



Special issue “Covid-19: the economics of pandemic risks and insurance” of the Geneva Risk and Insurance Review

Alexander Muermann¹ · Casey Rothschild²

© International Association for the Study of Insurance Economics 2020

How should societies handle mortality and financial risks caused by pandemics? What role can insurance markets and governments play in mitigating these risks? The papers in this special issue of the Geneva Risk and Insurance Review address these topical and relevant questions, considering, in different ways, the unique characteristics of pandemics.

Pandemic risks are highly and non-linearly dependent. They can spread rapidly, and globally. Key policy-relevant characteristics such as the transmission channel, the reproduction number, or fatality rates are both specific to each virus and highly uncertain, particularly at the start of a pandemic. Pandemics are also fundamentally social in nature: their spread and severity hinge on individual, group, and firm behavior—behavior that is influenced both by government policy, by social institutions like insurance markets, and by their interactions.

The World Health Organization (WHO) characterized Covid-19 as a pandemic in March 2020. Shortly thereafter, we contacted researchers who we knew were thinking about and working on issues related to Covid-19. Motivated by their positive response, we commissioned additional papers to provide insights into the role played and to be played by the insurance sector in managing pandemic risks. This special issue on “Covid-19: The Economics of Pandemic Risks and Insurance” is the collective outcome of this process, featuring six papers on this topic.

Although this special issue was inspired by Covid-19, its objectives are more general. It first aims to provide new insights into the economics of pandemic risks and insurance and second, and no less important, it aims to spur new research on this topic. In the editorial, we address some themes that are common to the papers and we point to some areas where we see potential avenues for future research.

✉ Alexander Muermann
alexander.muermann@wu.ac.at

Casey Rothschild
casey.rothschild@wellesley.edu

¹ Vienna University of Economics and Business and Vienna Graduate School of Finance (VGSF), Vienna, Austria

² Wellesley College, Wellesley, USA



All six papers examine, in one way or another, governmental policies to address and deal with the impact of pandemic risks. All papers assume—at least tacitly—that social coordination via government policy has a role to play in mitigating pandemic risks, though they differ in their approach to modeling that policy. In the first article, *Christian Gollier* analyzes the properties of optimal confinement policies that aim to get the number of infected individuals below an “eradication” threshold below which infections, for example, can be easily tested and traced. His work breaks new ground in examining the effect of *uncertainty* surrounding a key parameter in the model: the reproduction number (of the unconfined individuals). Interestingly, and perhaps surprisingly, Gollier shows that taking this uncertainty into account can actually *lower* the intensity of confinement that is optimal for the government to impose.

Gollier’s paper is an important first step, but there are numerous other policy-relevant parameters in his modeling framework that are likely, in practice, to be uncertain. These include: the intensity of contagion risk, the average duration an infected individual remains contagious, and the speed of learning (of parameter values). Studying these other dimensions of uncertainty—and its implications for policy—is an important direction for future research.

Kent Smetters approaches government policy from a very different point of view. While Gollier’s paper looks only at policies that aim for rapid eradication of infection through a confinement policy whose intensity can be varied, Smetters’s paper takes the view that the infection cannot, in the near term, be eradicated; it can only be delayed until a new technology—mass testing, a vaccine, or therapeutics (“the cavalry”)—becomes available. In the meantime, policy—limited to a binary choice to “lock down” or not—can only delay an outbreak, and thereby save lives, by shutting down the economy, at significant economic cost.

Smetters uses a transparent graphical framework to demonstrate that—because of the rapid spread of infection in the absence of a shut-down and the steeply rising costs of extended shutdowns—shutdowns are only desirable if the cavalry will arrive reasonably but not *too* soon (after un-mitigated infection levels would be high, but still within an economically tolerable timeframe for economic shutdowns to be viable). Uncertainty in the timeframe for its arrival has ambiguous effects. So, as in Gollier’s paper, uncertainty can actually lower the optimal intensity of government intervention.

A potentially fruitful research avenue would involve connecting the two papers’ disparate approaches: suppose that, as in Smetters’s paper, there is no hope for eradication in the short run. But suppose that, instead of “the cavalry” being an instant cure-all, it represents the development of a technology (e.g., mass testing and tracing) that will facilitate eradication à la Gollier’s paper. The idea of a shut-down, then, would be to keep the infection rate low enough for the cavalry to be efficient once it arrives.

François Salanié and *Nicolas Treich*, in the third paper, raise the important issue that optimal governmental policies have to take into account the potential change in individual behavior they induce. In the context of pandemic risks, they analyze compulsory self-protection measures, such as mask-wearing, which have positive externalities. They observe that the indirect effects of such measures can have *negative*



externalities via their offsetting, collective effects on other behaviors such as voluntary social distancing (e.g., staying at home). Salanié and Treich show (and determine conditions under which) these indirect effects can actually outweigh the direct effects and reduce collective welfare.

This points to the critical importance of analyzing public policy interventions holistically rather than piecemeal, and we would hope that it spurs research into jointly optimal policies. One potentially interesting line of inquiry, for example, would start with the model in Smetters's paper and endogenize the timing of the arrival of the cavalry so as to consider the optimal joint decision between investments that speed up the arrival or effectiveness of the cavalry on the one hand and in shut-down periods on the other.

As Gollier emphasizes explicitly—and as motivates Smetters's graphical approach—purely analytical approaches to optimal policy interventions may be intractable. In the fourth paper, *Luciana Echazu* and *Diego Nocetti* take an alternative, numerical approach. Focusing on an individual-level perspective of the trade-off created by governmental policies that aim at saving lives, such as a lockdown or social distancing, they set up and calibrate a computational dynamic model to estimate the willingness to pay (WTP) for mortality and morbidity reduction. The estimates of the social WTP are in the range of 15% to 35% of 2019 U.S. GDP, with a significant degree of heterogeneity, e.g., by age. Although their model is quite distinct from that in Gollier or Smetters, their results accord well with those papers' analytical results. For example, they show that the baseline probability of infection (an analog, within their model, of the reproduction factor in Gollier) and its volatility have an ambiguous effect on the WTP. For reasonably low values of the probability of infection, a higher level of volatility in the infection rate can thus lead to a lower WTP for lockdown policies—mirroring Gollier's key result. Echazu and Nocetti also show that the probability of vaccine discovery (the analog of the time-of-arrival of “the cavalry” in Smetters) has ambiguous effect on the WTP, mirroring Smetters's results about the ambiguous effects of uncertainty surrounding the arrival time of the cavalry on the optimal length of a quarantine. Future numerical work along the lines of Echazu and Nocetti may be helpful for illuminating and informing analytical research.

The two papers by *Robert Hartwig*, *Greg Niehaus*, and *Joseph Qiu* and by *Andreas Richter* and *Tom Wilson* complete the special issue by focusing on the role of insurance markets, and their interaction with government policies, vis-à-vis the management of pandemic risks. This focus puts the financial risks associated with pandemics front and center—unlike the first four papers, with their emphasis on the trade-offs against mortality and morbidity risks. Both papers take the view that private insurance markets are ill-suited to deal with the financial risks associated with pandemics: managing these risks requires some form of government involvement. But there are good reasons to think that well-designed public–private partnership can add value by improving the trade-offs inherent in governmental policies that aim at saving lives and that are discussed in the previous papers.

Hartwig, Niehaus, and Qiu take an industry view, describing the pre-Covid-19 insurance market for pandemic risks, discussing reasons why private insurance markets might fail, and presenting and comparing different ways for the government



to intervene and improve risk sharing. They argue persuasively that optimal policy involves significant government intervention—and probably not the ad hoc ex-post sort that we have recently seen in many countries—and their analysis casts a public–private partnership through a reinsurance scheme in a positive light.

Richter and Wilson, on the other hand and complementary to the paper by Hartwig, Niehaus, and Qiu, take an insurer-level perspective. They describe pre-Covid-19 industry practice in preparing for and managing pandemic risks and discuss surprises and lessons learned from the realized and still ongoing impact of the Covid-19 pandemic on the industry. Richter and Wilson’s firm-level perspective highlights another key aspect of government–insurer interactions during pandemics: the importance of (legal) clarity about policy language. In particular, large insurers were well aware of the possibility of a pandemic and prepared themselves accordingly, e.g., by performing pandemic-specific scenario analyses. Business interruption insurance, however, is one insurance area where insurers were hit by surprise and uncertainties remain. There are at least two related reasons for this. First, business interruption exposure to pandemic risks is partly endogenous to government policy (e.g., such as examined by Smetters: how long should the shut-down be?). Second, governments may have an incentive, and some ability, to “reinterpret” policy language in ways that lead to unanticipated ex-post exposure for insurers (representing a form of “external” moral hazard).

These two papers point at potentially important differences between the perspectives of—and means available to—private insurers and society in managing pandemic risks. Richter and Wilson discuss two risk management measures against pandemic risks—building up resilience and contingency planning—and stress the relative importance of the former over the latter at the insurer-level. It is important to note, however, that insurer resilience is not the same thing as social resilience. For example, for an individual insurer it might be optimal to build up resilience by excluding coverage of pandemic risk. However, if all (re)insurers exclude such coverage, it would potentially leave society in a worse state—and could leave the industry as a whole exposed to ex-post “reinterpretations” by governments looking for scapegoats or unwilling partners in cleaning up the resulting mess. On the other hand, if all insurers build up resilience by holding more solvency capital, then this might be in line with society’s objective as the insurance market will be more robust towards systemic shocks.

Future research could focus on specific frictions that drive a wedge between firm-level objectives and induced industry outcome on the one hand and social welfare on the other hand. Such research can provide important insights into the justification and comparative evaluation of different governmental policies.

We hope that the collective papers of this special issue on “Covid-19: The Economics of Pandemic Risks and Insurance” together with the ideas for future research put forward in this editorial inspire further research into this highly relevant and pressing topic.

Acknowledgements We owe a particular debt of gratitude to the referees who reviewed and constructively commented on the articles of this special issue on extremely short notice. To the same degree, we



are grateful to the authors who wrote and revised their papers with tight deadlines. The reviewers' and authors' efforts enabled us to publish this special issue in the fall issue in 2020, while the pandemic is still spreading.

References

- Echazu, L., and D. Nocetti. 2020. Willingness to pay for morbidity and mortality risk reductions during an epidemic. Theory and preliminary evidence from COVID-19. *Geneva Risk and Insurance Review*. <https://doi.org/10.1057/s10713-020-00053-0>.
- Gollier, Ch. 2020. Pandemic economics: optimal dynamic confinement under uncertainty and learning. *Geneva Risk and Insurance Review*. <https://doi.org/10.1057/s10713-020-00052-1>.
- Hartwig, R., G. Niehaus, and J. Qiu. 2020. Insurance for economic losses caused by pandemics. *Geneva Risk and Insurance Review*. <https://doi.org/10.1057/s10713-020-00055-y>.
- Richter, A., and T. Wilson. 2020. Covid-19: Implications for insurer risk management and the insurability of pandemic risk. *Geneva Risk and Insurance Review*. <https://doi.org/10.1057/s10713-020-00054-z>.
- Smetters, K. 2020. Stay-at-home orders and second-waves: A graphical exposition. *Geneva Risk and Insurance Review*. <https://doi.org/10.1057/s10713-020-00056-x>.
- Treich, N., and F. Salanie. 2020. Public and private incentives for self-protection. *Geneva Risk and Insurance Review*. <https://doi.org/10.1057/s10713-020-00050-3>.

