

Framework for Evaluating the Role of Insurance in Managing Risk of Future Pandemics

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The current pandemic has proven to be one of the most extensive complex catastrophic risks the global economy has ever faced. This paper provides stakeholders with a practical framework, informed by the recent experience with COVID-19, for defining a meaningful role for insurance with respect to business interruption (BI) and other risks from future pandemics (“pandemic risk”). In particular, the framework puts into context the scale and complexity of the pandemic risk by comparing and contrasting it with other extreme events such as floods, earthquakes and terrorism. We then characterize the following **three alternative options** where the property and casualty industry may be able to play a role in supporting businesses, nonprofits, and the public sector in managing the risk of future pandemics in the United States:

1. **Status Quo (SQ)** – Currently, there is loose coordination between public and private responses to pandemic losses. SQ contemplates a similar loose coordination of private insurance with other financial services and the public sector in responding to BI and other losses (e.g., workers compensation, liability, surety, and event cancellation) during future pandemics.
2. **Service Provider (SP)** – This option contemplates a non-risk-bearing role for the property and casualty insurance industry, whereby insurers provide underwriting expertise, marketing of pandemic risk-related products, and claims payment administration on a fee-for-service basis. The entire cost of pandemic-related claims would be publicly financed.
3. **Service and Risk (SR)** – In addition to relying on the property and casualty insurance industry to act as a service provider, this option expands its role to include committing capital to cover a specified layer or other defined element of losses from a future pandemic. SR contemplates that insurers would price pandemic risk coverage by sending economic signals that encourage mitigation and other loss reduction measures without imperiling the financial viability of the insurance industry.

KEY FINDINGS

- Recent experience with COVID-19 highlights the need for a framework to help determine whether there is a role for insurance with respect to business interruption (BI) and other risks from future pandemics.
- Three options for insurance are (1) the status quo, with loose coordination between government programs and private insurance products; (2) insurance companies providing services to a publicly-funded pandemic risk program; and (3) insurance companies also assuming some level of risk-bearing within such a private-public partnership.
- Before weighing the alternative options, stakeholders would: (1) define criteria for providing pandemic relief; (2) evaluate, improve, or set aside existing COVID-19 pandemic relief programs; and (3) identify the role the insurance industry is best positioned to play.
- Specific questions to consider include: (1) how and to what extent the insurance industry can fill gaps in the existing set of programs and policies; (2) how and to what extent the insurance industry can augment the effectiveness of an existing program or policy; and (3) what existing programs or policies might insurance replace.

Three guiding principles and a decision-making framework are proposed for evaluating the performance of each of these alternative options (SQ, SP, and SR) in future pandemics, including a hypothetical reoccurrence of COVID-19. The paper concludes by posing three practical issues for stakeholders to consider.

The following general points frame the rest of the paper:

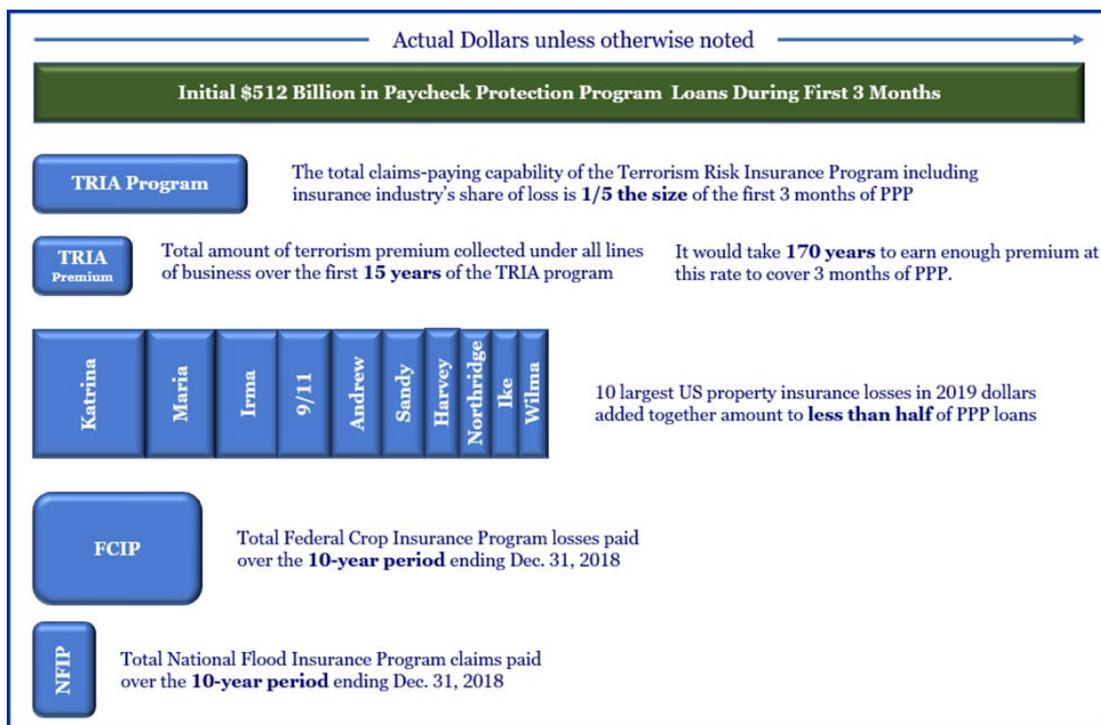
- The scale, correlations, and complexity of pandemic risk, as evidenced by ongoing COVID-19 losses, far exceed traditional parameters that define the concept of insurability for private insurers and reinsurers noted in Part II;
- The property and casualty insurance industry’s financial capacity for covering foreseeable losses from future pandemics is inadequate so that substantial public sector participation in financing pandemic losses will be necessary.

PART I: SCALE AND COMPLEXITY OF THE PANDEMIC RISK

Based on the United States’ experience in responding to COVID-19, evidence suggests that pandemic risk presents a much larger **scale** and greater **complexity** than other extreme events.

- **Scale** – The United States’ government response during the months of April to June 2020 highlights the magnitude of the challenge facing the country. During that period, the Paycheck Protection Program (PPP), a federally funded 8-week small business program, approved more than 5 million applications for forgivable loans representing some \$525 billion in pandemic relief. This banking-administered relief effort eclipses the scale of any historical insurance-based catastrophe response. For example, PPP’s \$525 billion outlay between April and June 2020 was more than twice the amount of U.S. property insurance claims from the 10 largest property insurance loss events combined, or the equivalent of 170 years of insurance premiums associated with the Terrorism Risk Insurance Act, as shown in Figure 1.

FIGURE 1: PAYCHECK PROTECTION PROGRAM (PPP) EXPENDITURES IN FIRST THREE MONTHS (APRIL-JUNE 2020) COMPARED TO HISTORICAL INSURED LOSSES AND OTHER PROGRAM DIMENSIONS



Sources: U.S. Treasury [Paycheck Protection Program Loan Data](#); Insurance Information Institute data regarding [U.S. Catastrophes](#); and U.S. Treasury’s [Report on the Effectiveness of the Terrorism Risk Insurance Program](#).

The Paycheck Protection Program is just one of a number of federal and state relief programs directed to individuals, businesses, nonprofits, and local governments. With the passage of the American Rescue Plan Act signed by President Biden on March 11, 2021, the expenditures by the public sector for COVID-19 relief now total more than \$3 trillion.¹

- **Complexity** – Businesses, nonprofits and governments face a dynamic catalogue of exposures from COVID-19, as shown in Table 1. Future pandemics would likely present similar risks and exposures (e.g., event cancellation and surety) as well as other losses that have yet to emerge and could take years or even decades to fully understand.

TABLE 1. RISK AND EXPOSURES FROM FUTURE PANDEMICS

Risk	Exposure
Lockdown Orders	Business Interruption Modification to Reopen
Infected Workers and Family Members	Workers Compensation Liability
Infected Customers and Suppliers	Liability

PART II: PARAMETERS OF INSURABILITY

Hartwig/APCIA (2020)² highlight the following six criteria for insurability of a risk:

- A risk must consist of a large number of exposure units so that the losses of the few can be **distributed** across the entire population of policyholders;
- Losses must be **accidental** or random and unintentional in nature;
- Losses must be determinable and **measurable**, enabling accurate and timely adjustment;
- Losses cannot be exceedingly catastrophic or financially **ruinous** to the risk pool as a whole;
- The probability of loss and its consequences must be **calculable**, a characteristic necessary for the proper modeling and pricing of risk; and
- The premium charged by insurers to transfer the risk of loss must be economically **affordable**.

Rather than implying a binary picture (that is, risks are either insurable or uninsurable), it is more useful to focus on a continuum of insurability, ranging from easy-to-insure to difficult-to-insure. The U.S. experience in dealing with COVID-19 shows that pandemic risk is toward the far end of that spectrum. That said, there are steps that can be taken to nudge the pandemic risk toward a greater degree of insurability, such as:

¹ See <https://www.usaspending.gov/disaster/covid-19>.

² Hartwig/APCIA (2020). Uninsurability of Mass Market Business Continuity Risks from Viral Pandemics. <http://www.pciaa.net/docs/default-source/default-document-library/apcia-white-paper-hartwig-gordon.pdf>

- **Containing the probability and severity of risk:** COVID-19 and earlier pandemics (e.g., the “Spanish” Flu (1918-20), Hong Kong Flu (1968), Asian Flu (1956-1958), H1N1 Flu (2009)) provide some data that insurers can utilize to estimate probability and potential losses and deaths from future pandemics of different magnitudes. [Catastrophe models with respect to pandemics are still in their infancy](#) but they could eventually be used to complement the historical data as a basis for pricing insurance. Because prior data on pandemics are extremely limited, insurers normally incorporate risk margins in their premium calculations resulting in higher prices and reduced capacity.

Despite its severity, COVID-19 can be viewed as mild compared to the 1918 “Spanish” Flu pandemic. The current pandemic has killed over 3.3 million people worldwide as of May 14, 2021. John Barry (2004) noted that the number of fatalities in the 1918 flu pandemic is estimated to be between 50 and 100 million people. [In a January 2021 interview](#), he pointed out that adjusting for population, the number of fatalities today would be equivalent to between 225 and 450 million people. The impact of future pandemics on the insurance industry is discussed in Lloyd’s (2008) report. It indicates that any insurance proposal would have to be robust against a more severe pandemic than COVID-19.

- **Capping potentially ruinous exposure:** The U.S. experience with COVID-19 affirms the potential of extreme losses from pandemics. A private-public partnership, such as a federal backstop or similar mechanism would cap overall exposure of the pandemic risk to the insurance industry and create a limited private market for covering well-defined and limited amounts of losses from future pandemics.
- **Dealing with affordability:** The public sector could assist businesses and other entities that cannot afford a risk-based insurance premium through means-tested vouchers, tax credits or other subsidies.

PART III: PUBLIC POLICY RESPONSE TO OTHER EXTREME RISKS

The private and public sectors have, with varying degrees of success, worked together to manage other low-probability, high-consequence risks; however, there are key differences between the path taken for pandemic risk and the risks of flood, earthquake, and terrorism. With respect to other extreme risks, many insurers have been willing to provide coverage against disasters that they perceive as having a low probability of large claims payments. After suffering a severe loss from an “unexpected” extreme event, they may increase premiums significantly (if allowed to do so by state regulators), reduce the amount of protection they are willing to offer through higher deductibles and/or lower limits of coverage, or conclude that the risk is simply uninsurable. Aware of these issues, the industry and policymakers at the federal and/or state level often establish and continuously refine a private-public partnership to assist in managing extreme risks, as illustrated by the following examples:

- **Flood insurance** was offered by many insurers from the 1890s until 1928, when two severe floods led every responsible company to discontinue coverage, declaring the flood risk to be uninsurable (Knowles and Kunreuther 2014).³ The National Flood Insurance Program (NFIP) was established in 1968 to provide homeowners in flood-prone areas with financial protection against damage to their property. Currently, most residential flood policies in the United States are provided by the NFIP, with private insurers marketing coverage and processing claims but not bearing any risk.
- **Earthquake insurance** was widely available to homeowners in California starting in 1916 but few homeowners purchased coverage. Following the Loma Prieta earthquake in 1989 and the Northridge quake of 1994, there was increased interest by homeowners in earthquake-prone areas of California in purchasing earthquake insurance. In 1995, insurers concluded that they could not risk selling more residential earthquake policies. This led to the formation of the California Earthquake Authority (CEA), a state-created entity that has offered earthquake insurance since that time (Roth, Jr. 1998).⁴

³ Knowles, S. G., and H. C. Kunreuther (2014). Troubled waters: The National Flood Insurance Program in historical perspective. *Journal of Policy History*, 26(3), 327-353.

⁴ Roth, R. J., Jr. (1998). Earthquake Insurance Protection in California. In: *Paying the Price: The Status and Role of Insurance against Natural Disasters in the United States*. (H. Kunreuther and R. Roth, Sr., Eds.). Washington, DC: Joseph Henry Press, 67–95.

- **Terrorism coverage** was provided by insurers on commercial property policies until after the attacks of September 11, 2001. Insurers generally had not evaluated how much to charge for this protection despite the World Trade Center attack in 1993 and the Oklahoma City bombing in 1995, because they had not suffered severe losses from these events. Following 9/11 most insurers refused to include terrorism as part of their commercial property coverage—especially in central business districts—or they charged extremely high premiums (Kunreuther, Pauly and McMorro 2013).⁵ This market reaction led Congress to enact the Terrorism Risk Insurance Act of 2002 (TRIA), a private-public partnership that has been renewed four times.

Following the SARS outbreak in 2003, [even though insured losses from that event were modest](#), insurers identified the potentially unmanageable severity of the pandemic risk and thus excluded losses due to business interruption, property damage and liability in most of their commercial policies. As a result, pandemic exclusions were widely in place with respect to certain products and markets years prior to the outbreak of COVID-19.

Insurers currently face a multifaceted push by policyholders, state legislatures, U.S. Congress, the courts, and public opinion for some kind of an “insurance solution” to COVID-19 and future pandemics. Insurers and their regulators continue to hold the technical expertise regarding insurance, but the demand for change of the *status quo* is primarily driven outside of the insurance industry by businesses, nonprofits, and the public sector.

Accordingly, in developing solutions for pandemic risk it is necessary to consider:

- Broad stakeholder participation (e.g., insurer, policyholder, and public sector interests) to ensure identification and definition of the economic and societal problems to be solved;
- The potentially strong correlation between pandemic risk exposure and asset values (meaning that a pandemic is an exposure that impacts both sides of an insurer’s balance sheet);
- The extent and potential volatility of reinsurance participation in protecting insurers against the pandemic risk and diversifying the risk globally;
- The capacity of insurers to commit to delivering administrative services (e.g., claim management) and to incur risk-bearing with due concern for the industry’s concurrent role in insuring against non-pandemic exposures;
- The public policy objectives associated with the risk of future pandemics that fall outside of the purview of the property and casualty insurers but may have an impact on the amount of BI losses or the larger economic consequences of BI such as:
 - Assisting employees temporarily laid off, through programs such as expanded unemployment insurance;
 - Considering measures adopted by other countries, such as the Short Time Work ([Kurzarbeit](#)) program in Germany, where companies paid temporarily laid-off employees a significant portion of their salary for up to one year and these companies were then reimbursed by the German government; and
 - Developing and enforcing a coherent framework of federal and state regulations and restrictions to limit the spread of the pandemic, thus reducing costs to insurers and businesses. These measures include:
 - Shelter-in-place requirements
 - Closing businesses and other activities (e.g., entertainment)
 - Social distancing requirements
 - Wearing masks and engaging in other protective measures

⁵ Kunreuther, H., M. Pauly and S. McMorro (2013). *Insurance & Behavioral Economics: Improving Decisions in the Most Misunderstood Industry*. New York, NY: Cambridge University Press.

PART IV: DESIGN OPTIONS FOR PRIVATE-PUBLIC PARTNERSHIPS FOR PANDEMIC RISK

The need to consider private-public partnerships for accelerating economic recovery from COVID-19 and providing protection against future pandemics is the basis for a report by Marsh (2020) that emphasizes the importance of examining the role of the insurance industry in concert with the role of the public sector to address these concerns.⁶ The three alternative options for dealing with the pandemic risk noted above are now discussed in more detail:

1. **Status Quo (SQ)** – This option accepts a loose coordination between public and private responses, such as foreseeable private market responses that further narrows insurers' exposure to pandemic risk, and the replication of current *ex post* policy responses including:
 - The Paycheck Protection Program or similar broad-based relief programs
 - Presumption of entitlement to workers compensation benefits in some states; and
 - *Ad hoc* state-enacted limitations on liability for exposure to disease.

2. **Service Provider (SP)** – This option centers on an integrated private-public partnership with a non-risk bearing role for the property and casualty insurance industry. An insurer provides some or all underwriting, claims, distribution and other capabilities on a fee-for-service or similar basis in which:
 - insurance agents and brokers may elect to sell a federally-administered expense protection agreement to businesses and nonprofits; and
 - a business that purchased this protection and was later ordered closed due to a pandemic would receive an immediate payout of a previously determined amount to assist in covering expenses.

3. **Service and Risk (SR)** – In addition to acting as a Service Provider, this option would have the property and casualty insurance industry commit capital to insure a limited layer or other well-defined element of the pandemic risk without jeopardizing their financial viability. The public sector would limit the pandemic risk for insurers, distribute the overall cost of the program and promote affordability for individual policyholders in the following ways:
 - Losses that exceed the financial capacity of the private sector would be covered by the federal government either through *ex ante* premiums or *ex post* assessments (as in TRIA) to recoup public expenditures; and
 - Means-tested vouchers or tax subsidies would be used for assisting small businesses in purchasing coverage for pandemic risk.

PART V: GUIDING PRINCIPLES

Three guiding principles are proposed for evaluating the above alternative options for dealing with the pandemic risks facing businesses.

Principle 1: Charging risk-based premiums to the extent possible. Premiums that reflect risk from future pandemics provide businesses with clear signals as to the nature of the hazards they face and, to the extent feasible, encourage organizations to engage in cost-effective mitigation measures to reduce their vulnerability and their insurance costs. Risk-based premiums would reflect the cost of capital that insurers need to integrate into their pricing to ensure an adequate return to their investors. Based on this principle:

⁶ Marsh (2020). [Pandemic Risk Protection: Accelerate Recovery and Build Resilience Now Through Public-Private Partnership](https://info.marsh.com/l/395202/2020-06-01/bmbxvj/395202/207425/pandemic_risk_protection_report.pdf). June. https://info.marsh.com/l/395202/2020-06-01/bmbxvj/395202/207425/pandemic_risk_protection_report.pdf

- State insurance regulators would allow insurers to charge premiums against losses from future pandemics that reflect the best estimate of the risk and the cost of capital;
- State insurance regulators continue to ensure that insurers and reinsurers have sufficient capital, so they are unlikely to become financially impaired or insolvent following a future pandemic; and
- Consideration would be given to whether premium reductions, based on policyholder adoption of (future) well-enforced standards (e.g., workplace safety precautions) are appropriate to mitigate the severity of the risk.

Principle 2: Dealing with fairness and affordability issues. Any special treatment given to businesses that cannot afford risk-based insurance premiums would come from public funding and not through insurance premium subsidies:

- Specific means-tested criteria could determine who qualifies for this funding; and
- Funding for this protection could come from vouchers or tax reductions.

Principle 3: Developing risk management strategies ex ante. The public sector would develop and enforce regulations and standards to reduce losses and deaths from a future pandemic, coupled with the following programs to enable firms to keep their productive employees and maintain jobs:

- Regulations by the public sector (federal, state and local government) that require businesses to close and residents to shelter-in-place; and
- Programs that provide funding to workers who are temporarily unemployed and to firms that are in danger of bankruptcy or insolvency.

PART VI: A FRAMEWORK FOR EVALUATING PROPOSED STRATEGIES

A decision-making framework to evaluate the alternative strategies involves the following elements, depicted in Table 2:

- *Options* under consideration, such as the three alternatives noted above;
- *Events* (i.e., hypothetical pandemics) that affect the performance of each of the options. These n distinct events, denoted as E_1, E_2, \dots, E_n are scenarios characterizing the nature of future pandemics based on data from past pandemics and future projections. One of these events could be COVID-19. Epidemiologists and other experts can provide estimates of the likelihood and uncertainty associated with each of these events;
- *Consequences* of each Event i if Option j is chosen, denoted as C_{ij} , indicates the consequences when Option O_j is chosen and Event E_i occurs. The consequences reflect impacts to the different interested parties (e.g., insurers, businesses/firms, employees, taxpayers, and the public sector – communities, state, regional, federal) as a function of the option chosen and specific pandemics that could occur. Suppose event 1 was COVID-19. Then C_{11} would be the impacts of COVID-19 if one maintained the Status Quo; C_{21} would be the impacts if insurers had a Service Provider role; C_{31} would be the impacts if insurers had a Service and Risk role as part of private-public partnership.

TABLE 2: FRAMEWORK FOR LINKING OPTIONS AND EVENTS WITH CONSEQUENCES

		<i>Events</i>					
		E_1	E_2	\dots	E_j	\dots	E_n
<i>Options</i>	1 SQ	C_{11}	C_{12}	\dots	C_{1j}	\dots	C_{1n}
	2 SP	C_{21}	C_{22}	\dots	C_{2j}	\dots	C_{2n}
	3 SR	C_{31}	C_{32}	\dots	C_{3j}	\dots	C_{3n}

The options can be evaluated in dealing with pandemics of any severity. The framework can also assess variations of these options and evaluate their impacts on other projected pandemics. The credibility of such an analysis depends on the accuracy of the assumptions for evaluating the different consequences for each of the options in the context of COVID-19 or future pandemics.

PART VII: PRACTICAL ISSUES

To facilitate interaction among insurers and other interested parties, such as regulators, legislators, and businesses regarding the potential role of the insurance industry in managing the risk of future pandemics, we propose the following practical issues for consideration:

I. Define criteria for providing pandemic relief

While attention has focused on locked-down businesses not having access to adequate BI insurance, empirical evidence suggests that using lockdowns as a basis for providing loans or as a criterion for providing insurance may not be effective. BI insurance is offered today when businesses are facing challenges from disasters or untoward events that occur over a well-defined period of time, such as a flood, hurricane, earthquake or a terrorist attack. In the case of a pandemic, the impacts generally occur over an undefined period of time and vary from region to region, so using lockdown as a criterion for insurance is likely to be inappropriate.⁷

The impacts of a pandemic on the firm and to its employees include the following:

- Decline in revenue / Lower profits or losses
- Continuation of fixed expenses (e.g., rent, mortgage payments, utility expenses)
- Unemployment / Reduced working hours
- Cost of childcare during school closures

Stakeholders would consider the relief to be delivered during a pandemic and the recovery period, bearing in mind:

- The purpose and amount of the benefits to be provided to businesses, nonprofits and governments (including their employees) and the cost of these benefits over time; and
- The parties who should bear the costs of these benefits over relevant time periods as a function of the severity of the pandemic and its impacts.

2. Evaluate, improve, or set aside existing COVID-19 pandemic relief programs

State and federal policymakers used a wide array of programs and policies for dealing with the economic consequences of the COVID-19 pandemic. The dialogue among stakeholders should consider which programs ought to remain available for future pandemics, which require improvement, and which ones should be abandoned altogether. If a COVID-19 relief program worked or could be improved, that program could probably be relied upon again during the next pandemic. If a COVID-19 program failed and cannot be fixed, it should probably not be repeated during the next pandemic. Policies under consideration include:

- Expanded eligibility for unemployment benefits
- Increased unemployment benefit amounts
- Economic Impact Payments to individuals
- Expanded leave entitlements for employees

⁷ A statistical analysis of the PPP data revealed that the loan amount per capita is similar across states whether they are locked down, partially locked down or not locked down at all.

- The Paycheck Protection Program, the Emergency Capital Investment Program, the Coronavirus Relief Fund, and the Coronavirus Economic Relief for Transportation Services Program
- Limitations on or immunity from liability for healthcare providers, businesses and others with respect to injury caused by exposure to COVID-19
- Presumption of compensability under state workers compensation systems for medical expenses, wage loss and permanent or temporary disability from contraction of COVID-19

3. Identify the role the insurance industry is best positioned to play

With a pandemic relief strategy in hand, coupled with an understanding of what worked and what did not during COVID-19, the dialogue among stakeholders can move forward to focus on the potential to expand the role of the insurance industry as part of a private-public partnership for addressing future pandemic risks. Questions to be considered include the following:

- How and to what extent can the insurance industry fill gaps in the existing set of programs and policies?
- How and to what extent can the insurance industry augment the effectiveness of an existing program or policy?
- What existing programs or policies might insurance or an insurance administered solution replace?

The proposed framework and guiding principles set forth in this paper are designed to foster and guide a productive dialogue on appropriate roles for the insurance industry and public sector in addressing losses from future pandemics and other catastrophic risks. As noted in a recent report by Lloyd's (2020), "COVID-19 has set in motion irreversible societal change, calling for new insurance solutions."⁸ The importance and opportunity to address this issue now, while it is still high on everyone's agenda, cannot be overemphasized.

⁸ Lloyd's (2020). *The Insurance Industry Response to COVID-19*. October. <https://uk.practicallaw.thomsonreuters.com/w-027-9436>