation of building efforts to lower-risk areas. People may either fully rely on preventive government measures without acting substantially independently, thus losing an incentive to move away from the affected region, or they may systematically underestimate the risk, since the signalling effect of risk-based pricing is reduced. This assumption is supported by the observation that, in some cases, people are increasingly relocating to certain high-risk areas (eg, to coastal Florida), which may be driven by the partly lower costs of property in high-risk areas. In addition, stakeholders can draw on a whole toolbox of additional levers to reduce the natcat protection gap in their regions. However, the costs and potentially positive and negative impacts of levers should be carefully evaluated, taking into account the needs and characteristics of the different regions.

Concluding remarks

From a purely financial point of view, the natcat protection gap is the smallest of the gaps considered in this report, at US\$139bn per annum over the last decade for direct losses. Despite some efforts by the insurance industry and public players, the gap has been growing at an average of 4% a year over the past 50 years (1970-2020) and is expected to continue growing due to accelerating climate change.

While particularly prominent in the USA and Europe in absolute terms, the gap is also significant in emerging markets, where 85-90% of losses are uninsured in some markets, and where the direct human impact tends to be much higher. Thus, in order to address the gap effectively, it is crucial for both public and private stakeholders to choose levers that are suitable and effective for their region. In addition to preventing financial losses, the effective implementation of levers may save lives and reduce human suffering in high-risk regions.

VII. Health protection gap

Particularly prevalent in developing economies

For a summary of this chapter, see the Executive Summary, “Health protection gap”, p14.

The health protection gap was on the minds of governments long before the COVID-19 pandemic began. Policy changes targeting increased health protection in both developed and developing countries, technological advances (including the automation of medical examinations) and an ageing population with increasing healthcare needs are only some of the changes in this area. As the defining global health crisis of our time³⁶⁰, COVID-19 made all stakeholders look closely at the health coverage currently provided to individuals and assess whether it is sufficient.

There are substantial differences between countries’ health systems (eg, their level of technological progress) and these need to be taken into account when analysing the health protection gap. The gap consists of two parts. First, it includes the health spending by individuals (eg, when they have insufficient insurance coverage). Second, it includes avoided health costs — the amount that should have been spent by individuals to meet their health needs but was not spent. Building on this definition, we estimate the health gap based on two components:

- Firstly, we start by looking at total out-of-pocket (OOP) expenditure, including the “ordinary” part of health spending — for example, expenditure such as insurance co-payments (in developed countries) and contributions to the cost of dental care and non-urgent medication — as well as “stressful” OOP expenditure that puts pressure on personal or family finances (for example, non-insured treatment of cancer or other critical illnesses).

As total OOP expenditure includes choices made by individuals (in other words, preferring OOP expenditure on health services instead of insurance coverage) it is an imperfect estimate of the real health protection gap, despite often being used as a proxy. We therefore apply a narrower definition and only include expenses that put a large financial strain on individuals paying for health services themselves, ie, we focus on “stressful” OOP health expenditure. This is the part of OOP that leads to cutting down on habitual spending or borrowing money from relatives and financial institutions to cover medical costs. Nevertheless, stressful OOP alone is also still an imperfect estimation of the true need for coverage; several surveys identified that a large proportion of the population of both developing and — in some cases — developed markets avoid necessary health spending.

- Secondly, therefore, we consider the costs that were avoided due to a lack of affordability or a lack of access to healthcare. This can be considered the upper range of estimation of the health protection gap and we will use it as the gap definition. Besides the stressful part of OOP explained above, the avoided healthcare spending can be estimated as a sum of:
 - Avoidable costs that are due to affordability issues.
 - Avoided costs that are due to a lack of access to healthcare infrastructure. These costs mainly arise from low-income countries, with the World Health Organization estimating that 400 million people do not have access to basic health services.

There are big differences in countries’ health systems, affecting size of health gaps

400 million people do not have access to basic health services

³⁶⁰ “COVID-19 Pandemic. Humanity needs leadership and solidarity to defeat COVID-19”, United Nations Development Programme, 26 March 2020

Health protection gap estimated at US\$0.8trn, higher when avoided costs are included

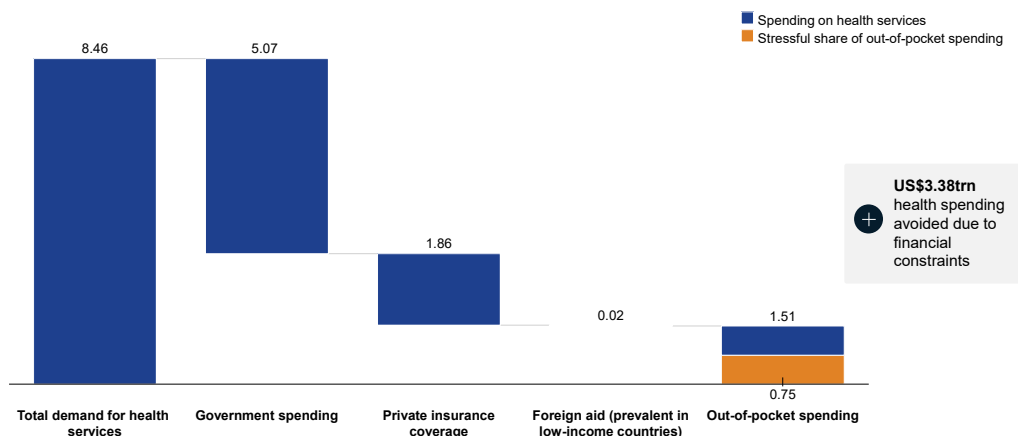
The 2020 health protection gap is estimated at between US\$0.8trn and US\$4.2trn (Figure 29), which is equivalent to 1% to 5% of global GDP. As discussed above, it comprises two parts:

- The 2020 level of stressful OOP expenses worldwide amounted to approximately US\$0.75trn (as estimated by Swiss Re in 2021 based on a multi-country survey). To put this into perspective, total OOP expenditure was US\$1.5trn (ie, including “ordinary” and “stressful” OOP expenditure)³⁶¹.
- Avoided costs were approximately US\$3.4trn in 2020³⁶². Around US\$3.2trn stems from emerging markets and roughly US\$0.2trn from the rest of the world. Estimates for emerging markets are based on a survey done by Swiss Re of emerging countries in Asia. These figures were then extrapolated³⁶³ to all low- to medium-income countries globally. The affordability gap in developed (high-income) countries is based on an extrapolation of approximately 56 million people in the USA who claimed they cannot afford the treatment they need³⁶⁴.

56 million people in US claim they cannot afford treatment

Figure 29: Stressful out-of-pocket healthcare spending¹ of US\$0.75trn — including avoided health spending — takes total gap even higher

Demand for health services — 2020 (\$trn)



1. Spending by individuals that puts pressure on their finances

Sources: WHO; Swiss Re; Geneva Association

Health protection gap is unevenly spread across the world

The World Health Organization distinguishes four groups of countries when it comes to health expenditure. The first is the USA, which forms its own group because it accounts for 46% of global health spending. The second group consists of other high-income countries, such as those in western Europe, New Zealand, Australia, Japan and Singapore, accounting for 38% of the world's health spending. The third group includes upper-middle-income countries, such as China, Brazil and Mexico, with 14% of global health expenditure.

361 Global Health Expenditures Database, World Health Organization

362 2019 used as a proxy for 2020

363 Based on OOP growth rates and Geneva Association 2018 global gap assessment

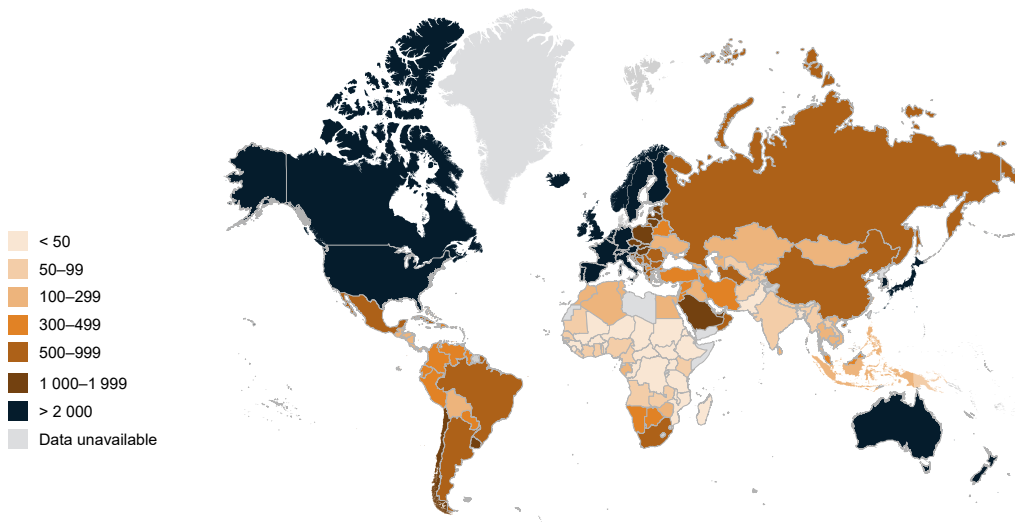
364 Calculation based on the number of people in the USA who avoided some or all healthcare spending in the past year due to affordability and average per capita spending of US\$11 000 for 2020 (NIH)

Finally, the fourth group is low- and lower-middle-income countries, such as India, the Philippines and Vietnam, which account for just 2% of health spending. The distribution of health spending per capita by country is shown in Figure 30. Note that these figures do not consider the effectiveness of the healthcare spending in each country (ie, how the health spending actually contributes to a society's overall level of health).

Low- and lower-middle-income countries account for just 2% of health spending

Figure 30: Uneven geographic spread of health spending

Health spending per capita — 2019 (US\$)



Source: WHO

Looking at the geographical distribution of the gap, we find significant differences: upper-middle-income countries account for approximately 73% of the gap, or around US\$2.9trn, while low- and lower-middle income countries account for 14%, or US\$0.6trn. The rest of the gap is split between the USA, with approximately 7% (US\$0.3trn), and the other high-income countries (6%, US\$0.2trn)³⁶⁵.

These differences can be partially explained by differing dynamics in government and private insurance spending. While overall spending increased by 3.7% per annum over the past 10 years, or by approximately US\$0.24trn per year, high-income countries accounted for approximately US\$0.19trn (80%) of that, with the USA alone accounting for around US\$0.11trn (45%) of the absolute increase.

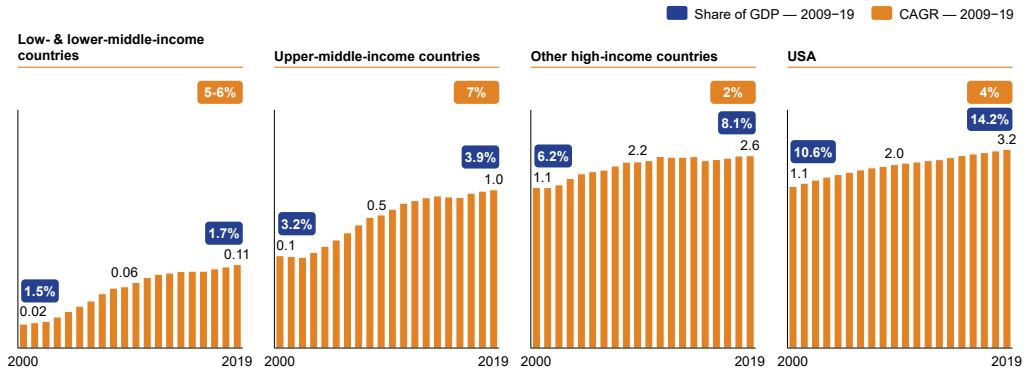
Similarly, government and private insurance spending represents between 2% and 4% of GDP in low- and upper-middle-income countries versus 8% in developed countries and 15% in the USA. These figures have increased over the past few years in all country groupings (Figure 31).

The importance of OOP expenses measured as a share of total spending differs between the groups of countries (Figure 32). The more developed the country, the lower the share of OOP expenses. In low-income countries, they account for around 50% of total spending and in upper-middle-income countries they account for 32%. Although both groups show a decrease in the share of OOP expenditure by around 10 p.p. over the last 20 years, the share remains significant.

³⁶⁵ Percentages calculated with data from the World Health Organization, the World Bank, Swiss Re and the Institute for Health Metrics and Evaluation

Figure 31: Government & private insurance spending growing in absolute terms & as share of GDP

Total health spending by government & private insurance by countries grouped by income level — 2000-19 (US\$trn)



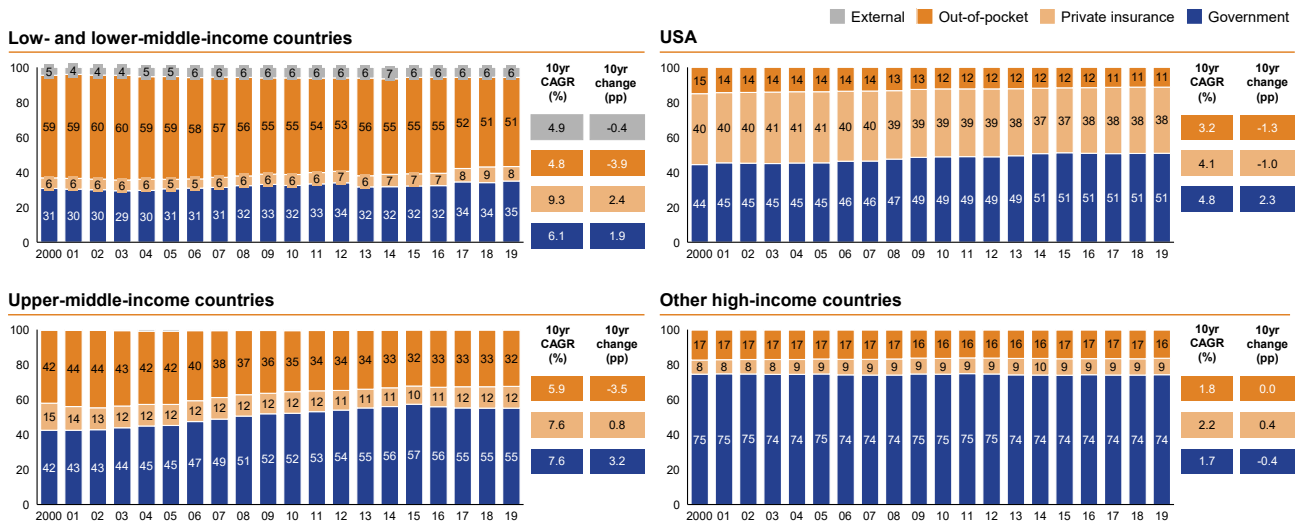
Source: WHO

In contrast, in high-income countries (not including the USA), OOP expenses represent only 16% of total spending and have remained relatively stable since 2000. The USA has the lowest share of OOP expenses of groups at 11%, down 4 p.p. over the last 20 years. OOP expenditure in real terms has grown quickly in low-, lower-middle- and upper-middle-income countries by 5-6% per annum, which is higher than the 2-3% a year in the USA and other high-income countries.

In low-, lower-middle- and upper-middle-income countries, the relatively large OOP share of total healthcare spending is driven by a lower penetration of private insurance and lower public spending. Penetration of private health insurance in these countries, measured as premium as a percentage of GDP, was approximately 0.12%³⁶⁶ in 2020, and, despite showing a positive trend since 2015, it still remains insignificant, especially when compared to the 1.76% in developed markets³⁶⁷.

Figure 32: Share of out-of-pocket healthcare spending is largest in low-income countries (50%), followed by upper-middle-income countries (32%)

Split of health spending by countries grouped by income level — 2000-19 (%)



Source: WHO

366 McKinsey Global Insurance Pools; IMF
367 Ibid

18% of household income in emerging Asian economies spent on healthcare

Globally, stressful OOP expenditure grew 5% a year³⁶⁸ from 2009 to 2019, mainly driven by emerging markets in Asia, which had annual growth of 10% compared with 2-4% in the rest of the world. Emerging Asian markets are also significant in terms of the size of the gap (45-47% of the global gap³⁶⁹). Swiss Re explains the stressful OOP gap in emerging Asian economies by the lack of government healthcare coverage. OOP spending on healthcare in those countries accounts for nearly 18% of household income, and the health gap is estimated to be 12% percent of average household income³⁷⁰. Healthcare is also quoted as one of the primary reasons for financial stress, with 400 million people unable to afford it. Across emerging Asian markets, Thailand has the lowest gap (approximately 2% of average household income) as a result of the roll-out of a universal healthcare system. The highest gaps are in Malaysia (46% of average household income) and Indonesia (25%). China also stands out due to its high level of OOP expenditure.

Gap could grow at 4-5% p.a. to reach US\$6-6.5trn by 2030

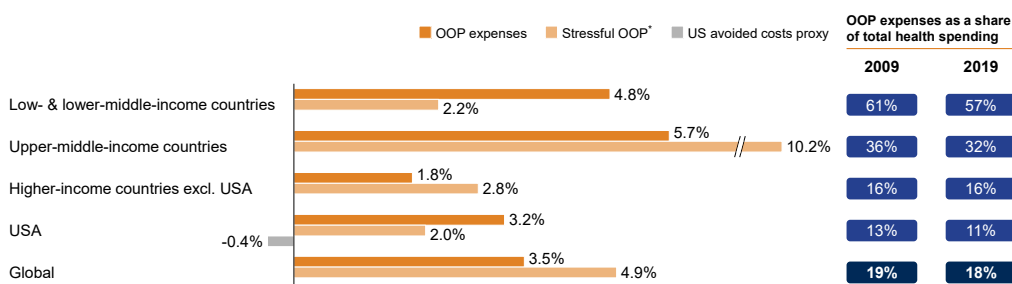
To look at the dynamics in the development of the protection gap, we estimated its past growth rate by examining two sources:

- Trends in total (stressful and non-stressful) OOP spending by country as reported by the World Health Organization. This indicator is measured consistently, and we use it to understand the historical dynamics.
- The Swiss Re Resilience Index, which has been estimated and continuously reported since 2009. It provides an estimate of the stressful part of OOP expenses. Given that stressful OOP spending typically indicates the need for additional funding, we also apply the trend to the avoided costs.

Overall, it can hence be estimated that from 2009 to 2019 the gap increased at approximately 4-5% per annum (Figure 33).

Figure 33: Growth of out-of-pocket (OOP) & stressful OOP expenses varies between countries

OOP and stressful OOP growth rates — 2009-19 (%)



Source: WHO, Swiss Re*

368 Livia Bonato et al., "Resilience index 2021: A cyclical growth recovery, but less resilient world economy", Swiss Re Institute, June 2021

369 "Healthcare in emerging markets: Exploring the protection gaps", The Geneva Association, 2019

370 Rajeev Sharan and Clarence Wong, "The health protection gap in Asia: A modelled exposure of \$1.8 trillion", Swiss Re Institute, 5 October 2018

Health protection has evolved differently among country groups. Upper-middle-income countries showed the fastest growth at 6% for OOP expenses and 10% for stressful OOP expenses. They were followed by low- and lower-middle-income countries, with 5% growth in OOP expenditure and 2% for the stressful segment. Developed countries, including the USA, showed the slowest growth in the gap at 2-3% of total and stressful OOP expenditure. The largest contributors to growth were the upper-middle-income countries, accounting for approximately 60% of the absolute increase.

Given the historical trend of the gap, we estimate that it will continue to develop at 4-5% a year, with a major share originating in emerging markets. At this pace, the gap is expected to reach US\$6-6.5trn a year by 2030 if applied to both OOP spending and avoided health costs (ie, if applied to the maximum of the estimated gap range).

Public and private stakeholders can make use of a variety of levers












To address the health protection gap, we have identified a toolbox of levers (Figure 34) for private or public stakeholders. It is worth noting that the portfolios of levers chosen by different countries are expected to be highly specific, depending on the position of the insurance industry, past initiatives and policy choices. This toolbox of potential levers should not be thought of as a list of recommendations but as a “menu” of possible actions.

Figure 34: Health protection gap — toolbox of potential levers



We have looked at several case studies (Figure 35) that illustrate how some of these levers have been put into practice in some parts of the world by private or public stakeholders.

Figure 35: Overview of case studies

	Levers	Case studies	Outcomes
Private	Establish add-on services to help customers take better care of their health	 Comprehensive health ecosystem	~30% of Chinese population are registered users
		 Set of health add-on services that can quickly be scaled up across Asian countries	>10 Asian countries where service is available
		 Offer of connected health services that specifically rewards users for healthy lifestyles	14% reduction in overall cost of claims by users
		 Digital application for patients to manage chronic kidney disease & schedule treatments	15 hrs Waiting time for appointments, down from 11 days
Public	Use a full set of distribution channels to increase coverage	 Microinsurance policy sales through convenience stores	4m convenience store sales of microinsurance in 2017
		 Pharmacies integrated into health insurance to improve customer experience & expand distribution channels	>10 000 pharmacies integrated in distribution
Public	Raise awareness as well as foster prevention & early detection	 National board to promote health awareness	80% of citizens attending regular screening for high cholesterol
		 Incentivisation of patients to attend regular preventive screenings	14pp reduction in share of dental replacement costs in total dental costs
		 Programme for chronic type 2 diabetes patients to manage their symptoms	Impact n/a
Public	Complement public health insurance/social security with private insurance	 Mandatory complementary private insurance	95% of French citizens hold some sort of private health insurance
		 Incentivisation to take out private complementary insurance	42% of Danish citizens hold some sort of private health insurance

Case studies

Establish add-on services to help customers take better care of their health

This can be done by integrating multiple medical services into one patient experience. Among the commonly integrated services are:

- Services that support and financially incentivise prevention and early detection
- Services for in-person or digital consultation with doctors
- Tele-prescription and tele-pharmacy services

If these add-on services are integrated in one seamless experience for the patient, they are commonly referred to as health ecosystems³⁷¹. These integrated add-on services go beyond simply digitising medical services by facilitating smooth, end-to-end health management, often through one digital app and by leveraging large amounts of data. As a result, they aim to become an established part of users' everyday life and to increase users' engagement with health management topics.

By enabling customers to take better care of their own health, integrated add-on services may also contribute to the positive impact of the other healthcare-related levers in this report. In particular, the levers relating to distribution, prevention, access to healthcare and spending

³⁷¹ Julian Kawohl, Niklas Knust, Ulrich Pidun et al., "The untapped potential of ecosystems in health care", Boston Consulting Group, 2021

effectiveness may be reinforced. While multiple insurance products offer add-on services, it is important to note that currently only a few health ecosystems exist in the market. Nevertheless, a few examples of add-on services that are progressing in the direction of health ecosystems are detailed below.

- A large Chinese financial services corporation managed to build what can be considered the closest approximation of a health ecosystem to date. Its services offer a particularly wide integration of both digital and physical health services for its customers. As of December 2021, its offering included 49 100 doctors, 96 000 healthcare providers, 3 600 hospitals (including 50% of Chinese grade A tertiary hospitals³⁷²), 202 000 pharmacies (34% of all pharmacies in China), and 225 warehouses for drug delivery³⁷³.

**420 million
Chinese use
same healthcare
app, facilitating
1.27 billion
consultations**

All of these healthcare services are integrated into one app where customers may start with a teleconsultation with one of the doctors, then be transferred to attend a physical consultation in one of the affiliated hospitals and, lastly, receive medication delivered from one of the warehouses — all in one seamless process. By offering this service, the provider managed to recruit around 30% of the Chinese population (420 million people) as registered users by the end of 2021. Of these, around 20% (84 million) were using the service on a regular basis³⁷⁴. In 2021, the service facilitated 1.27 billion healthcare consultations³⁷⁵.

While it is difficult to compare this engagement rate due to the lack of similar services in the region, 20% can be regarded as significant. Achieving a significant engagement rate is key for ecosystems to realise their potential to narrow health protection gaps. Only active users will be encouraged to make their health a more central concern in their lives and participate more in preventive measures. A recent survey among C-level health insurance executives suggests that convenience is the major factor influencing users to stay engaged with a health ecosystem³⁷⁶.

In the Chinese example, the comprehensiveness of the services offered can be considered the major driver of convenience for users and represents an aspirational goal for other players. However, this approach may not be realisable in other cases as multiple banking and insurance ecosystems with over 100 million users each already existed in the corporation's portfolio prior to the health ecosystem's establishment³⁷⁷. This access to a wide customer base and existing tech infrastructure represented an advantage in establishing the ecosystem. In addition, strict data privacy laws may pose challenges to establishing an equally connected patient offering, especially in certain European countries.

- An international insurance company launched an offering of connected add-on health services in south-east Asia. This service is focused on fewer health offerings — mainly teleconsultations, an AI-based chatbot to check symptoms and other innovative features such as an image-based body mass index calculator³⁷⁸. The service is now available in more than 10 Asian locations³⁷⁹.

372 The highest classification of Chinese hospital in terms of size and services

373 "Announcement of unaudited interim results for the six months ended 30 June 2022", Ping An, 2022

374 Ibid

375 Ibid

376 Stefan Biesdorf, Ulrike Deetjen and Basel Kayyali, "Digital health ecosystems: Voices of key healthcare leaders", McKinsey, 12 October 2021

377 "Ping An reports steady YoY growth of 4.3% in operating profit attributable to shareholders of the parent company in 1H2022", Ping An, 2022

378 We Do Pulse – Health and Fitness app, Pulse Ecosystems

379 Ibid

While everyone can use the app's services, customers of the insurer that operates it receive special benefits and features. Today, 90% of the health insurer's policies can be acquired through the app, significantly improving the access to its products for rural populations with limited access to physical points of sale. 1.8 million policies were sold through the app in the first year alone and 70% of its users are new to the insurance company, showing the demand for and wide adoption of such offerings³⁸⁰.

- An African health insurance company established a membership system that rewards its members for making healthier lifestyle choices. Users can track and record behaviour such as physical activity, buying healthy food and completing health check-ups and screenings. In return, they receive tangible financial benefits such as cash back on shopping for healthy groceries, buying fitness trackers or signing up for a gym membership³⁸¹. While the programme aims to improve the health of its members, the insurance company benefits too, as the medical costs of its customers decrease. Compared to non-users, users of the app have 10% fewer hospital admissions, 25% shorter hospital stays, and 14% lower overall claims costs³⁸². These numbers may also be subject to (at least some) selection effects as younger, healthier customers are more likely to use the app than older ones. Nevertheless, these results still provide an indication of the impact ecosystems can have on decreasing the need for healthcare and hence on reducing the global health protection gap.
- In Canada, the COVID-19 pandemic accelerated the development and adoption of add-on services, especially for teleconsultations, as analyses from the province of Ontario illustrate. Ontario is Canada's largest province, with 38% of the Canadian population³⁸³. In Ontario, the share of doctor consultations performed online increased from 4% to 60% during the pandemic³⁸⁴. Of the patients that had digital consultations, 91% were satisfied with their service. While this level of online consultations was due to the pandemic, 38% of Ontarians surveyed said that they would still use virtual services as their first point of contact with doctors after the pandemic³⁸⁵.

This growing adoption of teleconsultation services could contribute to narrowing the health protection gap by decreasing the number of avoided treatments. A survey showed that 7% of Ontarians have no dedicated family doctor and 60% struggle to find available appointments within two days of wishing to consult a doctor³⁸⁶. As a result, almost 70% postpone treatments³⁸⁷, have not bothered to see a doctor at all³⁸⁸ or visit emergency rooms with minor conditions that could be treated by a general practitioner³⁸⁹.

An initiative by the Toronto General Hospital (TGH) provides an example of how add-on services can be used to decrease waiting times and improve access to medical attention. In 2018, the TGH launched the eKidneyCare app for patients with chronic kidney disease, encompassing digital services such as tracking blood pressure and symptoms, management of medication and direct communications with kidney specialists. In addition, the service includes a feature enabling patients to be referred to primary-care providers and

African health insurer scheme leads to fewer hospital admissions

380 "Pulse by Prudential. HSBC investor call", Prudential, 2020

381 "Need a reason to join the world of Discovery today?", Discovery, 2022

382 Dr. Jonathan Broomberg, "Fighting healthcare costs through shared-value", Discovery, 2017

383 "2021 census", Statistics Canada, 2021

384 "Canadians' health care experiences during COVID-19", Canada Health Infoway, 2022

385 "What do Canadians think about virtual healthcare?", Abacus Data, 2020

386 "Primary care performance in Ontario", Health Quality Ontario, 2020

387 Sean Simpson, "Seven in ten Canadians (68%) have skipped seeing a doctor due to long wait times, timeliness or other barriers", Ipsos, 2017

388 Ibid

389 "Virtual healthcare in Canada: The solution at our fingertips", Telus Health, 2019

nephrologists who can then prioritise patients and access their healthcare data virtually. For patients who were referred using the app, median waiting times for specialist appointments decreased from 111 days to 15 hours³⁹⁰.

Ensuring that the population has access to high bandwidth internet and is digitally literate is important for optimising the positive impact of digital add-on services. In Ontario, 12% of the population did not have access to internet with a bandwidth above 50 mbit/s in 2020^{391, 392}. In the same year, 55% of the Canadian population above 18 years old were not sure where to find digital healthcare services³⁹³.

Establishing health add-on services could contribute to closing the global health insurance protection gap. At the same time, some overarching drawbacks and limitations should be mentioned. While the Chinese financial services corporation took the role of “ecosystem orchestrator” in the first example, in some markets these may be lacking³⁹⁴. Among multiple other factors, including legacy data-security regulations or slow digital adoption by some customer groups, this lack of orchestrators could be the main challenge to the development of add-on services and ecosystems in the future. Orchestrators need to have the abilities and incentives to drive ecosystem development and ensure it reaches a necessary scale quickly. Furthermore, while digital healthcare services are particularly relevant to younger audiences, they may only have a limited potential to improve the health of the elderly, which is the demographic that accounts for most medical expenses today³⁹⁵.

Digital healthcare may only come into its own with younger users

Therefore, while new technologies may already have a positive impact, their full potential may only be realised when today’s young digital natives grow older and become the healthcare seekers of tomorrow. As an additional consideration, the instant and comprehensive availability of healthcare services may not prompt all customers to contribute to the increased efficiency of their national healthcare systems. If the next telemedicine offering is just one click away, some customers may use these services at a frequency that does not optimise overall efficiency.

To conclude, with increasing comprehensiveness, integration and convenience for its users, the potential of an add-on service or ecosystem to narrow the health protection gap is increasing. Such services have the potential to make personal health a growing focus for customers and hence contribute to improving health-related prevention. In addition, through digital health ecosystems, people with otherwise limited access to physical healthcare could receive better care.

Use a full set of distribution channels to increase coverage

In developing countries in particular, access to healthcare, including health insurance and medical treatment facilities, can vary. The largest differences are usually between rural and urban populations. In 2015, 56% of the world’s rural population was without access to health insurance, while only 22% of those in urban regions were not covered³⁹⁶. By creating new distribution channels that aim to reduce barriers to health insurance access, private insurance companies could contribute to narrowing the global health protection gap.

390 Catrina Kronfli, “Realizing the full potential of virtual care in Ontario”, Ontario Chamber of Commerce, 2020

391 “Up to speed: Ontario’s broadband and cellular action plan”, Government of Ontario, 2022

392 S. Gandhi, “From science fiction to science fact: How virtual care can improve health care in rural and northern communities”, Municipal World, 2020

393 “Over half of all Canadians do not know how to find virtual care”, SunLife, 2020

394 Expert interview

395 “Focus on health spending”, OECD, 2016

396 Xenia Scheil-Adlung, “Global evidence on inequities in rural health protection: New data on rural deficits in health coverage for 174 countries”, International Labour Organization, 2015

- In an example from Thailand, many of the country's largest insurance companies started to sell microinsurance through the convenience store chain 7-Eleven when the company received the country's first licence to sell microinsurance in 2013³⁹⁷. To acquire health insurance coverage, customers simply need to submit their ID card data and their mobile phone number, and they then receive all additional documents and information via text messages.

The convenience store offers a range of health insurance. For example, one insurer offers a combined life- and hospital-cost insurance at an annual premium of THB500 (US\$14)³⁹⁸. Another insurance company offers a selection of health insurance products starting with a US\$4 annual premium (covering up to US\$550) and going up to a US\$16 annual premium (covering up to US\$2 990)³⁹⁹. The insurance products are distributed through the 12 400 branches of 7-Eleven Thailand.

As roughly 15% of the Thai population shops at 7-Eleven on a daily basis, (11 million customers per day) and 56% of its outlets are in provincial areas, expanding this new distribution channel improved the access of Thailand's rural population to private microinsurance⁴⁰⁰. In 2017, four years after its launch, the assistant secretary general of the Thai regulatory body for insurance called the microinsurance sale through 7-Eleven a success, with almost four million policies in force — a 10% increase on the previous year. Sales through 7-Eleven were the major channel contributing to this number⁴⁰¹.

**4 million
microinsurance
policies sold
through Thai
convenience stores**

While creating additional distribution channels beyond established insurance represents an opportunity to extend coverage to new customers, the quality of the health insurance protection provided is an additional factor to be considered. There are some new distribution channels through which it could be challenging to provide customers with advice on different policy options. If a customer feels that there is a lack of transparency about the health insurance policies available, this could decrease the likelihood that they take out a policy.

- In the USA, multiple private health insurance providers have integrated pharmacies into their distribution networks in a similar way to that in the 7-Eleven case in Thailand. In one US example, a player integrated 10 000 physical pharmacies into its insurance offering⁴⁰². The aim is both to offer a more integrated healthcare experience and to expand distribution to additional physical channels.

This can contribute to narrowing the health protection gaps that exist in the USA. In 2020, 8.6% of US citizens were uninsured, while 34.8% were exclusively covered by public insurance, making them vulnerable to gaps in their personal health insurance protection⁴⁰³.

Pharmacies appear to be a suitable channel to expand to, as they take on a more central role in the American healthcare system than in many other countries⁴⁰⁴. In line with that, three of

397 "First time in Thailand with the micro insurance service in 7-Eleven", Ministry of Finance, Government of Thailand, 2013

398 "Personal accident insurance plan for retail 'Micro500' (micro insurance)", AIA

399 "Providing certainty where it matters most: Blue Marble microinsurance", AIG

400 "Convenience store services", CPall, 2002

401 "7-Eleven to offer travel coverage", Bangkok Post, 10 January 2018

402 "How Aetna and CVS Health are delivering a new model of integrated care", Aetna

403 Lisa N. Bunch and Katherine Keisler-Starkey, "Health insurance coverage in the USA: 2020", USA Census Bureau, 2021

404 Ashley Chiara, "The expanding role of pharmacists: A positive shift for health care", Commonwealth Medicine, 26 March 2019

**70% of vulnerable
Hispanic groups
unaware of US
healthcare reforms**

the five largest US pharmacies (by number of pharmacists employed)⁴⁰⁵ — Walgreens, CVS and Rite Aid — serve 4.3% of the population (14 million people) every day^{406, 407, 408}.

Due to the high number of customers served, pharmacies could also contribute to further improving the low awareness of health insurance offerings. For example, five years after the initial launch of the Affordable Care Act — one of the most comprehensive healthcare reforms in recent US history — 70% of the vulnerable groups of the Hispanic population were unaware of their improved options for subscribing to healthcare programmes⁴⁰⁹. While measures such as the “Summer Sprint to Coverage”⁴¹⁰ campaign or tax penalty letters⁴¹¹ have already worked towards improving the awareness of health insurance, distributing private health insurance through physical stores could further contribute to this development.

Other US players broaden distribution channels through different initiatives. For example, one established private insurance company and an insurtech launched a new group health product. The insurance plan is exclusively available to SMEs with one to 50 employees and is distributed through a B2B2C distribution model. The SMEs themselves sign up for the insurance and they can then offer up to three different health insurance plans to their employees. In addition, the employer must cover at least 50% of the employee’s insurance premium⁴¹². In 2021, the offering was taken up by 16 506 companies across the USA⁴¹³.

Furthermore, multiple US private health insurance players have established fully digital options for customers to acquire their products^{414, 415}. However, the effectiveness of linking health insurance offerings and pharmacies could be challenged. The overlap between the people that visit pharmacies and those that have comprehensive health insurance coverage may be substantial, limiting this distribution channel’s potential to narrow health insurance gaps. Extending distribution to convenience stores or shopping malls, for example, may further increase the opportunity created by this lever.

To conclude, expanding the distribution of health insurance products to additional channels may yield potential to extend coverage to people who were previously uninsured. Ensuring that these new channels do in fact create access to new target groups and that they carry products that are relevant to these groups (such as microinsurance products in emerging markets) further enhances the potential offered. In addition, continuing to provide customers with advice on insurance choices can ensure that the quality of insurance coverage does not decrease as distribution increases.

Raise awareness as well as foster prevention and early detection

Such actions can improve people’s general health, reduce the need for medical treatment and ultimately contribute to narrowing the health protection gap. The WHO estimates that insufficient

405 “US national pharmacy market summary 2021”, IQVIA, 2021

406 “Our company at a glance”, CVS Health, 2022

407 “Facts & FAQs”, Walgreens, 2020

408 Jihyun Byun, Suad Ghaddar, Janani Krishnaswami, “Health insurance literacy and awareness of the Affordable Care Act in a vulnerable Hispanic population”, 31 August 2018

409 Ibid

410 “Biden-Harris administration launches ‘Summer Sprint to Coverage’ campaign for final 30 days of special enrollment period”, Centers for Medicare and Medicaid Services news release, 25 July 2021

411 “Letters about tax penalties can increase health insurance coverage”, Office of Evaluation Services, 2018

412 “Cigna + oscar broker sales kit”, Cigna + oscar, 2022

413 “Annual report 2021”, Oscar, 2022

414 “Individuals and family plans”, Aetna, 2022

415 “Shop plans”, Kaiser Permanente, 2022

physical activity alone causes avoidable healthcare costs of US\$54bn annually⁴¹⁶. In terms of the total cost to society, smoking and obesity are estimated to be among the top three social burdens generated by humans that could potentially be reduced with higher levels of awareness and prevention⁴¹⁷. Below are examples of how both private and public players can contribute to promoting awareness, prevention and early detection to reduce global healthcare costs.

- In 2001, the Singaporean Health Promotion Board (HPB) was established with the mission to promote healthy ways of living among the country's citizens. The HPB is an official government organisation and to fulfill its mission it collaborates with schools, SMEs, large corporations and "community ambassadors"⁴¹⁸. Its approach is to execute awareness campaigns, such as its "It's OKAY to Reach Out"⁴¹⁹ campaign to promote mental health, and to provide its partners with specific tools to promote healthier lifestyles within their communities. These tools include assistance in offering healthier food options, providing free exercise sessions, hosting workshops and organising health screenings.

Since its inception, the HPB has been able to improve multiple measures that indicate its success in promoting more healthy lifestyle choices among Singaporeans. For example, screening rates for cholesterol increased to 80% and the rate of healthy food consumption increased from 29% to 49%⁴²⁰.

Singapore health promotion boosted cholesterol screening 80%

As the latest research indicates that the impact of purely communicative campaigns is unclear, the success of Singapore's HPB may be largely attributable to the actionable support it offers to its communities. For example, while a campaign to increase the awareness of prostate cancer in the UK prompted more health checks the month after it ran, its long-term effect remains unclear⁴²¹. And the USA National Colorectal Cancer Awareness week produced similarly unclear results. While public awareness of this type of cancer increased in that specific week, no increase in US screening rates has been recorded⁴²². These findings support the conclusion that simple solutions may only have limited effectiveness and that solutions that are better targeted towards specific groups and incentives will most likely deliver more impact.

- Another example in which a public institution has successfully promoted health awareness, prevention and early detection comes from Germany. Since 2005, citizens can report their attendance at annual dental check-ups and, in return, receive higher reimbursements for the costs of treatment. If check-ups have been attended for five consecutive years, the public insurance reimbursement increases from 60% to 70%. After 10 years it increases to 75%⁴²³. Private insurance policies can be taken out to cover the remainder of the costs.

416 "Global action plan on physical activity 2018–2030: more active people for a healthier world", WHO, 2018

417 "Overcoming obesity: An initial economic analysis", McKinsey Global Institute, November 2014

418 "About us", Health Promotion Board Singapore, 2022

419 "National mental well-being campaign, 'It's OKAY to Reach Out', launched to raise awareness on the importance of mental well-being", Health Promotion Board Singapore, 2021

420 "Singapore comes together to celebrate 20 years of healthy lifestyle", Health Promotion Board Singapore news release, 27 October 2012

421 "Checks for prostate cancer hit all-time high on back of NHS and charity awareness campaign", UK National Health Service news release, 19 May 2022

422 David A. Kleiman, Angela H. Kuhnen, Peter W. Marcello, et al., "Has National Colorectal Cancer Awareness Month increased endoscopy screening rates and public interest in colorectal cancer?", "Surgical Endoscopy", 2021, Volume 35, Issue 1

423 "Richtlinie des Gemeinsamen Bundesausschusses zur Bestimmung der Befunde und der Regelversorgungsleistungen für die Festzuschüsse nach §§ 55, 56 SGB V zu gewähren sind (Festzuschuss-Richtlinie) sowie über die Höhe der auf die Regelversorgungsleistungen entfallenden Beträge nach § 56 Absatz 4 SGB V", Gemeinsamer Bundesausschuss, 2021

Since the initiative began, the share of preventive dental treatment in total dental treatment costs has increased, indicating the initiative's success in promoting prevention and early detection in dental care. In 1997, dental replacements accounted for 36.2% of total dental treatment costs and preventive treatment accounted for 49.8%. In 2020, dental replacements only accounted for 22.1% of total costs, whereas preventive treatment accounted for 62.1%⁴²⁴.

Fitness trackers can incentivise healthier lifestyle choices

Various insurers across the globe use fitness trackers to incentivise their customers to make healthier lifestyle choices. For example, a player from the USA uses its app to provide its customers with personalised health and activity goals, and rewards their achievement with bonus points. These points can be used to collect various rewards⁴²⁵. Another player from Germany awards bonus points in a similar way and even gives users the option of redeeming them via direct cashback⁴²⁶. And a Canadian insurance provider launched a comparable system that also allows users to share activity challenges with their friends or colleagues⁴²⁷.

- In an example from Latin America, the insurance company put a similar programme at the core of its business model. That player is currently operating in Chile and Brazil, but planned to expand to seven additional Latin American countries in 2022⁴²⁸. Its direct customers are companies that would like to offer life insurance coverage to their employees. As of the beginning of 2022, 2 500 companies were signed up to its service⁴²⁹. To improve distribution and decrease costs, life insurance is available to employees exclusively online, starting with a US\$4 monthly policy⁴³⁰. After acquiring life insurance, employees can connect their tracking devices to the insurer's app and as they track healthy habits, such as physical activity or meditation, their life insurance coverage increases — at no additional cost to the corporate customer or employee. For example, for every 10 000 steps recorded, an employee's life insurance may increase by \$1. As of the first half of 2022, the company granted US\$30m in increased life insurance plans, incentivising a total of one million users to maintain a healthier lifestyle⁴³¹.
- An insurance company in Japan offers a similar life insurance product. Its customers can pay lower premiums if they participate in regular preventive health checks. If the results of these health checks are favourable, the customer's premium is further reduced. According to the insurer, customers who regularly engage in health checks submit 10% fewer claims than those who do not. In addition, 30% fewer life insurance claims due to deaths have been registered⁴³². However, in some countries, the potential offered by such tracking devices may be limited; data privacy concerns may slow down adoption and clear communication might be required to convince customers of the benefits of using the new technologies.
- In the USA, a private insurance company developed a medical programme specifically targeted at preventing patients with chronic diseases from developing more severe symptoms. The programme was created for patients with type 2 diabetes and is based on two key elements.

424 "Jahrbuch 2021: Statistische Basisdaten zur Vertragszahnärztlichen Versorgung", Kassenärztliche Bundesvereinigung, 2021

425 "Attain by Aetna", Aetna

426 "So funktioniert TK-Fit", Techniker Krankenkasse, 2022

427 "Wellness program: enjoy better health and rewards you'll love", RBC Insurance, 2022

428 Carolina Milan, "Chile startup Betterfly hits unicorn status with \$125 million round", Bloomberg, 1 February 2022

429 Randy Nieves-Ruiz, "Latam tiene un nuevo unicornio: Betterfly, valorado en 1,000 mdd; Ilegará a México en alianza con Chubb", Forbes, 1 February 2022

430 "Betterfly raises \$60 million series b in Latin America's largest insurtech round", Business Wire, 2022

431 Ibid

432 "Expanding role of prevention in addition to protection", Dai-ichi Life Holdings, 2018

First, participants are provided with tools that enable them to better monitor their blood glucose levels. These tools include an activity tracker, a mobile continuous glucose monitoring device and an app that sends real-time notifications, based on the recorded blood glucose levels. Second, one-on-one coaching helps participants make lifestyle choices related to nutrition, activity and sleep that will help them control their symptoms⁴³³.

Eligible customers were able to enroll in the programme at no additional cost. As a result of the programme, certain patients achieved a meaningful reduction in their diabetes symptoms within 90 days, with the customers with the highest pre-therapy glucose levels seeing the sharpest reduction. Other participants were even able to significantly reduce the amount of medication they required or completely discontinue it⁴³⁴.

As programmes such as this one become more sophisticated and more frequently adopted, their impact on equality in healthcare coverage could be questioned; as these programmes might not be extended to customers with lower cover, the differences between the health of more and less wealthy individuals could further increase, even in developed markets⁴³⁵.

To conclude, the outlined initiatives that aimed at driving awareness, prevention and early detection have been successful. At the same time, not all campaigns are equally likely to deliver results. Based on the examples, initiatives that include multiple stakeholders (eg, schools, workplaces, individuals), implement actionable measures and provide direct financial incentives to customers appear to be particularly successful.

Complement public health insurance/social security with private insurance

This can serve as an additional pillar for solving healthcare challenges and addressing protection gaps. In OECD countries, private health insurance providers covered approximately 30% of the population in 2020⁴³⁶ and 10% of total healthcare spending in 2022⁴³⁷. In most national healthcare systems, private health insurance plays a complementary role⁴³⁸. In addition, taking out private health insurance can be mandatory but is most often voluntary⁴³⁹. Research suggests that both an appropriate regulatory framework and an appropriate delivery of private health insurance options to the public are the factors for the success of a two-pillar healthcare system^{440, 441}. Below are examples of how private health insurance is delivered in different healthcare systems and an analysis of its impact on narrowing health protection gaps.

- In France, private healthcare insurance policies take on a mandatory complementary role. While 95% of the country's citizens are part of a public insurance scheme⁴⁴², these schemes only cover 70% of the costs of most medical treatment. Patients are required to pay the remainder themselves⁴⁴³ and this can become costly; as reported in the French press, some

Private insurance covers 10% of OECD health spending

433 "Innovative new Level2™ digital health therapy resulted in better health for people with type 2 diabetes", United Health Group, 2020

434 Ibid

435 "Relationship between income and health", The Health Foundation, April 2021

436 Social protection: private health insurance 2000–20, OECD.Stat, 2020

437 "Private health insurance", OECD, 2021

438 "Private health insurance in OECD countries: The benefits and costs for individuals and health systems", OECD, 1 January 2004

439 "Private health insurance spending", OECD, March 2022

440 "Private health insurance in OECD countries: The benefits and costs for individuals and health systems", OECD, 2004

441 "What are the equity, efficiency, cost containment and choice implications of private health-care funding in western Europe?", WHO, 2004

442 Ibid

443 "French 'top-up' health insurance explained", "Connexion", 5 November 2020

COVID-19 patients who needed intensive care faced hospital fees of many thousands of euro afterwards due to insufficient coverage by public schemes⁴⁴⁴.

To fill this significant protection gap of around 30% of most medical treatment, private insurers have introduced “top-up” insurance policies⁴⁴⁵. These reimburse a defined percentage of the remaining costs that can range from a few percent to covering more than 30% if private practitioners charge higher fees than expected by the government.

The supplementary function of these private insurance policies has been significantly strengthened over the last few years. In 2016, the French government introduced the “Accord National Interprofessionnel” (ANI) that obliges all employers to offer their employees options for top-up insurance. The scope of these policies is set out in an additional regulation. Furthermore, the employers must pay at least 50% of the annual policies they offer⁴⁴⁶. In addition, in 2019, the “100% Santé” law came into force, obliging top-up policies to gradually reimburse more of the cost of medical services that were not previously always fully covered, including costs for hearing aids, spectacles and dental prostheses. In addition, other parties beyond insurance providers were included in the changes to the law. Medical service providers such as practitioners and the producers of prostheses were required to offer a defined set of products and services that is guaranteed by the French healthcare system to be fully covered⁴⁴⁷.

95% of French have complementary private health cover

As a result of these regulatory changes, 95% of the French population is now covered by complementary private insurance providers⁴⁴⁸. The impact of private insurance plans on closing protection gaps in France therefore seems clear; they improve the coverage of medical costs for 95% of the population by up to 30%.

- The South Korean healthcare system operates in a similar way, with private insurance taking on a complementary but voluntary role. The population is covered by universal healthcare, as 97.2% is covered by the public National Health Insurance Program (NHI) and the remaining 2.8% is covered by the social security service, Medical Aid. While all citizens are covered by the healthcare system, they usually have to contribute 20% to the costs of inpatient care and 30-60% to outpatient care, depending on the provider. As a result, 34.3% of healthcare expenditure was OOP expenditure in 2017, while the average among OECD countries was 20%. Approximately 8% of the population therefore held some sort of additional private health insurance in 2017⁴⁴⁹.

A question in relation to this system is whether costs could be reduced by establishing a healthcare system that is fully public with no need of, for example, marketing expenses or underwriting costs. However, private health insurance providers could create operational efficiencies, as market theory suggests that private players optimise their business as they seek profit in a competitive environment⁴⁵⁰. In addition, a competitive market for complementary private health insurance may foster product innovation⁴⁵¹.

444 Ibid

445 “Loi ani: La loi de sécurisation de l’emploi”, Solimut Mutuelle de France, 13 January 2014

446 Ibid

447 “Understanding the French ‘100% Santé’ healthcare reform”, April International, 9 January 2020

448 Isabelle Durand-Zaleski, “International health care system profiles: France”, Commonwealth Fund, 5 June 2020

449 “OECD reviews of public health: Korea. A healthier tomorrow”, OECD, 31 March 2019

450 “What are the equity, efficiency, cost containment and choice implications of private health-care funding in western Europe?”, WHO, 2004

451 Ibid

- In the Danish healthcare system, private health insurers take on a voluntary complementary role. All citizens are automatically enrolled into a publicly financed, universal healthcare system. While the system dates back to the 1800s, today's system was founded in 1973⁴⁵². All Danes have access to a comprehensive public healthcare system, but gaps in its coverage still exist. As a result, 42% of the population has acquired some sort of complementary private health insurance⁴⁵³. Although 84% of healthcare costs are covered by public institutions, the adoption of voluntary private insurance plans is increasing. Between 2005 and 2019, private insurers' share of total healthcare expenditure coverage doubled — from 1.5%⁴⁵⁴ to almost 3%⁴⁵⁵.

Danish insurers doubled share of healthcare expenditure to 3%

There are multiple Danish for-profit private health insurance companies and there is also a nonprofit insurance provider, Sygeforsikringen “danmark”, which is an association owned by its customers⁴⁵⁶. The cover it provides includes dental treatment, drugs, physiotherapy and spectacles and contact lenses⁴⁵⁷. It allows its members to actively participate in the association through regular member meetings and bodies such as representative boards and dedicated local member offices⁴⁵⁸. And it aims to cap its administrative costs at 10% of total premiums collected⁴⁵⁹. Denmark's approach of complementing public insurance/social security with private health insurance significantly reduces the protection gaps for 42% of the population within otherwise comprehensive coverage.

To conclude, the positive impact of a two-pillared health insurance system may be enhanced by making a robust decision on how to balance and design the underlying healthcare system. While private health insurance providers may introduce efficiencies, their higher administrative costs may reduce efficiencies in other areas. Nevertheless, the participation of private health insurance plans appears to be successful in different markets and can therefore be considered a potential lever to narrow health protection gaps.

Additional levers

Widen the base of customers eligible for public and private insurance

Customers who are ineligible include those excluded due to factors such as preexisting conditions or old age. Related differences in policies could also be harmonised. Current regulations on these two points differ substantially between countries and a large number of customers are not covered due to categorical exclusions or premiums that they cannot afford. For example, while in Hong Kong, Italy and Mexico insurers have greater freedom to define preexisting conditions they regard as exclusion criteria, in countries such as Malaysia, the UK, Australia and the USA, possible exclusions are either entirely prohibited or more tightly defined by governmental regulations⁴⁶⁰. Adjusting such criteria may increase the number of people protected under health insurance policies but may also require insurers to reassess their risk portfolio, potentially increasing prices for some customer groups.

452 Karsten Vrangbæk, “International health care system profiles: Denmark”, Commonwealth Fund, 5 June 2020

453 Ibid

454 Maria Olejaz Tellerup et al., “Denmark: Health system review”, “Health Systems in Transition”, 2012, Volume 14, Number 2

455 “Denmark: Country Health Profile 2019”, OECD, 28 November 2019

456 “Om foreningen: Sygeforsikringen danmark”, Sygeforsikringen “danmark”

457 “Find din Gruppe: Sygeforsikringen danmark”, Sygeforsikringen “danmark”

458 “Om foreningen: Sygeforsikringen danmark”, Sygeforsikringen “danmark”

459 Ibid

460 “International health briefs — preexisting condition exclusions around the world and application language”, RGA Re, 19 January 2016

Widen the scope of coverage for public health insurance/social security to reduce untreated conditions

For example, in some jurisdictions, pharmaceuticals or dental services are not included in universal insurance and are covered by a mix of private and public insurance. This may cause some people to avoid minor treatments that are not covered and ultimately lead to a larger total stress on the health system as conditions that are not addressed early may result in more expensive treatment later.

Facilitate access to physical healthcare infrastructure

This would ensure that all people who have access to health insurance also have access to formal medical attention. Expensive travel may be required for a person to visit the nearest medical facility, especially in rural areas of developing countries, ultimately making it unaffordable to receive any formal healthcare services. If medical services covered by health insurance are not accessible, people may not consider taking out a health insurance policy in the first place.

Increase the effectiveness of healthcare spending

Smarter health spending could increase effectiveness

As the productivity growth of the health sector still lags behind productivity growth in the wider economy, government agencies could consider introducing smart regulations that satisfy current healthcare needs⁴⁶¹. For example, increasing the amount of performance metrics captured or developing a clearinghouse for billing data and insurance-related administrative costs could be ways of improving the productivity of healthcare systems⁴⁶². Mandatory limits on the cost of healthcare could be a move in the same direction, curbing some of the inflation in health services. However, these measures might need to be balanced against potential unintended consequences.

Concluding remarks

At US\$0.8trn to US\$4trn in 2020, or 1-5% of global GDP, the health protection gap is a substantial one. If the current trends continue, it could grow at 4-5% per year, leading to a gap of US\$6-6.5trn in 2030 (if both OOP spending and avoided costs are considered). Health-related protection gaps are especially prevalent in the emerging economies of Asia, Latin America and Africa. The recent COVID-19 pandemic has directed policymakers' attention to this protection gap and has also accelerated efforts to address it. To continue these, public and private players might need to collaborate, create the right frameworks and ensure that health and insurance services can be delivered to more people at higher quality.

461 Anna Malinovskaya and Louise Sheiner, "Productivity In The Health Care Sector", Hutchins Center on Fiscal and Monetary Policy at Brookings, July 2016

462 Nikhil Sahni, Pooja Kumar, Edward Levine and Shubham Singhal, "The productivity imperative for healthcare delivery in the USA", McKinsey, 27 February 2019

VIII. Concluding remarks

Our world is changing at an unprecedented speed, largely driven by four global megatrends shaping the environment in which we live: climate change, new technologies, demographic change and evolving macroeconomic and political structures. These megatrends create significant changes in the risk landscape with potential implications for the health, wealth and income of individuals and organisations and for their property and financial stability.

This report assessed the evolving risk areas and — based on their economic relevance, impact on human lives and insurability — identified four particularly relevant ones that will become even more applicable in the future, namely cyber, pension, natcat and health. There are already significant annual protection gaps for these risks — amounting to US\$1trn for pension, US\$0.9trn for cyber, US\$.8trn for health and US\$0.1trn for natcat — and they are expected to grow even further.

The report identified the factors driving the protection gaps, on both the demand and the supply side, including why certain risks could be very difficult to insure completely. It provided an overview of potential levers available to a broad variety of stakeholders, including private insurers and policymakers, to help address the protection gaps. These levers can help in different ways, including preventing risks from materialising, improving access to insurance or using regulatory standards and frameworks.

While these levers provide a starting point for the design of measures that aim at narrowing protection gaps, their appropriateness and effectiveness may vary depending on the situation of individual markets.

Such critical considerations are discussed throughout the report. For example, in some regions with lower economic wealth the demand for risk protection may still need to be fostered and developed. In contrast, in some regions the demand for risk protection may already be present but there is not sufficient supply to serve the protection needs. Second, the collaboration of public and private players may be particularly important to narrow some of the protection gaps effectively. Public players, on the one hand, can, for instance, create legal and regulatory frameworks and set standards that are necessary for social security systems and insurers to be able to address the protection gaps. Private players, on the other hand, can introduce innovative products to increase protection against growing and emerging risks.

The report identifies and describes a wide range of case studies to provide examples of where private and/or public policy action has been successful in reducing gaps. If the protection gaps are narrowed effectively (ie, by fostering supply and demand), this can contribute to greater resilience and human well-being around the world due to the enhanced security of lives, livelihoods and assets.

GFIA has made recommendations for policymakers of the actions that can have the largest potential impact on global protection gaps. These can be found on p15.

IX. Overview of case studies








Cyber

	Levers	Case studies
Private	Incentivise & support prevention measures	<div style="display: flex; align-items: center;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg); font-size: 0.8em; margin-right: 5px;">Overarching</div> <div> <p>Cyber-risk engineering as part of insurers' product portfolios</p> <p>Financial incentives for prevention via policy clauses</p> </div> </div>
	Raise & increase awareness of cyber risk (especially among SMEs)	<div style="display: flex; flex-direction: column; gap: 5px;"> <div style="display: flex; align-items: center;"> <p>Government information campaign via TV, social media, newspaper & radio</p> </div> <div style="display: flex; align-items: center;"> <p>Annual cyber awareness poll & campaign for SMEs</p> </div> </div>
Public	Introduce a cyber-incident reporting framework for corporations & public entities	<div style="display: flex; align-items: center;"> <p>Cyber Incident Reporting for Critical Infrastructure Act in 2022</p> </div>
		<div style="display: flex; align-items: center;"> <p>Security of Critical Infrastructure Act 2018 and expansion in 2021 to broaden scope of critical infrastructure</p> </div>
		<div style="display: flex; align-items: center;"> <p>Network & Information Security (NIS) Directive and General Data Protection Regulation (GDPR), requiring obligatory incident reporting for specific sectors</p> </div>
Public	Foster prevention & adaptation (incl. cyber-risk maturity models)	<div style="display: flex; align-items: center;"> <p>Cyber Defence Unit with voluntary members to ensure advanced IT skills against cyber attacks</p> </div>
		<div style="display: flex; align-items: center;"> <p>Cyber requirements defined as part of the EU Basel III and Solvency II regimes</p> </div>












Pension

	Levers	Case studies
Private	Introduce innovative, flexible products	<div style="display: flex; align-items: center;"> <p>Products offering a flexible & customisable mix between variable & fixed returns</p> </div>
		<div style="display: flex; align-items: center;"> <p>Products enabling customers to invest in new asset classes (eg, infrastructure)</p> </div>
Public	Drive awareness of the need for pensions	<div style="display: flex; align-items: center;"> <p>Life product in which payout takes the form of residence in a retirement home</p> </div>
		<div style="display: flex; align-items: center;"> <p>Campaign to ensure the new pension system is understood by all citizens</p> </div>
		<div style="display: flex; align-items: center;"> <p>Campaign to increase overall pension awareness & financial education</p> </div>
Public	Encourage more people in the formal labour force to opt in to pension schemes	<div style="display: flex; align-items: center;"> <p>KiwiSaver plan, automatically enrolling new employees (with 8 weeks to opt out)</p> </div>
		<div style="display: flex; align-items: center;"> <p>Mandatory occupational pensions to which employers must contribute 9.5% of their employees' wages</p> </div>
		<div style="display: flex; align-items: center;"> <p>Automatic enrolment through enterprise-level regulation</p> </div>
Public	Introduce tax incentives for asset allocation & savings	<div style="display: flex; align-items: center;"> <p>Plan d'épargne retraite (PER), enhancing & harmonising tax benefits on pension products</p> </div>
		<div style="display: flex; align-items: center;"> <p>Tax incentives for both employer & employee contributions, incl. minimum contributions</p> </div>

Natcat

	Levers	Case studies
Private	Make coverage more accessible through revisited distribution	 Access to crop insurance for Indian farmers via a central crop insurance portal
	Strengthen prevention & adaptation measures	 "Build Back Better" scheme in New Orleans after Hurricane Katrina  Building codes to limit loss of life & damage from earthquakes
	Introduce government-backed programmes, PPPs, mandatory contributions to natcat funds or pooling solutions	 Mandatory P&C premium add-on for natcat leading to high coverage  Multi-country parametric insurance scheme to build resilience by pooling risk
Public	Build a regulatory environment that fosters access to global reinsurance markets & the participation of foreign players	 Earthquake Commission's reinsurance programme  Reinsurance incentivised via the Solvency II regulation

Health

	Levers	Case studies
Private	Establish add-on services to help customers take better care of their health	 Comprehensive health ecosystem  Set of health add-on services that can quickly be scaled up across Asian countries  Offer of connected health services that specifically rewards users for healthy lifestyles  Digital application for patients to manage chronic kidney disease & schedule treatments
	Use a full set of distribution channels to increase coverage	 Microinsurance policy sales through convenience stores  Pharmacies integrated into health insurance to improve customer experience & expand distribution channels
	Raise awareness as well as foster prevention & early detection	 National board to promote health awareness  Incentivisation of patients to attend regular preventive screenings  Programme for chronic type 2 diabetes patients to manage their symptoms
Public	Complement public health insurance/ social security with private insurance	 Mandatory complementary private insurance  Incentivisation to take out private complementary insurance

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