

Public-Private Solutions to Pandemic Risk

Opportunities, challenges and trade-offs

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The Geneva Association

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Foreword

We are pleased to continue our research series on pandemics with this second report, exploring different pandemic risk insurance schemes that have governments and insurers working together to manage the risk of business continuity losses caused by a pandemic.

This study follows *An Investigation into the Insurability of Pandemic Risk*, published in October 2020, which illustrated that pandemic business continuity risks, because they are correlated and not diversifiable, cannot be covered by the private insurance market. Shouldering these losses alone could bankrupt the industry.

As demonstrated in the areas of life and health, insurers certainly have an important role in protecting society from pandemics. Any solution in the business interruption space should leverage their core, value-added: absorbing manageable amounts of risk, distribution capabilities, claims settlement skills, and unparalleled risk management expertise.

But given the nature of the risk, governments need to be the leading players. Otherwise, the insurance industry's solvency would be at stake, to the detriment of millions of policyholders who expect their motor, homeowners and general liability claims, for example, to be paid speedily and reliably.

When COVID-19 hit, governments moved quickly to try and define appropriate future pandemic risk insurance schemes. These efforts may have been premature. As the current pandemic persists, many governments have postponed deciding the right solution until the full context comes to light.

This report aims to support ongoing deliberations by weighing the advantages and disadvantages of four basic forms of public-sector involvement in pandemic risk solutions: direct insurance, reinsurance, social insurance, and post-event financial relief – the way the world has been dealing with the current pandemic.

COVID-19 is still omnipresent. Once we have successfully reined in the virus, society will have a clearer, more informed view on how to prepare for future pandemics. We hope this report helps pave the way for governments and insurers to agree on their partnership terms around pandemic risk.



Jad Ariss
Managing Director



1. Executive summary

Commercial insurers have always sought to push the boundaries of insurability by developing innovative and viable approaches to new and emerging risks of major severity such as natural disasters or changes to liability regimes. For example, Alternative Risk Transfer (ART) solutions, introduced in the 1980s, are designed to better reflect individual risk characteristics, mitigate moral hazard (i.e. the risk of people behaving less carefully once covered by insurance), offer (limited) cover for new exposures and expand capacity for large catastrophe risks (e.g. by tapping into the vast pool of institutional investment funds through Insurance-Linked Securities (ILS)).

Pandemic business continuity risk was, in general, never possible nor intended to be covered by the private-sector insurance market.

These efforts notwithstanding, pandemic business continuity risk was, in general, never possible nor intended to be covered by the private sector. To some extent, this reflects demand side reasons such as an endemic underestimation of the frequency and severity of pandemics. However, the shortage of supply primarily results from the high level of embedded risk and, therefore, prohibitively high amounts of capital needed to underpin credible insurance commitments. These extraordinarily high capital requirements are attributable to the unique correlation in the frequency and severity of pandemic business interruption losses as revealed by COVID-19. Looking ahead, this does not rule out the provision of small-scale selected private market coverage by limiting the degree of risk transfer and the number of businesses covered.

Governments need to get involved as ‘insurers of last resort’ and bring to bear their unique ability to organise economically viable risk transfer over time through taxation and borrowing.

Coverage for pandemic business continuity risks with meaningful limits, however, will remain unavailable from the private insurance market as a result of prohibitively high capital requirements. Capital market investors, too, are likely to steer clear of pandemic business continuity risk, given its correlation with financial market impacts from pandemics. This is in sharp contrast to the uncorrelated nature of natural catastrophe risk, which is one of the main attractions of ILS for investors. The most significant obstacle to securitising (and insuring) pandemic risk, arguably, is the impossibility to model and price it.

Therefore, governments need to get involved as 'insurers of last resort' and evaluate insurers' potential, non-risk bearing contributions to pandemic preparedness and resilience building (e.g. risk assessment, risk mitigation and claims management). Also, the public sector can bring to bear its unique ability to organise economically viable risk transfer over time through taxation and borrowing.

Against this backdrop, from an institutional perspective, focusing on how risk mitigation can be organised, one can distinguish between four 'archetypical' forms of public-sector involvement in pandemic risk schemes:

1. Mandatory or voluntary direct insurance offered by the government and administered by private insurers
2. Government reinsurance backstopping mandatory or voluntary private-sector coverages
3. Mandatory social insurance
4. Post-event financial relief with no pre-event dimension whatsoever

We can judge these exemplary types of involvement against their relative strengths and weaknesses in achieving seven specific public policy goals, namely maximum coverage, limited public exposure, funds matching needs, incentives for risk mitigation, cost-efficient risk transfer, operational efficiency and macroeconomic benefits. Each option has its distinct strengths and weaknesses. Having said this, just distributing cash post-event is probably the least effective approach, foregoing any benefits from pre-event risk mitigation and preparedness measures. For government-provided insurance, reinsurance and social insurance each, a solid economic case can be made, with the final choice depending on the important trade-offs involved (e.g. between the breadth of coverage and incentives for risk mitigation). The private insurance sector could, in principle, get involved across a wide spectrum ranging from the practical implementation of government-led pandemic risk schemes, risk assessment and prevention services, to limited risk transfer.

This generic institutional perspective can be supplemented with a more granular risk-oriented angle, focusing on how pandemic risk is actually being dealt with. Public-private partnerships (PPPs) around the world emphasise primarily either removing catastrophic risk from the (commercial) market, or redistributing it across all policyholders. In the scenario of risk removal, insurance companies may accept premiums from insureds, ensuring that policies can still be issued and serviced. However, they do not retain any risk. Examples include the National Flood Insurance Program and the California Earthquake Authority in the U.S.

Redistributing risk, on the other hand, refers to taking the risk of loss by a relatively small group of highly-exposed policyholders and sharing it across the wider pool of variably-exposed policyholders through a levy.

There is a valuable role for the insurance industry to play – as absorbers of limited risk, professional distributors and claims managers and/or experts in risk assessment, mitigation and prevention – in pandemic risk schemes.

A key consideration for all conceivable options for government involvement is whether the cover should be mandatory or voluntary. This will determine the size of the risk pool and, therefore, the scope for fair risk redistribution. The government would provide the underpinning support to those who have taken out pandemic insurance, and yet it would also have to prop up 'free riders' with no insurance. For pandemic systemic risks, where the cover would need to involve a full government guarantee, the mandatory participation of businesses might be most appropriate. The ultimate way forward still needs to be decided and agreed upon by the key stakeholders.

Except for the post-disaster relief option, each of the types discussed in this report indicates a valuable role for the insurance industry to play, as absorbers of limited risk, professional distributors and claims managers and/or experts in risk assessment, mitigation and prevention.

Even though this report clearly focuses on how to address business continuity risk, the proposed assessment criteria for potential public-private partnerships could also be applied to severe pandemic-induced mortality scenarios, for example, which may be the main risk arising from a future pandemic.



2. Introduction

The shutdown measures adopted by many governments to contain COVID-19 have plunged the global economy into the deepest recession since the Second World War. This dislocation has exposed massive protection gaps in the area of business continuity risk. Less than 1% of the estimated USD 4.5 trillion global pandemic-induced GDP loss for 2020 is likely to be covered, reflecting pre-COVID-19 coverage exclusions and restrictions as well as the niche character of business interruption (BI) insurance which accounts for less than 2% of the world's property & casualty (P&C) insurance market.¹

As we have shown before, pandemic-induced business continuity risk is unique given its potential to impact virtually all policyholders simultaneously, over an extended period of time. It defies the two most fundamental criteria of insurability in the following ways:

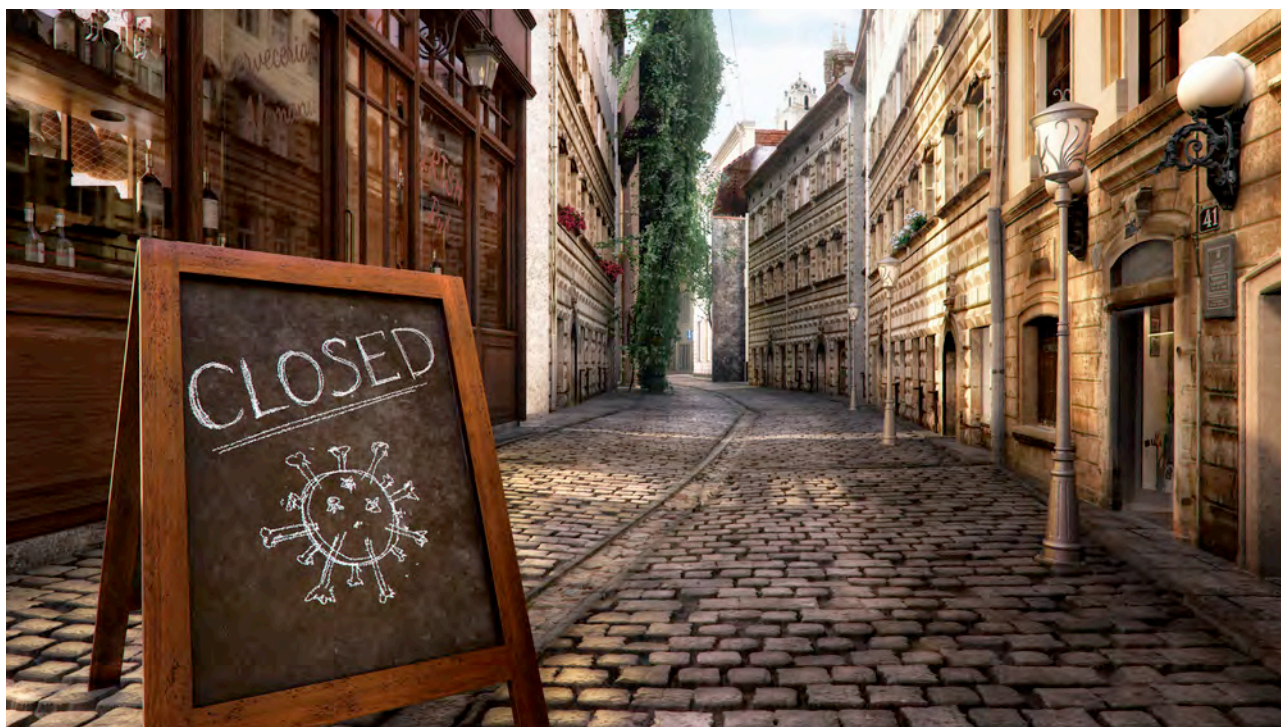
1. Losses are neither random nor independent. Even though pandemics are naturally occurring phenomena, policy decisions to lockdown entire economies are deliberate and intentional. This means that expected loss amounts and risk loadings cannot be set. There are also no historical data for the policy responses witnessed during COVID-19. Furthermore, the strong correlation among individual risks renders efficient risk pooling and diversification impossible.
2. The maximum possible loss is not manageable from the insurer's solvency point of view. The uncontrollable aggregation of losses could be ruinous to the risk pool and, ultimately, to the insurance industry as a whole. This in turn could lead to significantly further financial stability risks across the wider economy.²

Governments need to take the lead in absorbing the lion's share of pandemic-induced business continuity risk in order to harness the insurance industry's proven capabilities in mitigating risk.

Against this backdrop, governments need to take the lead in absorbing the lion's share of underwriting risks in order to harness the insurance industry's proven capabilities in mitigating risk.

¹ The Geneva Association 2020. Author: Kai-Uwe Schanz. This report also addresses the risk of severe pandemic-induced mortality and discusses the implications of a repeat of the 1918/19 Spanish flu for the U.S. life insurance industry, with an estimated 25% loss in surplus.

² Ibid.

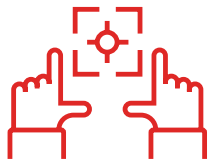


With that in mind, this report is divided into two main parts. First, it discusses the (limited) scope for private-sector solutions to pandemic risk by putting the current crisis into a historical context. Insurers have always endeavoured to push the boundaries of insurability to include new and emerging risks of major proportions. Even prior to COVID-19 such attempts have translated into innovative (albeit virtually 'not in demand') industry responses such as pandemic bonds and parametric coverages. We will explain why the private market for pandemic business continuity risk coverage has remained insignificant and what it would take to enable a limited degree of risk transfer going forward.

The second section offers an economic perspective on various conceivable types of public-private pandemic risk solutions and insurers' potential involvement in risk management, mitigation and/or transfer. The report first adopts a generic institutional perspective, assessing four types of exemplary government involvement in organising pandemic risk management against a number of (competing) policy objectives. In addition, we will discuss a more granular risk-oriented conceptual framework which focuses on varying degrees of risk redistribution through insurance mechanisms.

The report concludes by synthesising the scope for and prerequisites to harnessing insurance as a means to mitigate pandemic risk.

The Annex provides 'live evidence' of currently debated, specific programme proposals in the EU, France, Germany, the U.K. and the U.S. It offers a comparison of those schemes and introduces a specific form of pandemic BI insurance already available in China.



3. The scope for private-sector solutions to pandemic risk

3.1 Pushing the boundaries of insurability

Commercial insurance is designed to mitigate low-frequency/high-severity risks. For such risks to be insurable, some basic criteria must be met.³ If essential criteria of insurability are absent, insurance is unable to play its traditional role. These limits, however, are not set in stone and may be extended through product innovations, in the form of ART. Since their emergence in the 1980s, ART solutions have been designed to better reflect individual risk characteristics, mitigate moral hazard (i.e. the risk of people behaving less carefully once covered by insurance), offer (limited) cover for new risks, expand capacity for large catastrophe risks, reduce the counterparty risk for the policyholder and mitigate exposure to the underwriting cycle (i.e. the volatility in pricing, terms and conditions, limits, etc.).⁴

ART solutions are designed to better reflect individual risk characteristics, mitigate moral hazard, offer (limited) cover for new risks, expand capacity for large catastrophe risks, reduce the counterparty risk for the policyholder and mitigate exposure to the underwriting cycle.

The ART market comprises two segments: 1) risk transfer through alternative risk carriers and 2) risk transfer through alternative products (Table 1).

Risk transfer through alternative risk carriers

Alternative risk carriers, amongst others, include captives, pools and capital markets. Their use is primarily a function of the cost and availability of traditional insurance cover.

Captives are insurance or reinsurance companies owned by a corporation or group of companies whose core business is different from insurance. The primary purpose of a captive is to insure the risks of its parent(s). In addition to optimising risk retention, captives can also be beneficial if the traditional insurance market does not provide any relevant solutions to the company due to a lack of cover for a difficult to insure risk or restricted capacity as regards coverage, limits, or policy terms.⁵

³ The Geneva Association 2020.

⁴ Holzheu 2004.

⁵ AIG 2016.

Pools are arrangements between multiple corporations or insurers to mobilise sufficient capacity for very large risks. Most of them are similar to mutual insurers with companies as the policyholders. Pools are typically organised on a national basis to cover a specific risk class. In the U.S., for example, pools at the state level insure workers' compensation risks. Other pools cover personal lines risks like the natural catastrophe pool in Spain or the motor pool in Japan. Other commercial pools manage flood, nuclear, terror or aviation risks.⁶

Capital markets can act as risk carriers through financial instruments whose values are driven by insured (catastrophe) events. In the area of natural disasters, they represent a unique asset class the return of which is uncorrelated with the general financial market.⁷ The risk-bearing capacity of the capital markets is a multiple of the insurance industry's, with the global value of outstanding bonds (more than USD 100 trillion) and equity markets (about USD 75 trillion) far eclipsing the USD 2 trillion capital base of global non-life insurers.⁸

ART products include finite risk reinsurance; multi-year, multi-line (MYML) products; multi-trigger (MT) products, Insurance-Linked Securities (ILS) and parametric solutions (see Table 1).

Finite risk reinsurance relies more on risk financing than traditional risk transfer. It is based on multi-year contracts which take into consideration individual loss experience and investment income to bring down the policyholder's cost of risk. From an economic perspective, such products harness the time value of money and the diversification of losses over time. However, there is little risk transfer over the contract period which raises accounting and regulatory questions as to whether such structures qualify as insurance.⁹

Integrated multi-year multi-line products take advantage of risk diversification benefits within the insured's own portfolio. They usually blend uncorrelated risks into the insured's portfolio, enhancing the efficiency of risk transfer as the joint volatility is usually less than the sum of the volatility of the individual risks. Such structures enable the inclusion of additional, less 'traditional' risks such as cyber and supply chains in

existing covers. From the commercial insurance buyer's point of view the focus is increasingly on the overall bottom-line risk, rather than on specific risk classes.¹⁰

Multi-trigger products typically only pay in the event of an insurance (e.g. property) loss in combination with a non-insurance loss (e.g. commodity price volatility) in the same period. The insured can benefit from cost savings by bundling multiple risks with interdependent triggers. However, for such covers to be effective, both the insurer and the insured need to have an in-depth understanding of enterprise risks.¹¹

Insurance-Linked Securities (ILS) offer cover through financial instruments whose values are driven by insured loss events. ILS are securitised by establishing a special purpose vehicle which issues securities to investors. ILS can be rated and are sold publicly or placed privately.¹²

Parametric insurance products pay out based on a specific measure of physical hazard rather than an assessment of loss. Such policies could, for example, trigger from the magnitude of an earthquake, wind speed or rainfall amount within a predefined area. Parametric insurance establishes payouts and provides post-event liquidity much faster and cheaper than traditional indemnity products, which typically require on-the-ground damage and loss assessments.¹³ Another advantage of parametric insurance is its non-reliance on historical loss data from natural hazards which makes it particularly suitable for developing countries.¹⁴ The main drawback of parametric insurance is basis risk. The payout amount may differ from the actual losses encountered on the ground.¹⁵ To minimise basis risk, the design of the triggers can be refined, e.g. by using more precise location data for each asset insured.¹⁶

The following sections explore the scope for harnessing non-traditional risk transfer techniques in the context of pandemic risk.

6 Holzheu 2004.

7 Ammar et al. 2015.

8 SIFMA 2019; Swiss Re 2019.

9 Hartwig and Wilkinson 2007.

10 Swiss Re 2017.

11 Ibid.

12 Ammar et al. 2015.

13 SCOR 2019.

14 IDF 2020.

15 Singer 2019.

16 World Bank 2017; Swiss Re 2017.

Table 1: The ART space

ALTERNATIVE RISK TRANSFER (ART)	
Carriers	Solutions
<ul style="list-style-type: none"> • Captives • Pools • Capital markets 	<ul style="list-style-type: none"> • Finite risk re/insurance • Multi-year / multi-line products (MYML) • Multi-trigger (MT) products • Insurance-Linked Securities (ILS) • Parametric solutions

Source: The Geneva Association

Table 2 summarises the key features of ART products through the lens of insurability. All solutions discussed offer the scope for expanding insurability by deviating from traditional approaches to insurance and bringing down the cost of risk transfer. ART products harness diversification over time or within the insured's risk portfolio, can add non-hazard risk triggers, tap into pools of capital different from re/insurers' shareholders' funds and apply neutral and unambiguous loss triggers which do not depend on (possibly contentious) policy wordings. Fully collateralised ILS solutions even eliminate an important barrier to catastrophe insurance: the buyer's concern about counter-party risk.

ART products also address a major supply-side obstacle to insurability: moral hazard. Through the management of retentions and the definition of triggers, policyholders have no or significantly reduced incentives to adopt riskier behaviours as a result of being insured.

Table 2: Comparison of ART solutions

	Finite solutions	MYML products	MT products	ILS	Parametric solutions
Expansion of limits to insurability	Yes Spreading risks over time	Yes Bundling risks	Yes Second trigger can be non-hazard risk	Yes Tapping into additional capacity	Yes Closing gaps created by policy exclusions and sublimits
Reduction of moral hazard	Yes Through participation in own loss experience	Yes Through increased retention	Yes If second trigger is parametric	Possibly Depending on trigger	Yes Policyholders have no incentive to 'misbehave'
Elimination of counterparty risk	No	No	No	No	No

Source: The Geneva Association

3.2 Examples of pre-COVID-19 approaches to pandemic risk

The Geneva Association 2020 highlights the economic limits to insuring large-scale P&C pandemic risk. Therefore, there is little evidence of 'pure' pandemic coverage in P&C insurance markets. The following section examines two examples of pre-COVID-19 attempts to harness some of the previously outlined innovative approaches to risk transfer to make pandemic risk insurable.¹⁷

¹⁷ Another reported example (not covered in greater depth due to the lack of public information) is a policy taken out by The All England Lawn Tennis Association, which organises the Wimbledon tennis tournament. The Association is reported to have recouped almost half of its losses from cancelling the 2020 event thanks to a pandemic insurance policy it has taken out every year since the SARS pandemic in 2003. <https://www.forbes.com/sites/isabeltogoh/2020/04/09/report-wimbledons-organizers-set-for-a-141-million-payout-after-taking-out-pandemic-insurance/#69fc41bf29f6>

3.2.1 A parametric insurance product¹⁸

In 2017, Munich Re, one of the world's largest reinsurers, founded a dedicated business unit (Epidemic Risk Solutions) to develop structured solutions for different sectors with specific event definitions. In 2018, marketing efforts were intensified jointly with global commercial insurance broker Marsh and epidemic risk modelling firm Metabiota to create awareness and promote a parametric insurance product specifically designed to protect against economic losses from infectious disease outbreaks (e.g. loss of gross profit, loss of revenue, extra expenditure). The solution was targeted at industries that depend on their customers' physical presence, e.g. hospitality, sports and entertainment.¹⁹ It can be triggered by a severity scale for epidemic outbreaks (based on fatalities) or by health authority alerts as main elements of a specific event definition, which also has to take into account certain epidemiological specifics, to determine whether an insured event has occurred or not. Also, more generally, alerts by health authorities and fatality counts can be used to measure the size of an outbreak.²⁰

The only parametric risk solution specifically designed for infectious disease outbreaks and available prior to COVID-19 was met with little interest, with only one company buying the policy before COVID-19.

The product, however, met with a general lack of interest. Only one company (a U.S. health care provider) bought the policy prior to the COVID-19 outbreak, despite a growing awareness that pandemics pose a material risk to companies, not least in light of the 2003 Severe Acute Respiratory Syndrome (SARS) pandemic.²¹

3.2.2 A capital markets product

The best known product tapping into capital markets to respond to specific types of pandemics is the World Bank

Group's Pandemic Emergency Financing Facility (PEF). Its insurance window is based on two tranches of catastrophe bonds that pay out under specified conditions and are designed to cover 'surge costs' incurred by poor countries in the event of six designated categories of pandemics, including the coronavirus.²²

Launched in July 2017 with a term of three years, PEF provided up to USD 425 million in insurance in the form of bonds and swaps. As of end of July 2020, PEF has paid out close to USD 200 million to 64 of the world's lowest income countries hit by COVID-19.²³

Having said this, PEF has drawn criticism for its perceived slowness to pay as well as for its cost and complexity. Multiple triggers (including the number of infections and deaths, rates of spread, degree of geographic spread and duration of the pandemic) had to be met before payouts could be effectuated.²⁴ Another more fundamental criticism of PEF is that ILS are a relatively expensive approach to delivering disaster relief.²⁵

3.3 Towards more 'skin in the game'? Challenges and opportunities

As shown in the previous section, prior to COVID-19 both the supply of and demand for private insurance solutions covering pandemic business continuity risk were marginal.²⁶ Building on The Geneva Association's report on the insurability of pandemic risk,²⁷ the following section examines potential reasons for and remedies to the main obstacles (such as risk pooling, capital markets and parametric solutions), with a focus on supply-related factors.

3.3.1 Scope for risk pooling

Hartwig et al. present a few hypothetical examples to illustrate the amount of capital needed to provide a credible risk-pooling mechanism to pay claims that occur in a given time period (see Figure 2).²⁸ They ignore all administrative costs and define a credible mechanism as one providing a 99% probability of solvency. The

18 According to our knowledge, the following product example is the only parametric risk solution specifically designed for infectious disease outbreaks and available prior to COVID-19.

19 Marsh 2020.

20 Singer 2019.

21 Ratliff 2020.

22 Hartwig et al. 2020.

23 World Bank 2020 and EIOPA 2021.

24 Hodgson 2020.

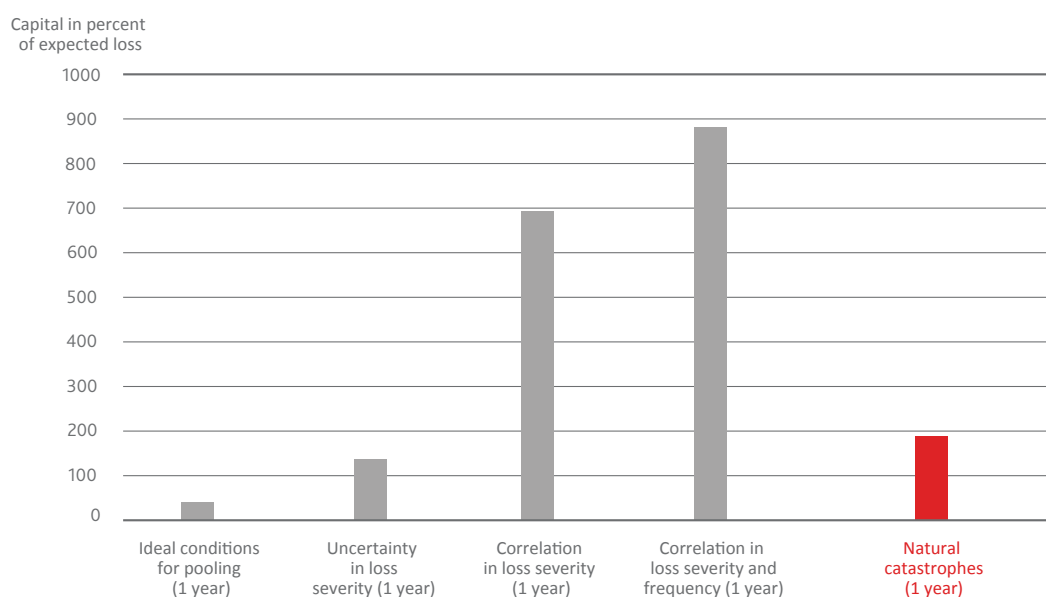
25 Annual PEF coupons payable to investors ranged as high as 11.5%, also reflecting the high expected loss of the structure. See Lane and Beckwith 2020.

26 Note, however, that PEF was not designed to address business continuity risk.

27 The Geneva Association 2020.

28 Hartwig et al. 2020.

Figure 2: Capital requirements (in percent of expected losses) under various assumptions



Source: The Geneva Association, using the numerical examples of Hartwig et al. 2020

authors show how the required amount of capital varies significantly with important characteristics of pandemic risk such as uncertain loss severity and correlation in loss frequency and severity.²⁹

Under ideal conditions for risk pooling the capital required is 55% of the expected loss costs. Introducing uncertainty into the severity of losses more than triples the capital required to 170%.^{30 31} Correlation in the average severity of losses across all policyholders (a characteristic of pandemic risk) further and dramatically multiplies required capital to about 750% of the expected loss costs.³² Introducing additional correlation in the frequency of a loss across the entire pool (as under a pandemic scenario) would further increase capital requirements to 950% of the expected loss.³³

Hartwig et al. also provide an instructive comparison with pooling of natural catastrophe risk which usually only

impacts a limited number of policyholders in the pool.³⁴ Hence, as opposed to pandemic risk, natural catastrophe risk would likely cause correlation in frequency and severity within groups of policyholders, not across all of them.³⁵ Assuming a pool of 20 separate risk groups (with correlation within but not across groups) yields a capital requirement of 220% of the expected loss.

In practice, however, a pool may be impossible to set up if a significant number of entities do not participate because they expect governments to provide free ex-post disaster relief. This so-called 'Samaritan's dilemma' would call for a mandatory participation in the pool.³⁶

Another factor with a significant effect on the economics of pooling arrangements is moral hazard. The actions of pool participants can influence both the frequency and severity of a loss. Moral hazard can be mitigated in a number of ways. For example, payouts could be made

29 See The Geneva Association 2020.

30 These conditions include a large number of exposure units, known loss distributions, losses which are not correlated across exposures and the fortuity of the loss distribution.

31 In the context of economic lockdowns examples of uncertainty include the scope (number of sectors or businesses affected), degree (partial or complete shutdown), duration of the measures and individual and community compliance with government guidelines. These uncertainties make shutdowns impossible to model (The Geneva Association 2020). However, insurers can reduce this uncertainty by incorporating limits on their coverage. The lower the coverage limit, the less capital is required. As discussed in section 4, coverage limits can be an effective tool to promote private insurance market solutions for relatively low pandemic losses, with governments providing excess coverage above the private market limits.

32 Severity outcomes for one entity are no longer independent of the other entities.

33 Hartwig et al. 2020.

34 Ibid.

35 See The Geneva Association 2020.

36 Buchanan 1977.

contingent on policyholders' behaviour; deductibles, coinsurance, limits or exclusions could be applied; or through the use of non-indemnity or parametric insurance contracts (see section 3.3.3).

In summary, the massive amount of capital required for credible pooling arrangements is a major, if not prohibitively high barrier to the supply of pandemic business continuity insurance coverage.³⁷ This does not rule out the provision of small-scale private market coverage by limiting the degree of risk transfer and the number of businesses covered. Meaningful coverage with high limits, however, cannot be provided by the private insurance market (see section 4)

Hartwig et al. ignore potential risk-sharing benefits across types of risks which is discussed in Box 1.^{38 39}

Box 1: Risk pooling across multiple types of catastrophe risk

Natural and man-made catastrophes are rare events. Whilst their infrequency is welcome to all risk stakeholders, the sparse event datasets present a challenge for catastrophe risk assessment. A fundamental question posed for any specific catastrophe relates to frequency.

Consider the following disparate range of catastrophe perils: earthquakes, wind storms, river floods, pandemics, terrorism, nuclear accidents and cyberattacks. There are some weak correlations between these perils, e.g. terrorists targeting nuclear power plants, but for actuarial purposes, these can be taken as independent, random processes.

Pooling multiple catastrophe risks has the insurance merit of smoothing over the aleatory uncertainty or random variability in the occurrence of catastrophes: a man-made catastrophe might occur in one year; a natural catastrophe in another. The range of global events in the first two decades of the 21st century illustrate this smoothing well. In 2001, there was the 9/11 Al Qaeda terrorist attack in the U.S., followed by the 2004 Indian Ocean tsunami, Hurricane Katrina in 2005 (Louisiana, U.S.), the Japanese offshore earthquake in 2011, and, with global impact, the WannaCry ransomware cyberattack in 2017 and COVID-19 in 2020.

Pooling multiple catastrophe risks also has the insurance merit of smoothing epistemic uncertainty which stands for knowledge-dependent variability in the occurrence of catastrophes. Provided there is little systemic bias in the frequency estimation for different perils, modelling ignorance may result in estimation errors that act in opposite directions, partially cancelling each other out. Frequency estimation is almost invariably undertaken by different modelling teams for different perils, with little overlap, and the information sources for the various perils are independent of each other, so there should be little systematic bias.

However, there needs to be an independent, evidence-based approach to benchmarking likelihood estimates. Such an approach exists based on counterfactual risk analysis, which involves enumerating near-misses. Even if major catastrophic events are rare, near-misses are much more common. By reimagining history in a computer simulation, a counterfactual stochastic catalogue of near miss events can be constructed for a pooled set of multiple risks.

Consider pandemic risk. Prior to COVID-19, there were five major lockdown near-misses in the previous two decades, which had alarming case fatality rates of 10% or more: SARS (2003), H5N1 influenza (2004), MERS (2012), H7N9 influenza (2013) and Ebola (2014). There are similar near-miss lists for natural catastrophes, terrorism and cyber risk.

The possibility of closing catastrophe protection gaps and broadening the risk base for shouldering catastrophe losses can be achieved by pooling multiple catastrophe risks and expanding sparse, individual event datasets to incorporate catalogues of near misses. These dual measures will enhance the crucial task of frequency estimation as well as confidence in the risk transfer process.

Source: Gordon Woo, RMS

³⁷ Box 2 offers a supplementary cost of capital calculation for pandemic risk coverages.

³⁸ Hartwig et al. 2020.

³⁹ EIOPA 2021 discusses the obstacles to multi-peril solutions such as potential tail dependencies (e.g. the correlation between the huge rise in people working from home and exposure to cyberattacks) and accumulation risk.



Box 2 offers a supplementary cost of capital calculation for pandemic risk coverages.

Box 2: Economic capital cost for a publicly-owned insurer writing pandemic risk

Any re/insurer that obtains its capital on the financial markets incurs market-consistent capital costs. These costs are based on the return an investor requires when investing in the insurer. There are two cost components: frictional costs and a market risk charge for market-dependent risks that the investor cannot diversify.

Frictional capital cost

There are four major components of frictional capital cost. First, the **cost of double taxation** arises when insurance companies are taxed on their investment return before it can be distributed to shareholders. Second, the **cost of financial distress** arises because selling insurance introduces the risk that an insurer will experience financial distress. Financial distress can be costly due to both direct costs – such as the costs of needing to raise fresh capital, legal fees and lost value from distressed sales – and indirect costs – primarily loss of reputation and associated franchise value. Third, **agency costs** are associated with difficulties of shareholders to ensure that their interests are aligned with those of the management. Finally, the fourth component of frictional cost is the **cost of regulatory restrictions** linked, for example, to conservative reserving standards, minimum capital requirements or fungibility constraints.⁴⁰

The frictional cost charges are associated with insurance activities. For a typical insurer, they amount to 3.5–4% of the available capital. A certain portion must be allocated to pandemic risk. Usually, the allocation key is chosen according to the contribution of the risk to the required capital.

In order to obtain concrete figures, let us assume a required return on investment of 3.75% above risk-free, a corporate tax rate of 20%, a solvency ratio of 200% and a diversification benefit of pandemic risk within the insurance-related activities of 70%. In a pandemic, the cover is likely to experience a total loss. Therefore, the capital required to cover the risk without considering diversification is the full cover.

⁴⁰ Swiss Re 2001.

Consequently, the proceeds required from the pandemic business to finance a 3.75% return above the risk-free rate to the investor can be calculated as follows:

$$3.75\% / (1-20\%) * 200\% * (1-70\%) = 2.81\% \text{ rate on line, i.e. as a percentage of the cover}$$

Note that this could be lower if the pandemic risk benefits from a higher diversification or the solvency ratio is lower.

Market risk premium

As pandemic risk is clearly correlated with the financial markets, investors need to earn a corresponding market risk premium on the capital that is exposed to that risk. To estimate this premium, we observe that the pandemic cover correlates totally with pandemic-related recessions affecting a broad range of sectors. Similarly, bond defaults correlate strongly with recessions affecting the respective industry segment. The basic assumption is that the market risk premium for a pandemic cover and a corporate bond with the same expected loss is similar.

Let us assume a 33-year return period for the pandemic event, i.e. a 3% expected loss. Berndt et al. analyse the decomposition of the total credit charge of bonds into a component for the expected loss and for the market risk premium.⁴¹ According to this study, a factor of 2.35 needs to be applied to the expected loss in order to obtain the market risk premium. This yields a market risk premium of 705 bps.

Total cost

Some components of the frictional capital costs are also accounted for in the market risk premium, particularly the cost of financial distress and, to a lesser extent, agency costs. To avoid double counting, the frictional capital cost needs to be appropriately adjusted. A reduction of 30% seems appropriate leading to frictional cost of 1.97% of the cover. The total rate on line, excluding any administration cost, therefore, amounts to 3% (for the expected loss) + 1.97% (to cover frictional cost) + 7.05% (to finance the market risk premium), i.e. 12%.

Note that the capital cost component amounts to 75% of the total cost. Such high percentages are typical for highly correlating risks.

Source: Lutz Wilhelmy, Swiss Re

3.3.2 Insurance-Linked Securities⁴¹

Following Hurricane Andrew in 1992 and the subsequent tightening of re/insurance capacity, efforts began to tap into capital markets directly as a mechanism for financing future catastrophic events. ILS are now well-established financing devices that enable insurance risk to be sold and traded in capital markets, increasing re/insurers' capacity to pay claims arising from mega-catastrophes and other loss events. CAT bonds are the most prominent type of ILS – a fully collateralised instrument that pays out if a defined catastrophic event occurs.⁴²

Insurance-Linked Securities (ILS) are well-established financing devices that enable insurance risk to be sold and traded in capital markets, increasing re/insurers' capacity to pay claims arising from mega-catastrophes and other loss events.

⁴¹ Berndt et al. 2018.

⁴² Cummins 2008.

Given the enormous potential capacity available from global capital markets, ILS have always been discussed in the context of expanding the limits of insurability. Pension fund assets alone amount to USD 33 trillion worldwide.⁴³ Global mutual fund assets are estimated to exceed USD 40 trillion.⁴⁴ This compares with the estimated USD 2 trillion capital base of the global non-life insurance industry.⁴⁵

Against this backdrop, more recently, discussions began as to whether ILS can be harnessed to manage other difficult-to-insure catastrophic risks such as cyber. In contrast to natural disaster risk, however, cyber events are hardly diversifiable if they have a global impact; 'cyber bonds', therefore, would have to offer significantly higher coupons than 'ordinary' cat bonds. Another concern is the correlation of a major global cyber event with financial markets, in sharp contrast to the uncorrelated nature of natural catastrophe risk which is one of the main attractions of ILS for investors. The arguably most significant obstacle to securitising cyber risk is risk modelling, pricing and the determination of a trigger mechanism as actual losses after a cyber event are typically difficult to establish.⁴⁶

The fundamental limits to insurability presented by pandemic business continuity risk present major, if not insurmountable barriers to ILS solutions.

The fundamental limits to insurability presented by pandemic business continuity risk⁴⁷ present major, if not insurmountable barriers to ILS solutions. Pandemic

business continuity losses are neither random nor independent. The strong correlation among individual risks renders efficient risk pooling and diversification impossible. Also, the maximum possible loss is not manageable due to the uncontrollable aggregation of losses. Therefore, similar to systemic cyber shocks, the appetite of capital markets for pandemic business continuity is likely to remain very limited, also in light of its correlation with other asset classes in financial markets.^{48 49 50}

3.3.3 Parametric coverages

Parametric insurance pays out on the basis of a pre-determined index (e.g. the magnitude of an earthquake or the intensity of a storm) which captures losses as a result of catastrophic events. In contrast to traditional insurance, it does not rely on assessing the actual damage. Therefore, the main advantage of parametric insurance is that payouts will be faster, with no gray areas, costly litigation or lengthy waiting periods while a loss is assessed.^{51 52}

Parametric insurance helps push back the frontiers of insurability and bridge protection gaps that are so far unaddressed.

So far, parametric insurance has been primarily used for natural disasters. More recently, advances in data science, sensor technology and artificial intelligence have enabled the creation of a broader spectrum of indices.⁵³ For example, innovative parametric solutions now protect shipping and manufacturing companies when river water levels fall. These new solutions do not provide

43 OECD 2020c.

44 TheCityUK 2018.

45 Swiss Re 2019.

46 Ammar et al. 2015.

47 As discussed in The Geneva Association 2020.

48 Contrary to pandemic business continuity risk, the risk of extreme mortality is regularly transferred to capital market investors. The first 'pandemic' bond was issued in 2003, when Swiss Re floated a USD 400 million offering to protect its own book against extreme mortality events such as war, terrorism, pandemics or nuclear attacks. Following this pioneering offering, a total of 27 additional catastrophe bonds with a pandemic component have been issued. None of them have been triggered to date. See Dror et al. 2020.

49 As discussed in section 3.2.2, previous attempts to specifically securitise pandemic risk have been criticised for their cost, complexity and slowness in paying out.

50 Louaas and Picard 2020 suggest a different approach to involving financial markets. As pandemics affect the various sectors of an economy in different ways, with both losers and winners, there might be some scope for risk coverage mechanisms based on a portfolio of financial securities, including long-short positions and options in stock markets.

51 SCOR 2019; IDF 2020.

52 This benefit is partially offset by basis risk, i.e. the difference between the insured's ultimate net loss and the actual payout resulting from the index. If the basis risk is negative the parametric payment is lower than the loss suffered by the insured. For example, a storm could destroy the insured's building, but s/he will not get paid if wind speeds never reached the agreed-upon threshold. According to Singer 2019, this potential mismatch is one of the main reasons for the still very small size of the parametric insurance market.

53 IDF 2020.

protection against direct physical damage, but rather the indirect consequences of events.⁵⁴ As such, they help push back the frontiers of insurability and bridge hitherto unaddressed protection gaps.⁵⁵

As discussed in section 3.2.1, pre-COVID-19 there was a specific parametric insurance product on offer designed to protect businesses against economic losses from infectious disease outbreaks (e.g. loss of gross profit, loss of revenue, extra expenditure), based on triggers such as a pathogen sentiment index, alerts by health authorities and fatality counts. Such solutions were inspired by the desire to address pandemic protection gaps. Business interruption insurance typically excludes coverage for losses from viral perils such as the forced closure of businesses in the interest of public health safety.

Currently, the scope for broader parametric coverage of pandemic business interruption risks pivots around the need for the rapid deployment of payments. For example, for small-and-mid-sized companies with high fixed costs, a few weeks can make the difference between staying afloat or going under.⁵⁶

In addition to expediting payouts and avoiding legal disputes parametric insurance is also a particularly suitable approach to mitigating moral hazard, i.e. a situation when insureds engage in risky behaviors without having to (fully) bear the financial consequences.⁵⁷ Well-established ways of mitigating moral hazard include insurance policies that are contingent on the insured's behavior. An alternative approach is to limit the extent to which risk is shared by adding deductibles, coinsurance, limits, exclusions, etc.⁵⁸

The cost efficiencies afforded by parametric triggers could help enable limited pandemic risk coverages; for example, designed for SMEs which tend to be most vulnerable to business continuity risk.

As Hartwig et al. 2020 show, moral hazard is relevant in the context of pandemic risk, too. If a business receives compensation for all or most of its pandemic-induced additional costs and lost revenue, it will have little incentive to take precautionary measures such as preparing a business continuity plan or mitigating losses after the event occurs. Also, public authorities could be more inclined to initiate or extend lockdown measures if they can pass a portion of the cost onto insurers.⁵⁹

In summary, the cost efficiencies afforded by parametric triggers could help enable limited pandemic risk coverages; for example, designed for SMEs which tend to be most vulnerable to business continuity risk

Parametric techniques, however, are unable to meaningfully narrow the gargantuan protection gaps revealed by COVID-19.

54 Singer 2019.

55 Ibid.

56 Unnava 2020.

57 COVID-19 has resulted in major contractual disputes about pre-pandemic BI wordings and highlighted the utmost importance of clarity in wordings. See HerbertSmithFreehills 2020 for a concise summary of the current business interruption insurance litigation in the U.K.

58 The Geneva Association 2020.

59 Ibid.



4. A comparative analysis of potential public-private pandemic risk management solutions

As we have shown in The Geneva Association 2020, society has a vital interest in cushioning pandemic losses. We have also demonstrated that the insurance sector alone is unable to provide the amount of coverage businesses need to withstand pandemic risk. Therefore, government involvement is a necessary condition for enhancing preparedness for and resilience to future pandemic shocks. From both an institutional and risk perspective, the following section will outline a broad spectrum of approaches the public sector can adopt in order to facilitate and support the sharing of pandemic risk through partnerships with insurers or stand-alone.

There is a broad spectrum of approaches the public sector can adopt in order to facilitate and support the sharing of pandemic risk through partnerships with insurers or stand-alone.

4.1 An institutional perspective – Four exemplary approaches to public-sector involvement⁶⁰

4.1.1 *Direct insurance*

The public sector could provide direct voluntary or mandatory insurance to those businesses who are (particularly) exposed to pandemic risk. Government insurers would not only collect premiums but also be able to borrow funds in case payouts exceed accumulated premiums. The government insurer could market policies directly to insureds (which would necessitate the establishment of a proprietary distribution channel or via existing government entities (e.g. emergency management agencies)) or, alternatively, through third parties such as banks, insurers and intermediaries. For claims settlement and payment, the same fundamental options are available.⁶¹

4.1.2 *Reinsurance*

Governments can provide reinsurance to insurers that, prior to a pandemic event, sell pandemic coverage to businesses. The reinsurance coverage would kick in for losses above a certain threshold and up to a designated limit. As for the direct insurance option, a major pandemic would probably require governments to borrow to raise funds as well as to tax in order to service the debt.

⁶⁰ The chosen typology is based on Hartwig et al. 2020.

⁶¹ Hartwig et al. 2020; Paudel 2012.

Box 3: Government reinsurance of terrorism risk

The terrorism insurance market provides ample evidence of how public-sector reinsurance schemes can work. Michel-Kerjan and Pedell and Hartwig et al.⁶² offer a comparative overview of three government reinsurance programmes set up after 9/11. The first example is France which established the government reinsurer GAREAT (Gestion de l'Assurance et de la Reassurance des risques attentats et actes de terrorisme), under which French primary insurers and reinsurers pool terrorism risk up to the first limit. A second layer of coverage is provided by a subset of the participants in the first layer, and a third coverage layer is sourced from international reinsurance markets. The French government offers a fourth layer of unlimited coverage.

In Germany, after 9/11, insurers started to exclude terrorism coverage, which led to the creation in 2002 of Extremus AG, an insurance company owned by private insurers and reinsurers and providing coverage to businesses for property damage and business interruption caused by terrorists acts. Extremus' second layer is provided by private reinsurers. A third layer is contributed by the German government, albeit limited.

The impact of 9/11 on the U.S. commercial insurance market was particularly severe. Terrorism rates surged or terrorism coverage was excluded altogether. This catalysed the creation of the Terrorism Risk Insurance Act (TRIA) in late 2002. Under TRIA, insurers are obliged to offer specifically priced commercial terrorism coverage. Insured entities can either accept or decline coverage. The government reinsures primary insurers above a deductible and with a limit. This backstop is post-funded.⁶³

4.1.3 Social insurance

The distinguishing feature of social insurance is mandatory participation. In addition, it involves a higher level of solidarity and more uniform non-risk adequate pricing. In the context of pandemic risk, participants would be required to make pre-event payments, for example through a special tax or levy. Benefits from such a scheme would be capped at a relatively modest level of potential losses, in line with the typical objective of social insurance to provide modest coverage for broad segments of the population.

Germany's *Kurzarbeit* scheme, which dates back to the 1960s, is an example of a social insurance programme at work in the COVID-19 context. During the lockdown in spring 2020, it mitigated a rise in unemployment and drop in consumer spending by paying furloughed workers a percentage of their lost wages.⁶⁴

4.1.4 Post-event protection

Under this approach the government offers an ad hoc safety net to those impacted by a pandemic. There is no pre-event financing nor pre-event commitment on how

funds would be allocated. Those funds are borrowed, transferring the cost burden onto current and future taxpayers. COVID-19 was handled by most governments using this post-event approach to protection.⁶⁵

4.1.5 A comparative evaluation against seven public policy objectives

The four general modes of public-sector involvement or intervention in pandemic insurance markets can be judged against their relative strengths and weaknesses in achieving various public policy goals. We will investigate the following seven objectives: 1) maximum coverage, 2) limited public exposure, 3) funds matching needs, 4) incentives for risk mitigation, 5) cost-efficient risk transfer, 6) operational efficiency and 7) macroeconomic benefits.⁶⁶

Achieving maximum coverage

As mentioned in section 3.2, optional coverage for pandemic risk was rarely taken up prior to COVID-19. Even though the experience of COVID-19 has led to a

62 Michel-Kerjan and Pedell 2005; Hartwig et al. 2020.

63 In addition to insurance and reinsurance, Monti 2008 discusses additional public-private partnerships in disaster risk management, e.g. the public sector acting as guarantor.

64 IMF 2020.

65 Alpert 2020.

66 These seven objectives are a combination of specific policy goals proposed by Hartwig et al. 2020 and OECD 2020a.

boost in risk awareness and a much increased interest in such coverage, it is uncertain whether this will translate into a long-term change in voluntary take-up, especially if the cost of coverage is substantial and availability of products is scarce. To achieve broader coverage of catastrophe risk protection, a number of countries have imposed requirements such as mandatory purchasing requirements for policyholders (e.g. in Belgium for terrorism risk), mandatory coverage inclusion requirements for insurers (e.g. France, Spain and Australia for terrorism risk) or requirements to make coverage available (e.g. in Japan for earthquakes and in the U.S. for terrorism risk).^{67 68}

Even though the experience of COVID-19 has led to an increase in risk awareness and interest in relevant coverage, it is uncertain whether this will translate into a long-term change in voluntary take-up.

Against this backdrop, a social insurance scheme or a compulsory direct insurance programme (administered by private insurers) would likely maximise coverage and effectively address the ‘free rider’ challenge associated with any voluntary approach. The reach of post-event protection, as witnessed during COVID-19, depends on the effectiveness of the channels used for distributing cash (e.g. the tax or the banking system). For reinsurance schemes with voluntary insurer involvement (in offering and pricing the coverage) and policyholder participation, take-up rates are expected to remain low.⁶⁹ For example, the current terrorism take-up rate under the US Terrorism Risk and Insurance Act (TRIA) is about 60%;⁷⁰ for residential earthquake insurance in California it is as low as 10%.^{71 72}

Low take-up rates would obviously dent the effectiveness of pandemic insurance in cushioning the economic blow from a pandemic.

A social insurance scheme or compulsory direct insurance programme (administered by private insurers) would likely maximise coverage and effectively address the ‘free rider’ challenge associated with any voluntary approach.

Limiting public exposure

The nature of pandemic business continuity risk⁷³ suggests that government-backing needs to focus on higher layers of losses (for which no or very limited private-sector reinsurance and retrocession capacity would be available). If at all, private re/insurance could develop longer-term for smaller losses below this threshold for government involvement.⁷⁴ This threshold may need to be set at a relatively low level, given private re/insurance markets’ inability to manage the losses resulting from a future global pandemic on the scale of COVID-19. Hence, there are difficult trade-offs between governments’ desire to reduce fiscal exposure (and to increase the share of risk transferred to private re/insurance markets) on the one hand and the policy objective of harnessing insurance for societal risk mitigation and resilience building (not only as risk absorbers but also as risk managers and experts).^{75 76}

There are difficult trade-offs between governments’ desire to reduce fiscal exposure and the policy objective of harnessing insurance for societal risk mitigation and resilience building.

Public-sector exposure is set to remain high to very high under all four exemplary types of government

67 OECD 2020a.

68 See also section 4.2 of this report which discusses the virtues of mandatory versus voluntary risk redistribution.

69 Dixon and Saunders-Medina 2020.

70 However, one needs to keep in mind that the government backstop (which is the majority of the cover) is post-funded. The price of the coverage is, therefore, not risk adequate, resulting in a relatively high level of penetration.

71 Ibid.

72 Marsh LLC 2019; Marshall 2018.

73 See The Geneva Association 2020.

74 Experience from the national terrorism re/insurance programmes in Australia, the UK and the US shows how long it takes to increase private sector involvement, even for a risk that, contrary to pandemics, is insurable and diversifiable in principle.

75 Insurers will have to clear a number of hurdles to enhance their capabilities to risk-manage pandemics. EIOPA 2020, for example, discusses specific challenges and opportunities in risk assessment, risk prevention and product design. See also the section below, ‘Incentivising risk mitigation’.

76 OECD 2020a; EIOPA 2020.

involvement explored in this section, subject to individual governments' appetite for lost economic output. For post-event responses the burden is likely to be highest. For reinsurance schemes with a clearly defined insurer deductible it would be somewhat lower yet still massive. For government-sponsored direct and social insurance schemes, the ultimate exposure of the public sector depends on how rates, taxes or social security contributions are set and to which extent participation is mandatory for direct insurance programmes.

For government-sponsored direct and social insurance schemes, the ultimate exposure of the public sector depends on how rates, taxes or social security contributions are set and to which extent participation is mandatory for direct insurance programmes.

Matching funds to needs

In order to be effective and to stabilise the economy, a pandemic insurance scheme would indemnify a substantial share of a business's losses, but also include deductibles to mitigate moral hazard. From the perspective of economic efficiency, it is desirable to have a high correlation between compensation and actual losses.^{77 78}

Intuitively, a centrally designed scheme is unlikely to properly match compensation with losses. Hence, it might be preferable if individual businesses signal their own demand for cover and compensation to private insurers from whom they would buy individually designed and priced policies. Therefore, a voluntary private insurance market with government provided reinsurance should translate into a more accurate matching of compensation and losses than under a direct

and centrally designed government primary insurance programme with limited coverage options.^{79 80}

Social insurance mechanisms for pandemic risk would offer a relatively uniform and modest amount of compensation to businesses. Especially for those who suffered large losses, the correlation between compensation and losses would remain low.

And, finally, a major and frequently-witnessed drawback of post-event protection schemes is their ad hoc character in an urgent context. This makes sub-optimal levels of matching very likely.

Incentivising risk mitigation

There is a fundamental trade-off between compensating businesses for their pandemic losses and the potential adverse effect this can have on their incentives to reduce the frequency and/or severity of the loss once it occurs.⁸¹ Against this backdrop of moral hazard, any risk-sharing scheme should also be judged by its impact on incentives for risk mitigation and prevention.⁸²

Whether or not pandemic business continuity risk is transferred to private re/insurers' balance-sheets, the industry could play an important role in enhancing societal resilience to and preparedness for future pandemic shocks.

In general, whether or not pandemic business continuity risk is transferred to private re/insurers' balance-sheets, the industry could play an important role in enhancing societal resilience to and preparedness for future pandemic shocks. The spectrum of contributions ranges from awareness building among policyholders, to supporting governments in assessing pandemic risk, to designing policies which incentivise risk mitigation (e.g. investments in ex ante business continuity planning, including protective measures at the workplace, the

77 Depending on how 'actual losses' are defined the amount of funds needed can vary significantly.

78 Hartwig et al. 2020.

79 As discussed before, potentially low take-up rates may offset the effectiveness of voluntary insurance, regardless of whether it is provided directly by the government or by private insurers who are reinsured by the government.

80 Hartwig et al. 2020.

81 Mitigation incentives include those for innovation to help businesses continue to operate, while keeping employees and customers safe.

82 EIOPA 2021.

possibility of teleworking or adapted cyber security policies).⁸³

For example, residents in Florida who make their houses more hurricane-resistant can expect to benefit from a reduced premium.⁸⁴ Therefore, in order to incentivise risk mitigation, it makes sense for governments to draw on insurance expertise in marketing and pricing pandemic insurance and in settling claims.⁸⁵

In order to incentivise risk mitigation, it makes sense for governments to draw on insurance expertise in marketing and pricing pandemic insurance and in settling claims.

Even though, in principle, a government insurance programme could replicate private insurance underwriting processes and contract design features, it would likely be driven by political considerations in pricing, impairing the effectiveness of risk-based underwriting in incentivising risk mitigation.

Social insurance programmes typically treat participants similarly in terms of pricing and benefits. Thus, the risk mitigation incentives from a social insurance scheme are weaker compared to private insurance mechanisms.⁸⁶

The mitigation incentives offered by post-event protection programmes depend on the public's expectations. If businesses consider it likely that the government will cover most losses, they will have little incentive for risk mitigation.⁸⁷ If, however, businesses have doubts as to the probability of public support and if they understand their potential exposure, risk mitigation

incentives will be strong. In light of the experience from COVID-19, the former seems more likely than the latter.

Maximising cost-efficiency of risk transfer

The most fundamental decision-making problem governments face in the context of pandemic risk is whether to financially support/back-stop a pandemic catastrophe risk insurance programme or provide support post-event from the general government budget. As covered earlier in this section, even if private-market appetite for pandemic business continuity risk remains subdued, insurer contributions to risk management, mitigation and prevention could be substantial.

As discussed in section 3.3.1 and depending on the specific nature of government responses to pandemics, a single pool providing coverage for all of a country's businesses could create a more diversified portfolio of risks than any insurance company could achieve on its own, resulting in lower economic (and frequently regulatory) capital needs and lower pricing.⁸⁸

The cost-efficiency of government-supported direct insurance and reinsurance schemes depends on the size of the risk pools resulting from public policy measures. Is participation mandatory or voluntary? And which role do insurers play in pricing and offering the coverage? These are major questions that need to be considered.

Social insurance schemes typically create large risk pools that can benefit from diversification effects. Post-event schemes, however, are likely to be the least cost-efficient form of risk transfer. Risk is not proactively mitigated pre-event.

Post-event schemes are likely to be the least cost-efficient form of risk transfer.

83 There will be challenges to capturing the industry's potential to risk-manage pandemics, not least because of the fact that insurers currently do not insure pandemic business continuity risk and do not have the same level of expertise as in other areas of catastrophic risk. For example, modelling non-damage business interruption risks associated with pandemics will remain very challenging, especially as such risks primarily arise from the (government) decisions taken to mitigate pandemics, such as the administrative decision from national or local authorities to implement a lock-down (The Geneva Association 2020). Also, insurers may lack tools and data to measure the efficiency of the prevention measures adopted by businesses and reflect the effect in the premium or policy conditions. Another challenge is that full risk-based pricing may be difficult to implement given the likely costs to high-risk business categories even factoring in risk prevention measures (EIOPA 2020 and EIOPA 2021).

84 Born Klein 2016.

85 McMorro et al. 2013.

86 See Feldstein 2005.

87 This is known as the Samaritan's dilemma (Buchanan 1977).

88 An assessment of the amount of capital required to cover a 1-in-100 hurricane striking eight US states suggests a 45% reduction in capital needs (USD 71 billion instead of USD 130 billion) if the states pooled their risks collectively rather than individually (Dumm et al. 2015).

Maximising operational efficiency

This objective is about minimising the share of premiums absorbed by insurers' operating expenses (distribution and administration), i.e. to maximize the amount of money available to indemnify losses. In insurance, this is an important aspect, as up to one third of premiums is needed to cover operating expenses.⁸⁹

Operational efficiency is driven by both system design and business execution. A system will typically be more cost-efficient the fewer 'middlemen' are involved. Also, the day-to-day operational efficiency is an important determinant, and the private sector is generally believed to be more cost-efficient and cost-conscious.⁹⁰

Among the four exemplary forms of government involvement, social insurance is likely to be most cost-efficient as it relies on existing administrative structures such as tax authorities. Benefits could simply be based on payroll or revenue, albeit at the expense of matching funds with the compensation needed (see above).

The cost for distribution, claims settlement and policy administration is set to be higher if the government directly provides insurance and lower if its role is limited to providing reinsurance to private insurers.

From a narrow cost perspective, post-event assistance appears to be relatively efficient, too, as operating expenses are only incurred when a pandemic actually occurs. However, reaching as many businesses as possible as quickly as possible, without prior preparation, could prove more costly than expected.

The cost for distribution, claims settlement and policy administration is set to be higher if the government directly provides insurance and lower if its role is limited to providing reinsurance to private insurers.

Achieving macroeconomic benefits

The main motivation for developing pandemic insurance mechanisms is to stabilise the economy.⁹¹ Insurance, regardless of whether it is provided directly by the government or through the private sector with a

government backstop, can help businesses stay afloat, curb unemployment and maintain consumer spending.

Each of the four fundamental mechanisms explored offer specific macroeconomic benefits. Even though post-event aid is ad hoc (and structurally delayed due to the necessary political approval processes), it can be more flexible and targeted than the other approaches.

Having said this, social insurance is likely to provide even greater macroeconomic benefits given its broad reach and particular relevance for small businesses with low-to-middle income owners and employees who spend rather than save the support funds received. Government-provided insurance or reinsurance, if voluntary, is obviously associated with smaller macroeconomic benefits, given the uncertainty over ultimate take-up rates.

4.1.6 The role of insurance

Under the conceptual framework discussed above, insurance expertise could be brought to bear across a broad spectrum, ranging from (limited) risk transfer to purely administrative support:

- Under government-led direct insurance schemes, private insurers could issue and market policies as well as offer pricing support, depending on specific government objectives. Insurers would also most likely assist governments in making payments.
- The government-backstopped reinsurance option could see insurers assume limited, lower-layer underwriting risk. Insurers would set risk-based rates for the risk they retain, with clear incentives for insureds to engage in risk mitigation. Payments would be made for losses incurred using the same coverage terms and conditions as for physical damage business interruption losses.
- There is no role for private insurers in implementing social security schemes.
- The only conceivable role for insurers under an ad-hoc, post-event relief scheme would be to supplement other channels for distributing public funds and, possibly, assist governments in achieving a better match between funds disbursed and actual needs.

⁸⁹ Hartwig et al. 2020.

⁹⁰ Ibid.

⁹¹ See The Geneva Association 2020 for more information on the magnitude of this challenge and associated protection gaps.



The only conceivable role for insurers under an ad-hoc, post-event relief scheme would be to supplement other channels for distributing public funds and, possibly, assist governments in achieving a better match between funds disbursed and actual needs.

More generally, as stand-alone risk carriers, insurers already facilitate pandemic vaccine research conducted by pharmaceutical companies through clinical trial insurance which covers participants of the trials and, in many countries, is mandatory as part of the regulatory approval process. This role is well-established and, as

opposed to the potential contributions mentioned above, could be instrumental in mitigating today's business continuity risk arising from the ongoing COVID-19 pandemic.

Table 3 summarises our comparative evaluation of the four exemplary pandemic risk-funding schemes. Each option has its distinct strengths and weaknesses. Having said this, just waiting for the next pandemic to happen and then disbursing cash post-event is probably the least effective approach. For government-provided insurance, reinsurance and social insurance each, a solid economic case can be made, with the final choice depending on various policy goals and trade-offs (e.g. between the breadth of coverage and incentives for risk mitigation).

Table 3: A comparative assessment of four exemplary types of government involvement in pandemic risk funding⁹²

Policy goal / type of government involvement	Direct insurance	Reinsurance	Social insurance	Post-event protection
Coverage	Low to medium (unless compulsory)	Low (depending on insurer involvement in offering and pricing)	High (but relatively modest level of compensation)	Medium to high (subject to effective distribution channels)
Public exposure	Medium to high (public sector would absorb all losses not covered by premiums)	Medium to high (public sector would absorb all losses in excess of insurers' deductible)	Medium (public sector would absorb all losses not covered by taxes or contributions)	High (public sector would absorb all losses)
Matching of funds with needs	Medium (if centrally designed, with limited coverage options)	High (for voluntary private insurance, protected by public reinsurance)	Low (especially for businesses who suffered large losses)	Low (due to ad hoc features, designed under time pressure)
Risk mitigation incentives	Medium (underwriting considerations likely to be influenced by political objectives)	High (based on underwriting mechanism)	Low (due to undifferentiated prices and benefits)	Low (if businesses expect 'bail-out')
Cost-efficiency of risk transfer	Medium to high (depending on pool size)	Medium (depending on pool size)	High (given large pool size)	Low (risk is removed from the market)
Operational efficiency	Low (cost of distribution)	Medium (cost of dealing with private insurers)	High (leveraging existing structures)	Medium (but uncertain)
Macroeconomic benefits	Medium (due to uncertain take-up rates)	Medium (due to uncertain take-up rates)	High (due to broad reach)	Medium (due to ad hoc character)
Role of private insurers	Issue and market policies Make claims payments Support pricing (if applicable)	Assume limited lower-layer risk Set risk-based rates Set incentives for risk mitigation	None	Supplementary role in distributing funds and matching them with needs

Source: The Geneva Association, compiled and assessed from quoted sources

- High level of policy objective achievement
- Medium level of policy objective achievement
- Low level of policy objective achievement

⁹² The assessment criteria do not carry the same weights. Arguable macroeconomic benefits and risk mitigation incentives are more relevant overall than cost and operating efficiency, for example.

4.2 A risk perspective – Removing pandemic risk from the market versus redistribution of risk⁹³

The previous section presented the institutional strengths and weaknesses of a number of exemplary and generic types of government involvement against specific (and often conflicting) public policy objectives. To complement that analysis, the following takes a closer and more granular look at how pandemic business continuity risk can be dealt with from a risk transfer point of view and with a clear focus on public-private partnerships. We will concentrate on the protection needs of SMEs and explore a typology inspired by the current policy debate in the U.K. but with relevance for other jurisdictions, too.⁹⁴ We will also look at responses to smaller-scale disruptions (e.g. localised lockdown measures) which may not require any government involvement in insurance markets.

Around the world, initiatives in which governments join forces with the insurance market have flourished, generating a range of different risk-sharing schemes that aim to address protection gaps for various large-scale disasters.⁹⁵ These schemes broadly have the same goal, which is to transform uninsured risk into insurance products that can be, at least partially, further transferred to global reinsurance markets in order to provide capital for recovery following a disaster.

Jarabkowski et al. provide a large-scale, detailed study of these schemes, termed **Protection Gap Entities (PGEs)** that operate between state and market.⁹⁶ Examples of PGEs include:

- **Pool Re** and **Flood Re** – the U.K., single-peril risk pools set up to support the market provision of commercial terrorism cover and residential flood insurance cover respectively; and
- **Consorcio de Compensación de Seguros (CCS)** – the provider of multi-peril disaster insurance in Spain.

As previously discussed, PGEs are the underlying ‘archetypical forms’ of government involvement and they typically vary considerably in terms of governance structures, risks covered (e.g. single or multi-peril), type of risk solution (e.g. insurance versus reinsurance) and

funding model (e.g. policyholders’ premiums, public or private levy).⁹⁷ Nevertheless, Jarabkowski et al. show that PGEs have important common underlying principles in their strategic responses to protection gaps and how they share risk with market and non-market parties.⁹⁸

Pandemics differ in three ways to the protection gap for other large-scale disasters, such as earthquakes, floods and terrorist attacks. They are systemic phenomena that can potentially affect the whole global economy, in terms of industries and geographic spread; they are difficult to bound temporally, raising complicated issues around when they end and whether further waves can be considered part of a single event or separate events; and, in the shape of business continuity risk, they are endogenous to the extent that they are driven by deliberate government decisions.

Useful lessons can be learnt from the strategic responses to other protection gaps for how we consider risk-sharing for pandemics in the future.

These characteristics make pandemics more problematic to insure, exacerbating the ‘protection gap’ issue.⁹⁹ Nonetheless, useful lessons can be learnt from the strategic responses to other protection gaps for how we consider risk-sharing for pandemics in the future. We therefore explain the principles underlying existing PGEs and apply them to evaluate some of the pandemic risk-sharing solutions currently being proposed.

4.2.1 The Protection Gap Strategic Response Framework

Jarabkowski et al. show that PGEs around the world emphasise primarily either removing risk from the market, or redistributing risk across all policyholders as their primary means of risk-sharing (see Figure 3).¹⁰⁰

93 This section was kindly contributed by Professor Paula Jarabkowski and her team.

94 Therefore, the assessment criteria applied are different from those used in section 4.1. Also note that the specific solutions mulled in the U.K. (as presented in the Annex) are far from settled and still evolving.

95 Paudel 2012.

96 Jarabkowski et al. 2019.

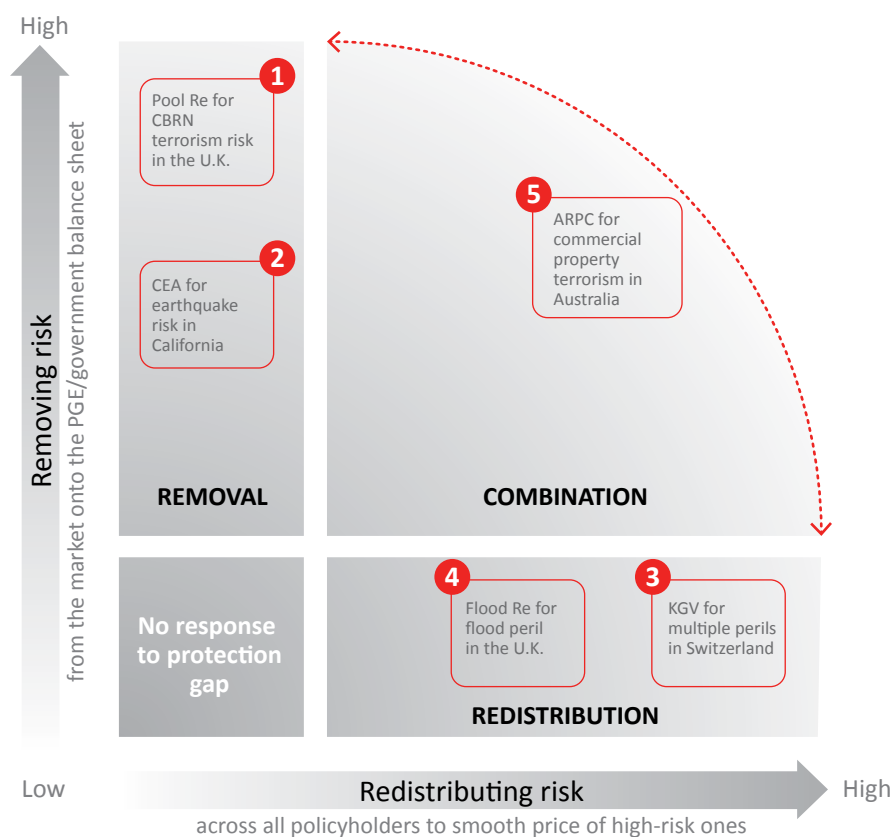
97 Browne and Hoyt 2000; McAneny et al. 2016.

98 Jarabkowski et al. 2019.

99 Lloyd’s 2020; OECD 2020a; The Geneva Association 2020.

100 Jarabkowski et al. 2018.

Figure 3: The Protection Gap Strategic Response Framework



1. Remove all risk from the market to the PGE/government
2. Remove risk to the PGE and return only some to the market (e.g. through reinsurance or insurers' retention)
3. Redistribute all of the risk across all policyholders
4. Redistribute some of the risk across all policyholders
5. Remove risk from the market to the PGE/government AND redistribute across all policyholders

Source: Jarzabkowski et al. 2018

Removing risk refers to a response in which risk is removed from the market onto the balance sheet of the PGE, and potentially then to the government (vertical axis, Figure 3).¹⁰¹ This is particularly likely for risk that is seen as too volatile or extreme for the market to take. In this scenario, insurance companies may accept premiums from insureds, so ensuring that policies can still be issued and serviced. However, they then pass the entire premium associated with this risk to the PGE. The PGE can then provide the cover because it has access to some government guarantee (limited or unlimited) to pay for losses, as with Pool Re in the U.K. in Figure 3, or

generates its own reserves in the private market to cover losses, as with the California Earthquake Authority.

While the extreme position on this dimension is removing the risk fully from the market, responses may vary along the continuum, removing only some of the most extreme risk. For example, a PGE might remove a 'top layer' of risk as defined by market signals, such as high price or withdrawal of insurance supply, while risk below a certain threshold is retained by primary insurers in the usual way.

¹⁰¹ Ibid.



Redistributing risk refers to taking the risk of loss by a relatively small group of highly-exposed policyholders and sharing it across the wider pool of variably-exposed policyholders through a levy (horizontal axis, Figure 3).¹⁰² Low-risk policyholders pay a slightly higher premium than their actual risk in order to subsidise an affordable premium for those who are highly exposed to risk. The PGE, typically formed as a pool, takes the premiums from all policyholders, using the levy to smooth pricing across all participants in the risk pool.

PGEs that adopt the strategic response of redistributing risk attempt to create a wide pool of insureds, in which the premiums of the many, widely distributed across possible exposures, can continue to cover the extreme losses of the few. However, they can only do so with some government legislation that enables a levy on lower-risk policyholders to subsidise higher-risk policyholders, as with Flood Re in the U.K., or through a not-for-profit government monopoly in which insurance is mandatory and offered at a fixed price, as with KGV (Cantonal Building Insurance) in Switzerland.

Removing and redistributing risk are not necessarily either/or responses. As demonstrated in Figure 3, PGEs can combine risk removal and risk redistribution, albeit not necessarily in equal measures. Rather they may take an approach where they remove some elements of risk and redistribute others.¹⁰³ Often such changes occur in

an evolutionary way. A PGE may initially be established to solve, for example, the problem of lack of supply for a very volatile risk through a strategic removal response. Once supply begins to return, it might also employ some redistribution of risk through industry retentions that are spread across a pool of policyholders, as with the Australian Reinsurance Pool Corporation (ARPC), for example.

4.2.2 An application to pandemic risk

The following is an evaluation of the five ideal types of responses to pandemics – present and future – and how they fit into the Protection Gap Strategic Response Framework (see Figure 4). The proposed typology reflects the current discussion in the U.K. but is also relevant for other jurisdictions.

Broadly, each of these responses intends to protect SMEs against business interruption. However, they vary in terms of their design, time scale, scope, product type, and degree of industry capitalisation. The typology is not intended to reflect any specific solution, all of which are currently evolving, but rather to evaluate the range of solutions under development according to their key risk-sharing characteristics.

¹⁰² Ibid.

¹⁰³ Jarzabkowski et al. 2018.

Type 1: Immediately 'putting out small fires'

This type is aimed mainly at supporting SMEs with immediate small-scale coverage during future waves of the current COVID-19 pandemic.¹⁰⁴ The key risk to be addressed is disruptions in the return to work, in light of potential short-term and localised lockdowns; that is, 'putting out the small fires' that may continue to occur as businesses reopen. This would be achieved by pooling risk between insurers and offering non-damage BI coverage for potential future waves of COVID-19.

As opposed to the exemplary schemes discussed in section 4.1, the scope of the solution is comparatively limited, intended to offer only cover for small claims, and relies solely on the insurance industry (i.e. market mechanisms) without any direct government intervention. The response is pre-funded through upfront premiums charged annually. It relies on the pooled capacity of insurers in order to offer affordable products to customers.

The risk remains in the insurance market with no government backstop. Endeavouring to respond to customers' needs to 'insure a burning house', this response will only work if business interruption losses are small scale (e.g. businesses close partially or for a few weeks instead of months) and locally contained (e.g. a few regional lockdowns as opposed to universal national lockdowns). Therefore, given the scale of pandemics and the need for premiums to be affordable to insureds, under Type 1, redistribution over an insured population will be necessary (see Figure 4). This includes ensuring a sufficiently wide and geographically-diverse pool of insureds so that the pool of premium can reasonably cover the losses linked to the hopefully few local lockdowns.¹⁰⁵

There are two main challenges with Type 1:

1. Such widespread redistribution is unlikely to occur without government legislation to ensure mandatory cover, and government legislation rarely happens at the speed necessary to cover recurrent waves of the current pandemic.
2. Like all forms of risk redistribution, consideration must be given to reducing moral hazard. Redistribution strategies can induce moral hazard because those at the highest risk of repeated loss are not incentivised to take measures to reduce their risk as they do not bear the full costs of their exposure. Our analysis of redistribution responses for other disasters, such as flood, has shown it can direct attention away

from risk mitigation and thus, in the long-term, exacerbate the very problem it was established to solve.¹⁰⁶ Therefore, it will be necessary to specify the risk mitigation measures that need to be in place as a condition of cover, such as imposing social distancing and following strict health guidelines. Unfortunately, such risk mitigation measures by individual businesses are not directly correlated with the trigger for business closure, which is imposed by governments.

Type 2: Long-term recouping post-event

Type 2 is designed as a post-event insurance product, aiming to provide SMEs with an immediate cash injection and recovery support, paid for over the long-term and backed by a government credit risk guarantee. It relies on both government capacity and insurance industry commitment.

Type 2 provides a flexible pricing mechanism. Insurers offer SMEs to buy multi-year contracts with mandatory premium payments over the full term, or with cancellation penalties to ensure insurers' claims costs are recovered. This will allow insurers to recover upfront claims costs over the length of the policy term (e.g. 10–15 years) whilst ensuring the product is affordable for customers by spreading the cost over time. Governments may be required to guarantee policyholders' future premiums to mitigate the risk of defaulting on payments.

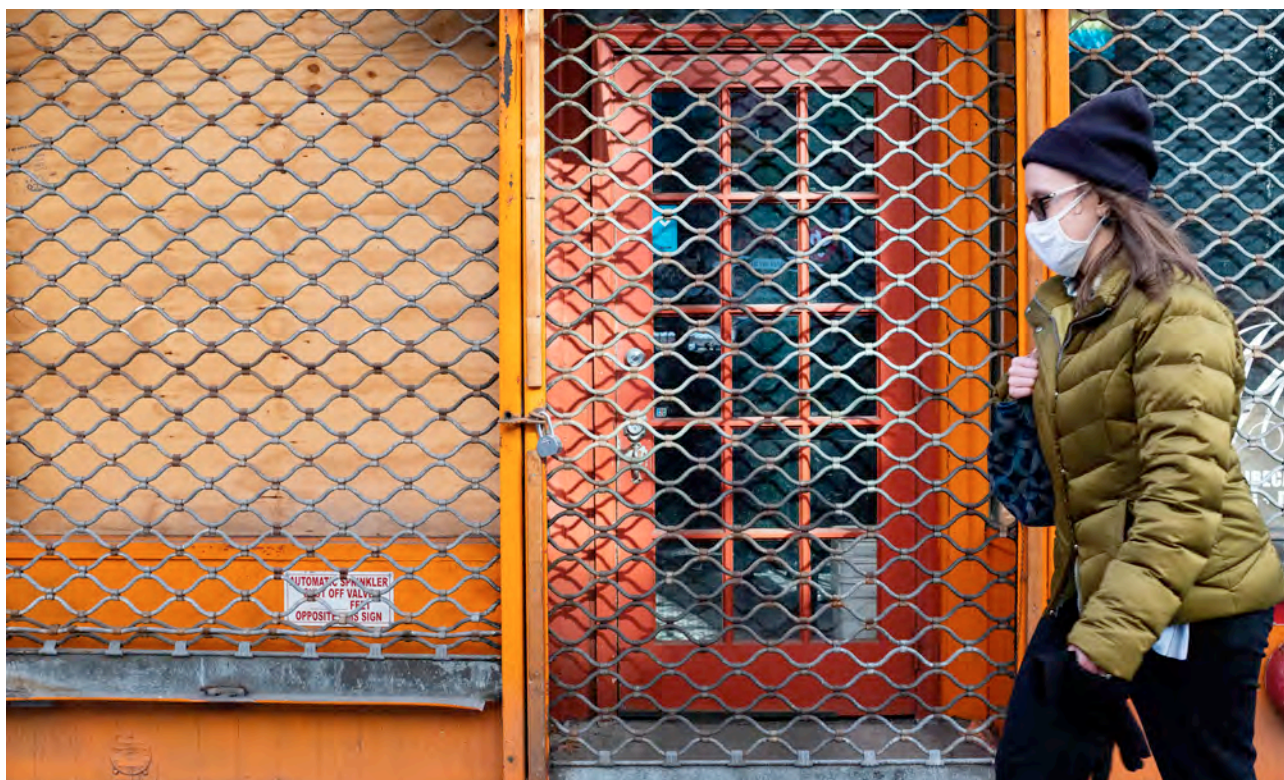
Type 2 is primarily risk redistribution with some element of risk removal. In the short-term, the risk to pay claims without receiving the full premium is covered by the insurance industry, and this industry subsidisation of the premiums at the outset will be redistributed across the policyholders through recouping premiums over time via a multi-year insurance contract (see Figure 4). Yet the risk of default on those long-term premiums is covered by a government guarantee which effectively moves some of the risk – the risk of default – to the public sector.

However, this combination approach has challenges. First, and accounted for in the design of the solution, it can only work where policyholders are compelled to take out a multi-year product. Given that even with this compulsory, long-term recoupment some businesses may default because of other disruptions to their business model, cash flow and survival, a government backstop is required to guarantee the premiums in light of default – an embedded risk-removal mechanism. Second, with or without this guarantee, moral hazard remains a problem, since businesses can take the upfront policy, even when their ability to remain robust for the

¹⁰⁴ In the meantime, the second wave is in full swing in many major economies, limiting the relevance of Type 1.

¹⁰⁵ See section 3.3.1 for the massive differences in capital requirements between local and national catastrophic events.

¹⁰⁶ Jarzabkowski et al. 2018.



life of the policy is uncertain. Many SMEs may have declining business models that are not realistic for a recoupment scheme, necessitating careful parameters in offering the product. While some of these businesses will fail and be unable to meet the long-term recoupment of premium, the insurance acts as an economic stimulus. At the same time, insurers' own risks are minimised due to the government guarantee.

Type 3: Defined-event, rolling-review backstop

Type 3 is a large-scale, government-backed premium pool to reinsure pandemic-specific non-damage business interruption (NDBI) insurance cover. As a PPP, it relies on the government as a financial backstop to cover any claims but is largely insurance industry-led in its execution.

Insurance firms design and offer products around pandemic-related NDBI and collect the premiums. These premiums are paid into a pool that is the designated reinsurer, providing payments to policyholders that are affected by a pandemic-related event as defined in the enabling agreement of the government. As per the label for Type 3, the government-defined event is critical because that will determine whether payments are triggered. This is because, while the insurance industry administers the scheme, it does not retain any of the risk. Rather, the designated reinsurance pool will pay all

claims with the government providing a financial backstop of an (unlimited) guarantee if the assets in the pool are exhausted, for example, due to a significant national lockdown or a series of medium-sized lockdowns.

Such government-guaranteed pools tend to be designed with a (rolling) review period. For example, a government inquiry every three to five years to ascertain the extent to which a government backstop is still necessary to ensure cover, or whether the private market can take more of the risk. Jarzabkowski et al. show that reviews provide an opportunity to increase retention of risk by the primary market and to increase the amount of commercial reinsurance cover that might trigger prior to the government backstop.¹⁰⁷ Rolling reviews enable private market appetite and capacity to be reconsidered regularly, incentivising the insurance industry not simply to rely on the government as 'insurer of last resort'. The rolling review of Type 3 may eventually involve some redistribution of risk across the insured population, as indicated by the arrow in Figure 4.

Type 3 entails full risk removal from the insurance industry. Although it administers the scheme, all of the risk is transferred to the government's balance sheet via the designated reinsurance pool.

¹⁰⁷ Jarzabkowski et al. 2018.

This approach has two challenges. First, it effectively subsidises the insurance industry to take the risk, without having any of it on their own books. Given the uninsurability of systemic pandemic BI risk this subsidisation seems to be inevitable. Unless a deliberate and creative policy to progressively return at least some of the pandemic risk to the market is put in place, the market will not develop appetite and technical capabilities to price and assume that risk. In order to address this challenge, Type 3 could move towards at least some redistribution over time, both buying a reinsurance product in the private market and also supporting insurers to retain some limited risk.

The second challenge arises because such designated reinsurance pools can grow into a significant pot of premium over time if there are no claims. Given that the premium (even though it arises via private-sector charges to policyholders) is guaranteed by the government, ownership over that premium can become contested through successive political cycles. To respond to this challenge, Type 3 could have a defined rolling-review period - for example, every five years – involving multiple private- and public-sector stakeholders, to clarify the potential for some redistribution to the private market and agree on terms for drawing on the premium pot; for example, to invest in risk mitigation measures.

Type 4: Open event, rolling-review backstop

While Type 3 aims to provide protection against pandemic risk, Type 4 takes a broader, multi-peril approach. It is designed for NDBIs as a result of any future systemic events, such as a cyber event, or the systemic effects of climate change.

In principle, this scheme is similar to Type 3 but is more open and not peril-specific. In Type 4, the exact peril has not been defined in detail a priori because the scheme is intended to be a catch-all for disasters that shock the system. Hence, the payment triggers are also undefined, needing to relate to some undefined, government-declared systemic event. Given the open definition of the event and trigger, this scheme could not operate in a private market but would need to have a full government backstop. The scheme may operate in the same way as Type 3, with premiums collected against systemic risk and paid into a government-designated reinsurance pool that can provide a buffer for the government backstop.

Type 4 acknowledges that, just as the pandemic was unanticipated, we cannot know what the next systemic disaster will be. However, it is also counter to current principles of insurance in terms of indices, models, pricing and solvency requirements. Even where a premium might

be charged, it could not truly be linked to, or reflect, the risk. Hence, it might best be considered as a form of levy upon insurance policies, all of which would be passed directly to the government pool, rather than a true insurance product.

As with Type 3, this option would also operate as a risk removal scheme. The government would declare events systemic, such as a pandemic or widespread cyberattack, and would fully backstop claims related to those declared events. The main challenge for Type 3 is the problem of declaring the trigger for such an event, given that knowledge about which risks are likely to be systemic is continuously evolving and risks that are not currently on the horizon at the time of designing the PGE may be systemic in the future. As Jarzabkowski et al. show,¹⁰⁸ over successive political cycles, the intentions encoded in the remit of the designated PGE and the valid uses of its funds become the subject of what the authors termed a 'Stakeholder Expectation Gap'. It was therefore recommended that PGEs be the subject of an ongoing dialogue between the key stakeholders, during which the remit itself may evolve to meet the changing nature of risk in society. In particular, the pool of premium being built up through such a scheme may be reinvested to better understand risks that are identified as systemic and to mitigate against their effects. This will be particularly critical with Type 4 and could be built into a three-to-five year rolling review process that incorporates an evolving set of stakeholders.

More fundamentally, Type 4 is an untested concept. Bundling systemic NDBI risk with other types of systemic risk is set to present major challenges in terms of complexity and exposure.

Type 5: Partial, temporary risk removal

Type 5 includes focused government-backed solutions that partially and temporarily remove a specific risk from a business sector to the government balance sheet, rather than the entire risk for that particular sector. This is designed to resolve, temporarily, the lack of appetite from the private insurance market in offering insurance products to cover those losses.

During the ongoing COVID-19 pandemic, the U.K. Government, in collaboration with the insurance industry, has introduced some government-backed solutions focused on specific sections of risk. While these continue and are being extended at the time of publication, they are only designed to be temporary solutions rather than remain in place after the COVID-19 crisis. We therefore label Type 5 as 'partial, temporary risk removal' solutions, of which we now explain two.

108 Jarzabkowski et al. 2018.

The **Trade Credit Insurance (TCI) Reinsurance Scheme** was co-created by the insurance industry and the U.K. Government.¹⁰⁹ The scheme serves as a state-backed reinsurance programme by providing a guarantee of up to £10bn for insurers to continue to offer TCI. Under the scheme, the government will reinsure 90% of insurance claims and takes 90% of the premiums,¹¹⁰ up to a total insurer loss ceiling of £3 billion, and 100% of claims between £3 billion and £10 billion.¹¹¹ Therefore, despite the increased risk of non-payment due to the ongoing pandemic, the scheme enables the provision of trade credit insurance to U.K. businesses that allows them to continue trading on credit terms. This provides financial liquidity and cash flow, a crucial factor for SMEs, and, importantly, ensures wider, ongoing economic activity. The scheme was announced in June 2020. Initially, it was set to run for six months but has been extended to the end of June 2021.¹¹²

The **Film and Television Production Restart Scheme** aims to assist in the restart of television and film productions that have been suspended or postponed due to the withdrawal of insurance for COVID-19 related risks. In July 2020, the Government launched the U.K.-wide, £500-million Film and TV Production Restart Scheme to offer insurance for productions against losses arising from Covid-19 interruptions, including filming delays and cast and crew illnesses. The government has outlined specific eligibility criteria for productions companies and offers cover directly to production companies with a cap of £5m per production for a fee of 1% of the production budget. The scheme has supported numerous productions to get back up and running, saving many jobs in the film and TV industry.¹¹³ The scheme, which was initially going to run for six months, has been extended until December 2021 in order to cover the summer shooting schedule.

Type 5 provides rapid, temporary, government-backed insurance or reinsurance solutions to the unavailability of re/insurance arising from pandemic risk. These solutions, however, are partial as they aim to cover only specific risks, such as trade credit, or particular sectors, such as film and TV production. The positive aspect of such solutions is that they can be instated rapidly at the instigation of the government, without needing to go through policy changes or legislation, so they can address immediate demand. However, the downside is that they are partial, which means that multiple such solutions would need to be set up in a timely fashion, if the goal is to provide insurance cover for as many

types of risks and different business sectors as possible. Moreover, their temporary nature assumes that the private market will have appetite to re-assume such risk at the end of the current pandemic

For systemic risks, a mandatory approach might be most appropriate, particularly for Types 3 and 4, where the cover involves a full government guarantee.

For each of the five types of solution presented, there are two key considerations. First, whether cover is mandatory or voluntary. This will determine the size of the risk pool and the scope for risk redistribution.

Second, each of these options necessitates government involvement to varying degrees, either through legislation to support redistribution or through a government guarantee or backstop. Also, questions of fairness arise. For example, in Type 5 some specified risks and sectors receive support while others do not. In Types 2 to 5, the government will support those who have taken out pandemic insurance, yet it will also have to prop up those without insurance. In light of this, for systemic risks, a mandatory approach might be most appropriate, particularly for Types 3 and 4, where the cover involves a full government guarantee.

Each type of solution indicates a valuable role for the insurance industry to play, as risk takers, professional distributors, and claims managers and/or as experts in risk mitigation and prevention.

Figure 4 integrates the five ideal types discussed in this section into the 'Protection Gap Strategic Response Framework'.

109 Association of British Insurers 2020.

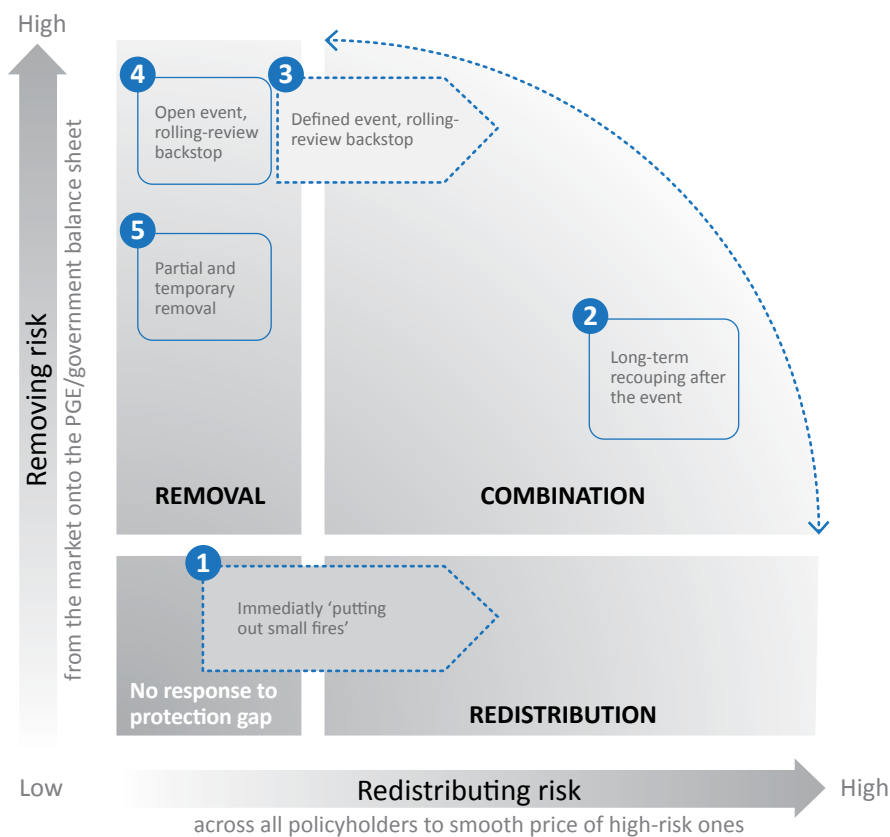
110 Association of British Insurers 2020.

111 Department for Business, Energy & Industrial Strategy press release June 2020.

112 Department for Business, Energy & Industrial Strategy 2020.

113 Department for Digital, Culture, Media & Sport and HM Treasury 2021.

Figure 4: Five potential responses to pandemic protection gaps



1. Immediate solution where risk is transferred to insurance industry, but unlikely to be viable (no response) unless the risk is redistributed across all policyholders
2. Remove risk to the insurance-led PGE and redistribute across all policyholders with government guarantee for default
3. Remove risk to the PGE/government and later may return some to the market (e.g. through reinsurance or insurer retention)
4. Remove all risk from the market
5. Partial and temporary removal

Source: Paula Jarzabkowski



5. Conclusions

1. The unique and systemic character of COVID-19 related business continuity risk has demonstrated the **limits to insurers' perennial efforts to push the boundaries of insurability**. Neither tapping into capital markets nor innovative approaches such as multi-year, multi-peril or parametric policies are expected to generate meaningful private sector capacity for covering pandemic risk associated with government-mandated lockdown measures.
2. In order to harness insurance as a proven pre-event mechanism for managing and mitigating catastrophic risks, **governments need to involve themselves as 'insurers of last resort'**. Also, their power to borrow funds and levy taxes is a prerequisite for economically viable risk pooling over time. In light of gargantuan loss exposures, government backstops are indispensable to nurturing even small-scale, private-sector coverages which may develop over time, as happened with terrorism risk following 9/11. The case for government involvement is further corroborated by increased urbanisation and global interconnectedness, which will make pandemic risk more acute going forward.
3. **Any form of government involvement in pandemic risk management comes with major trade-offs**. For example, mandatory social insurance schemes may have a significantly positive impact on the overall economy, in addition to being very cost-efficient. However, social insurance largely fails in the crucially important contexts of incentivising risk mitigation and matching the funds distributed with actual losses incurred by businesses. Government reinsurance backstops of private-sector solutions are another example of difficult trade-offs. They score well in terms of incentivising risk mitigation and indemnifying losses that were actually incurred. However, such schemes are not expected to be effective in maximising coverage and macroeconomic benefits.
4. Even though it is impossible for insurers to absorb pandemic business continuity risk in any meaningful way, **the industry could play an important role in enhancing societal resilience** to and preparedness for future pandemic shocks. Insurers could contribute through awareness building among customers, supporting governments in assessing pandemic risk, designing policies which incentivise risk mitigation (e.g. investments in ex ante business continuity planning, including suggesting protective measures at the workplace, teleworking or updates to cyber security policies). Therefore, insurers should reach out to governments and play an active part in designing and implementing future pandemic risk solutions.

5. **The lessons learned from COVID-19 will inform the public and private sector's 'playbooks' for future pandemics**, possibly resulting in significantly lower economic losses (and protection gaps). Therefore, such losses and gaps are endogenous variables which are changed or determined by the effectiveness of pandemic risk schemes, especially in terms of incentivising risk prevention and promoting resilience building. Insurers should sensitise stakeholders to the fact that the size of future protection gaps will critically depend on the measures adopted today.
6. With the world still in the throes of COVID-19, **the conceptual frameworks presented in this report do not yet lend themselves to judging any of the specific proposals** being considered in various jurisdictions. Once humanity emerges from the pandemic, governments should take stock of all the lessons to be learned and, on that basis, carefully analyse the pros and cons of conceivable public-private approaches to pandemic risk.

Annex: ‘Live evidence’ – A comparison of five pandemic risk insurance programme proposals¹¹⁴

In many jurisdictions, policymakers, legislators, insurers and insurance organisations are developing proposals on the establishment of pandemic risk insurance programmes. This annex presents a few prominent, publicly-discussed examples against the conceptual frameworks described in section 4.



Europe

Under the heading ‘shared resilience solutions’, EIOPA has proposed options for an insurance solution for addressing pandemic-related business interruption losses.

The following principles underpin the proposed development of a shared resilience solution for pandemic risks:

- Sharing costs and responsibilities across the relevant parts of the private and public sector (‘skin in the game’)
- An element of central coordination across public and private entities
- Conditionality upon implementing efficient and effective prevention and adaptation measures
- Insurance against a portion of the economic costs only.

On that basis, EIOPA outlines potential options for addressing pandemic risk assessment challenges (such as the modelling of NDBI risk) and incentivising risk mitigation and prevention measures through pricing and wordings.¹¹⁵ It also discusses some potential product design features to provide NDBI cover in the short or medium term (e.g. a focus on SMEs and the use of parametric triggers). The paper also sets out risk transfer approaches based on different mechanisms for risk sharing between insurers, reinsurers and governments at the national or European level (e.g. mandatory cover for NDBI insurance, pooling solutions and capital market solutions).

¹¹⁴ See also EIOPA 2021 for a mapping of selected proposal for pandemic risk schemes.

¹¹⁵ EIOPA 2020.



France

In April 2020, the French Minister of Economy and Finance established a working group including legislators and representatives from business and the French insurance associations to develop a framework for providing insurance for exceptional events, such as a global pandemic. Discussions are presently (January 2021) at an impasse as the French government does not support the proposed framework which is based on mandatory subscription.

Several versions of CATEX (catastrophes exceptionnelles) have been submitted by the French Insurance Association (FFA). The last proposition was to provide coverage for business interruption losses as a result of pandemics only (previous versions were covering pandemics but also terrorist attacks, riots and major natural catastrophes). Under this proposal, the coverage could be triggered by a government action leading to the closure of businesses in a given geographical region for a specified amount of time. The coverage would be attached to either commercial property or business interruption coverage and would be available to any company (SMEs and large corporations alike). It would offer lump-sum payments that do not necessitate loss adjustment, replacing business disruption costs net of salaries and profits.

The scheme would be funded by a premium paid by companies and backed by the government similar to existing regimes for natural catastrophes and terrorism risk. French insurers and reinsurers have indicated that they would provide EUR 2 billion in capacity.¹¹⁶



Germany

In June 2020, the German Insurance Association (GDV) published a green paper proposing the establishment of a legal entity that would collect funds from policyholders (either directly as risk-based premiums or through a compulsory, flat-rate levy attached to certain policies). It would make payments to policyholders in the event

of a WHO-declared pandemic and/or the declaration of a regional epidemic by the relevant German public authorities. Payments would either be made to all businesses (under the flat-rate levy model) or to those that paid risk-based premiums for the coverage. The German government would provide a backstop for losses above the capacity of the legal entity.¹¹⁷

The green paper also highlights the industry's risk management and mitigation expertise and the advantages of using existing customer relationships for a fast and efficient support payment process in future pandemics.¹¹⁸



United Kingdom

In the U.K., industry representatives have established various working groups to design solutions to the BI protection gap exposed by pandemic risk. One of the options debated is Pandemic Re, a government-backed reinsurance pool with broad participation from across the U.K. insurance sector.

Lloyd's suggests three additional potential solutions:¹¹⁹

1. Short-term: The **ReStart** programme would pool capacity within the Lloyd's market to provide business interruption coverage for small companies for future potential waves of COVID-19.
2. Medium to long term: **Recover Re** would collect premiums (based on diversification over time under multi-year policies) to fund payments to policyholders for non-damage BI after a future pandemic that disrupts businesses. The role of the government would be to provide a guarantee against policyholder premium payment defaults and, potentially, to fund payouts in the initial years before Recover Re is sufficiently capitalized.
3. Longer term: **Black Swan Re** would be a reinsurance pool backstopped by a government guarantee providing coverage for broader systemic non-damage business interruption losses. Under this proposal, private-sector capacity would be relatively small at first but expected to grow over time.

¹¹⁶ OECD 2020a and OECD 2021.

¹¹⁷ GDV 2020.

¹¹⁸ Richter and Wilson 2020.

¹¹⁹ Lloyd's 2020.



United States

In the U.S., three major proposals are being discussed:

Pandemic Risk Insurance Act

The first approach is based on a legislative initiative to establish a federal pandemic risk reinsurance programme – the Pandemic Risk Insurance Act of 2020 (PRIA). It would operate similarly to the Terrorism Risk Insurance Program by providing a federal backstop for business interruption and event cancellation losses incurred by participating insurers as a result of a ‘covered public health emergency’ (an event certified as such by the Secretary of Health and Human Services, e.g. a pandemic or infectious disease outbreak). Under the draft PRIA legislation, the private sector would have some ‘skin in the game’, with the federal reinsurance covering 95% of losses above an individual participating insurers’ deductible of 5% of direct earned premiums. There is an overall limit of USD 750 billion in annual payouts. Participating insurers would be obliged to offer the coverage but businesses would not have to purchase it.¹²⁰

Business Continuity Protection Program

An alternative scheme, the Business Continuity Protection Program (BCPP), has been proposed by a group of U.S. insurance associations (the American Property Casualty Insurance Association (APCIA), the National Association of Mutual Insurance Companies (NAMIC) and the Independent Insurance Agents and Brokers of America (Big I). BCPP would provide federal compensation for up to 80% of specific types of operating expenses (including payroll, employee benefits and other operating expenses) for up to three months following the declaration of a public health emergency. The trigger for protection would be parametric with no need for claims adjustment.

On a voluntary basis, covered businesses would have to purchase this protection in advance (at premiums of a percentage of their payroll and expenses) and would need to certify that they would implement all applicable federal guidance on health and safety measures during

the health emergency. The private insurance industry would not absorb any risk, with the federal government covering all claims costs.¹²¹ Similar to the National Flood Insurance Program, the insurance industry would assist in administering protection on behalf of the government, which would provide the actual support through the Federal Emergency Management Agency (FEMA).¹²²

Pandemic Business Interruption Program

A third proposal, the Pandemic Business Interruption Program (PBIP) was introduced by U.S. property and casualty insurer Chubb. It differentiates between coverage for SMEs and large companies. For small businesses, the programme would provide a fixed payment based on a multiple of payroll costs in the event of a government-declared pandemic and lockdown. The first layer is USD 250 billion with the industry’s share of USD 15 billion in year one, rising to USD 30 billion over the course of 20 years. An excess layer of USD 500 billion would be entirely funded by the government. Policyholders would only have to pay premiums for the industry’s share of losses. Companies opting out of purchasing this coverage would forego access to business interruption coverage or federal assistance programmes in the event of a pandemic. For medium and large companies, BI coverage could be purchased on a voluntary basis from private insurers who would cede a share of the risk (and premium) to a government reinsurer. Coverage would be limited to USD 50 million per policy and the industry retention would not exceed USD 15 billion initially but increase over time.¹²³

Table 4 offers a comparison of various programme proposals’ key features.

¹²⁰ Sclafane 2020.

¹²¹ NAMIC 2020.

¹²² Richter and Wilson 2020.

¹²³ Chubb 2020.

Table 4: An overview of select pandemic risk insurance programme proposals

	Risk sharing	Pricing	Claims adjustment	Offer	Purchase	Coverage	Eligibility
EIOPA	Yes	Risk-based or uniform	Indemnity or parametric	Mandatory or voluntary	Mandatory or voluntary	Pandemic BI	SMEs
CATEX	Yes	Risk-based	Indemnity	Voluntary	Mandatory or voluntary	Pandemic BI	All businesses
GDV	Yes	Risk-based or uniform	Indemnity or parametric	Mandatory or voluntary	Mandatory or voluntary	Pandemic BI	All businesses
Pandemic Re (U.K.)	Yes	Risk-based	Indemnity	Voluntary	Voluntary	Pandemic BI	All businesses
ReStart (Lloyd's)	Yes	Risk-based	Indemnity	Voluntary	Voluntary	COVID-19 BI	SMEs
Recover Re (Lloyd's)	Yes	Risk-based	Indemnity	Voluntary	Voluntary	Pandemic BI	All businesses
Black Swan Re (Lloyd's)	Yes	Risk-based	Indemnity	Voluntary	Voluntary	Systemic risk BI	All businesses
PRIA (U.S.)	Yes	Risk-based	Indemnity	Mandatory (for participating insurers)	Voluntary	Pandemic and infectious disease BI and event cancellation	All businesses
BCPP (U.S.)	No	Uniform (based on payroll and expenses)	Parametric	Mandatory	Voluntary	Pandemic BI	All businesses
PBIP (Chubb)	Yes	Risk-based or uniform	Indemnity or parametric	Mandatory (for SMEs) or voluntary	Quasi-mandatory (for SMEs) or voluntary	Pandemic BI	SME versus larger companies programme

Source: The Geneva Association, based on sources referenced

The scope for international solutions

From an economic perspective, cross-country risk-sharing arrangements for extreme events may make sense.¹²⁴ In the case of nuclear risk, for example, a number of national nuclear insurance pools have entered into reinsurance arrangements with other national nuclear insurance pools to generate sufficient overall capacity for a major event.¹²⁵

In the context of pandemic business continuity risk, EIOPA discusses the scope for EU-wide approaches such as a European reinsurance solution for pandemic risk coverage.¹²⁶ The EU would act as reinsurer above a certain threshold of accumulated losses at national level, in return for a percentage of premiums collected by re/insurers, adding to overall insurance capacity and benefiting from geographical diversification.

¹²⁴ Cebotari and Youssef 2020; Dumm et al. 2015.

¹²⁵ OECD 2020a.

¹²⁶ EIOPA 2020.

The following box highlights a pandemic BI risk product with limited coverage and government support which Chinese insurers started offering in February 2020.

Box 4: Product example from China: 'Comprehensive epidemic prevention and control'¹²⁷

The practice adopted by China's insurance industry in responding to COVID-19 in the early weeks of the national lockdown measures shows that pandemic BI risk, under certain conditions, with strong government support and effective public-private partnerships, is partially insurable. The 'comprehensive epidemic prevention and control insurance' product, encouraged by The China Banking and Insurance Regulatory Commission (CBIRC) was first launched in Hainan province, one of China's special economic zones, in mid-February 2020 in order to assist key enterprises in the region in speeding up the resumption of work. This product is mainly compensating enterprises for production losses, salary expenditure and quarantine costs caused by COVID-19 during the government's mandated lockdown period.

In order to control underwriting risks, the insurance cover has five notable restrictions:

1. The scope of insured companies is limited to those companies most heavily affected by COVID-19.
2. The coverage is limited to a maximum compensation of RMB 2 million (USD 300,000) for a single enterprise. Specifically, as for the salary expenditure, the compensation is based on the monthly salary of quarantined employees, and the maximum compensation limit is RMB 6,000 (USD 900) per person per month. The maximum compensation period is 14 days for suspected cases or people who are mandated by public authorities to quarantine, while for confirmed cases, the period of compensation is from the date of quarantine to the date of cure. As for the output losses, the amount of compensation shall be calculated according to actual losses incurred.
3. The insurance period is limited to six months.
4. The government provides additional subsidies for insured enterprises (RMB 120,000 or USD 18,000).
5. On a provincial level, insurers co-insure the underwriting risk; in Hainan, for example, it was jointly taken on by 12 P&C insurers.

At present, the comprehensive epidemic prevention and control insurance cover has been extended to most parts of China, covering 32 provinces (including autonomous regions and municipalities directly under the Central Government).



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This second report in The Geneva Association's research series on pandemics and insurance explores four exemplary and generic types of public-private pandemic risk solutions, as well as five specific risk transfer options for pandemic business continuity risk, focusing on the protection needs of SMEs. This report builds on the findings of our first report on the insurability of pandemic risk, which demonstrated that pandemic-induced business continuity risk defies criteria for insurability in the private market. The maximum possible loss is not manageable from the insurer's solvency point of view. Governments, therefore, need to get involved as 'insurers of last resort'.

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