Organizational resilience

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The word resilient originates from the Latin verb resilire (“to jump back”) and was introduced to the English language in the early 17th Century. The word Resilience is frequently used by academics, practitioners and policymakers who have adopted it more recently to describe how something or someone can recover and return to normality after an adverse event. This definition is suitable for physical structures that do not learn from or are strengthened by the adverse event; However, it is an oversimplification in the context of our interpretation of organizational resilience.

Organizations are living socio-ecological systems that adapt to the challenges of tomorrow. We have witnessed how organizations have mitigated risk by reimaging work life and adopting technologies in new ways to support organizations in meeting their objectives since the beginning of the COVID-19 pandemic in 2020.

We know today that only few organizations had insurance to cover losses from the pandemic, and most business continuity plans included some version of a plan for mitigating losses from a pandemic. Yet most continuity plans had an internal focus and did not envisage global disruption of supply

chains. Despite this, organizations have proven to survive the pandemic and may even have become more resilient.

Organizations should be able to learn from adverse events and utilize the knowledge gained from their survival to Bounce-Forward-Better and act more efficiently in future similar adverse events before they can be considered resilient.

With the help of our WTW Research Network partners, the Organizational Resilience Research hub continues to support and foster a broader understanding of how society, organizations and individuals most efficiently can mitigate their risks, learn from the past and become resilient by adapting to the challenges of tomorrow. To rethink insurance as the next generation of resilience, we work with the European Center for Risk & Resilience at The University of Southern Denmark, and Resources For the Future, in particular looking at transitions from catastrophe. We continue to promote the adoption of technology for risk quantification, insurance pricing and risk management through our collaboration with Loughborough University for the establishment of a Center for Doctoral Training under the umbrella of Automated Risk Engineering. Finally, there are also plans to start a new stream of research focused on supply chain resilience in 2023.

We are proud to work with some of the best scientists around the world. In the following chapter, we illustrate the most relevant achievements of the past year.

Simon Sølvsten
Head of Organizational Resilience Research

Do insurers adjust prices to incentivise the adoption of loss prevention?

In theory, loss prevention should, as the name implies, reduce the loss for the risk carriers and the expected present value of losses.

In a competitive insurance market, where the premium is given through market bidding, expected potential savings from investing in loss prevention technologies should become measurable in the insurance price. However, no empirical analysis has yet proven this theory. Thus, WTW Research Network has supported a research project that explores **what influence the use of property loss prevention technology has on property insurance pricing**.

Main results

A policyholder's claim history is found to significantly influence the cost of insurance; however, little evidence supports that the use of loss prevention technologies influences the price. Only water leak detection technology seems to have any measurable downward influence on the price with a 90% confidence level. It seems that technologies that reduce the cost in the tail of the risk distribution, where the probability for claims is lowest (and the cost highest) have less influence on the price compared to technologies that limit smaller yet more frequent damages. While risk carriers' price should reflect policyholders' risk, risk heterogeneity is likely more challenging to measure in the tail of the distribution where there are few claims. It is therefore likely that the influence of loss prevention technologies is muted if they primarily influence severe and costly damages. Furthermore, it was found that the size of claims has a significant yet different influence on prices. The results of the empirical analysis show that as the size of the claim increases, the relative influence the claim has on the price decreases.

Conclusion

The analysis shows that policyholders should not expect the insurance premium to change as a function of the deductibles and investments in loss prevention technologies. It is evident that loss prevention technologies lower the risk for the insurer; however, savings are not passed on to the policyholder. Consequently, the insurers benefit from policyholders' investment in loss prevention, which increases insurers contribution margin and lowers risk associated with the contract. While there is no clear evidence as to why the insurers do not price the contract according to the risk heterogeneity one explanation may be that there is not sufficient competition between insurers for the price to reflect the marginal cost in the contract.

As only limited support is found in the empirical analysis to back investment in loss prevention, the policyholder may be best served by determining investment strategies for loss prevention technology in order to minimize own direct operating costs rather than for the lowering of insurance prices.

Results

While claims history does clearly influence insurance premiums, there is no evidence that insurers incentivise investment in loss prevention by offering premium discounts. This backwards-looking approach is not incentivising investment in resilience.

Savings resulting from loss prevention are not passed on to policyholders, and it could be that lack of competition is encouraging this status quo.

Data

The analysis benefits from a comprehensive dataset assembled in collaboration with the industry. The dataset was collected from a total of 225 insurance bids for 72 insurance contracts. Each contract consists of grouped buildings portfolios with more than 12,000 building addresses,. The 72 contracts cover 40 different municipalities from 2008 to 2018,19 million square metres and 364 billion Danish kroner (£42b) in property value. The data consist of detailed information on the insured building's characteristics, claims history, insurance coverage and bids from winning and losing tenders.

Training the next generation of risk engineering experts

Technology has had a transformative impact on many areas of insurance, but one sub-market still currently largely reliant on manual processes is the insurance of industrial properties, especially when considering critical risks of fire and explosion.

Risk assessments for industrial properties are conducted by risk engineers, who synthesize heterogeneous information sources via various methods and then use their professional expertise to determine the risk and communicate this information. Looking into how exposure for fire insurance is estimated begins with the challenge of understanding that the methods are regionally dependent and, to some extent, constrained by the risk engineers' experience as well as company guidelines.

Calculation of risk exposure faces two essentially equal challenges in the coming years. First, we are faced with significant industry knowledge loss when the larger baby-boomer generations leave the job market. Second, we expect that Artificial Intelligence (AI) and other applications from computer science will begin to support and shape how risk engineers calculate and interpret property risk. In response to those industry-wide challenges, the WTW Research Network has jointly initiated a Centre for Doctoral Training with Loughborough University.

We envisage further evolution of business processes leading to wider economic benefits. For example, digitization can further support the standardization of business processes and enhance the consistency of approach across individuals and firms. If practitioners adopt common approaches and these are accepted at national and industry level, this can support greater comparability of risk assessment and thus increased efficiency of risk transfer as well as reduced cost of risk assessment. Digitization and adoption of more standardized methods can also lead to the development of tools of knowledge management for risk engineering, ensuring that skills and understanding are understood, shared and disseminated as widely as possible.

The Centre for Doctoral Training will initially support six PhD students examining foundational questions about the application of digital technologies in industrial and commercial property insurance. This initial research will support the incubation of an industry-wide effort for the digital transformation of risk assessment. Research supervised by Loughborough academics and WTW supervisors and advisers, will focus on the planned topics below:

Information extraction from building blueprints

Automatic detection of fire assets and objects for building environment mapping and fire risk assessment

Using 'digital twins' for insurance risk analysis and mitigation

The economics of industrial and commercial property risk transfer

Refining property hazard estimates using computer vision and machine learning

Knowledge management in industrial and commercial property insurance

The first PhD started in 2022 on "Automatic detection of fire assets and objects for building environment mapping and fire risk assessment" and will be accompanied by five further PhD students in 2023. The first cohort of PhD students is expected to conclude their research program in 2026.

Loughborough University

Loughborough University

Loughborough University set in the market town in Leicestershire, England, dates back to 1909 and was established as a university in 1966. It is one of the top 10 UK universities. With around 20,000 students, it has a reputation for providing the best student experience. From its earliest days it has produced research relevant to the real economy, with strong links with industry and professional bodies.

The ripple effect of disruption in supply chain

Modern supply chains rely on a global interconnected network to improve margins, and are usually designed to meet the challenges of the firm efficiently, rather than resiliently.

However, increased supply chain dependency, complexity and globalization come with increased risk. The potential risk depends on a firm's ability to mitigate losses. Informed supply chain resilience strategies can help the firm to mitigate risk and create new opportunities.

Integrated academic-industry analysis can guide firms and society toward resilient strategies and mitigate future global supply chain shortage and losses.

It is evident that the disruption we face today (e.g. the aftermath of the COVID-19 pandemic, the war in Ukraine, energy crises, water shortages around in Europe, US and Asia and an increase in climate-related catastrophes) calls for innovation to identify supply chain risk, quantify the risk and highlight the challenges for the modern risk manager. There is a need for both analytical tools and new insurance products to support and mitigate the future risks companies face.

The WTW Research Network has initiated a collaboration with The European Center for Risk & Resilience Studies at the University of Southern Denmark to explore methods for quantifying the gross risk of business interruption loss through understanding the ripple effect in supply chain disruption. The project shows interesting results in risk quantification, risk illustration and provides new tools to manage risk.

The project was initiated in 2022 and will be completed in 2023.

European Center for Risk & Resilience Studies

About The European Center for Risk & Resilience Studies

The newly established European Center for Risk & Resilience Studies (ECRRS) at The University of Southern Denmark foster adaption to systematic changes and efficient action on risks through problem-solving research that adds value to industry and society by concentrating on solution-based results. The center's activities are focused on research, think-tank and talent development which combined form the pillars of the center.

Transitions from catastrophe

Catastrophes can instigate transitions by disrupting existing systems and requiring action to minimize losses in well-being and value

Catastrophes differ from disasters in the scale and comprehensiveness of the event; catastrophic impacts challenge society's ability to come back from the event, in other words, the disruption challenges system resilience. Impacts from catastrophes are exacerbated by population growth, more permanent and efficient infrastructure, and growing scale, with e.g. trade and cyber connectivity, pandemics, ecosystem loss, and climate change reaching global proportions.

Governmental, regulatory and industrial approaches to catastrophic risks operate on both intensive and extensive margins. The intensive margins are affected by actions and policies maintaining and even entrenching existing systems and distributions of well-being, while the extensive margins require shifts in systemic conditions that can purposefully re-align human activity, ecosystem services from natural capital, and distributional concerns through e.g. managed retreat.

Risk management is heavily embedded in political economy, intertwining private and government responses to the impacts of catastrophe. To better understand the scope and connectivity of private and public actors managing catastrophic risks, and improve sustainable transitions, the WRN is supporting a project with the University of Southern Denmark and Resources for the Future. This project seeks to foster a better understanding of how catastrophic events are handled under existing financial, corporate and public institutions, to recommend how government and industry under threat from catastrophic risks can co-manage sustainable transitions along intensive and extensive margins to create more resilient communities in the future.

Reimagining insurance

The current insurance system works efficiently for those with financial safety nets, who can afford to wait for the claim settlement. However, those most at risk are often those with the least capacity to wait. Developing nations' populations are often underinsured and without fully effective risk management thus, the threshold for when an event is catastrophic in scale must be perceived as significantly lower for them and understood as the relative degree of resilience for this population. Therefore, there is a need to reimagine insurance to make it available and attractive for people in developing countries, to ensure fast loss settlements and payouts to meet challenges with household solvency, and to simultaneously ensure the system remains fair for both policyholder and insurer.

This "Transitions from Catastrophe" project will also explore how parametric micro-insurance can support the growing need for insurance in developing countries, the

challenges the instrumental design faces and how it can become widely available for those who need it.

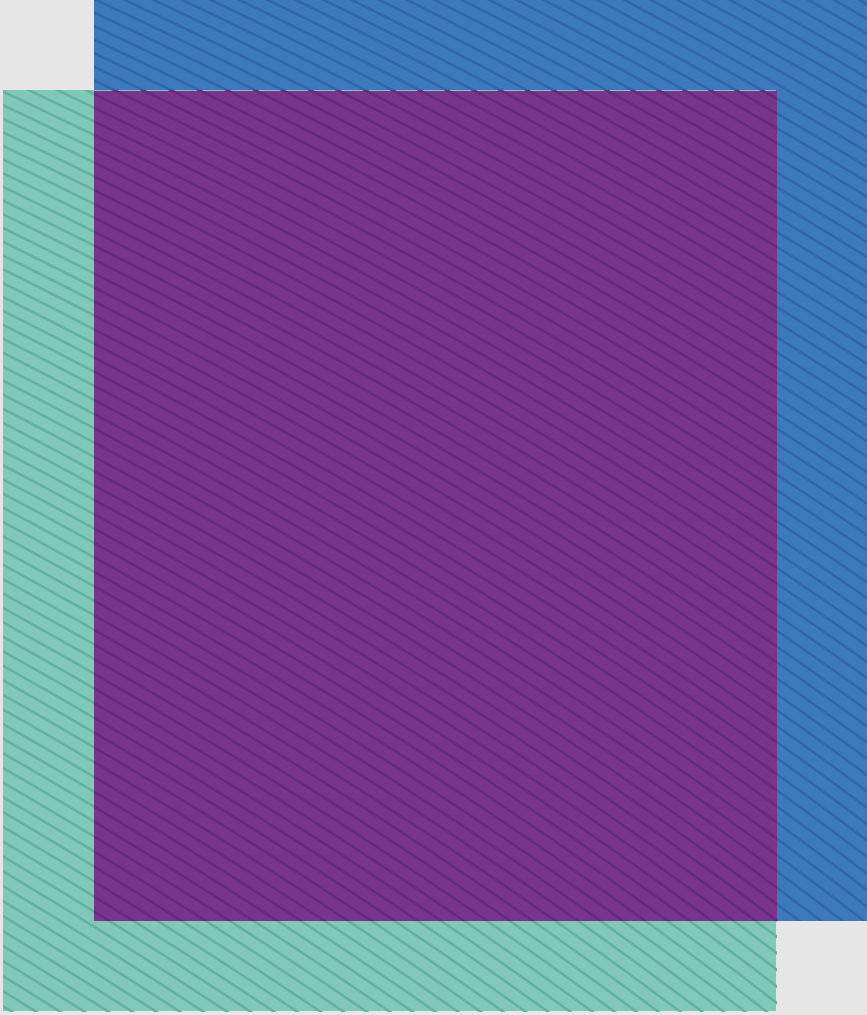
The project will start on January 1, 2023, and conclude by the end of 2025.

SDU
University of Southern Denmark

University of Southern Denmark
The University of Southern Denmark (SDU) began with the Odense Campus in 1966. Since then, it has grown into an internationally recognized research university and is one of the top 50 universities in the world. SDU now has five faculties with more than 27,000 students, almost 20% coming from outside of Denmark, and more than 3,800 employees distributed across the original campus in Odense and regional campuses in Slagelse, Kolding, Esbjerg, and Sønderborg.

RESOURCES *for the* FUTURE

Resources for the Future
Resources for the Future (RFF) is an independent, nonprofit research institution in Washington, DC. RFF's mission is to improve environmental, energy, and natural resource decisions through impartial economic research and policy engagement. RFF is committed to being the most widely trusted source of research insights and policy solutions leading to a healthy environment and a thriving economy.



About WTW

At WTW (NASDAQ: WTW), we provide data-driven, insight-led solutions in the areas of people, risk and capital. Leveraging the global view and local expertise of our colleagues serving 140 countries and markets, we help you sharpen your strategy, enhance organisational resilience, motivate your workforce and maximise performance. Working shoulder to shoulder with you, we uncover opportunities for sustainable success — and provide perspective that moves you. Learn more at wtwco.com.

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WTW-83951 02/23

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