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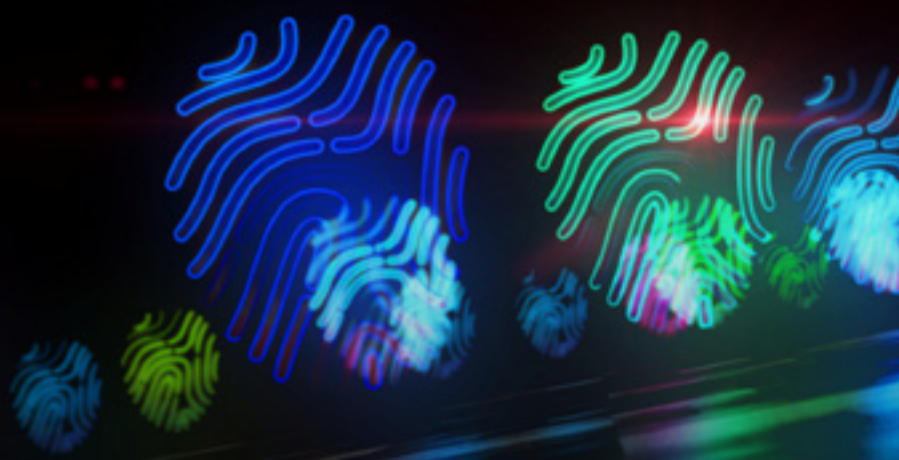
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THE CAPCO INSTITUTE
JOURNAL
OF FINANCIAL TRANSFORMATION

RISKS

Pandemic insurance: A portfolio management approach

ALEXIS LOUAAS | PIERRE PICARD



INSURANCE

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DEAR READER,

Welcome to edition 54 of the Capco Institute Journal of Financial Transformation.

In this edition we explore recent transformative developments in the insurance industry, through Capco's Global Insurance Survey of consumers in 13 key markets, which highlights that the future of insurance will be personalized, digitalized, and connected. Other important papers cover topics high on global corporate and political agendas, from ESG and climate change to artificial intelligence and regulation.

The insurance industry has been undergoing transformation in recent years, with insurers responding to the needs and expectation of tomorrow's customers, for products that were tailored, flexible, and available anytime, anyplace, and at a competitive price.

COVID-19 has accelerated such change, forcing insurers to immediately implement programs to ensure they can continue selling their products and services in digital environments without face-to-face interaction. New entrants have also spurred innovation, and are reshaping the competitive landscape, through digital transformation.

The contributions in this edition come from a range of world-class experts across industry and academia in our continued effort to curate the very best expertise, independent thinking and strategic insight for a future-focused financial services sector.

As ever, I hope you find the latest edition of the Capco Journal to be engaging and informative.

Thank you to all our contributors and thank you for reading.

A handwritten signature in black ink, appearing to read 'Lance Levy', with a stylized, flowing script.

Lance Levy, **Capco CEO**

PANDEMIC INSURANCE: A PORTFOLIO MANAGEMENT APPROACH

ALEXIS LOUAAS | Postdoctoral Researcher, CREST-Ecole Polytechnique

PIERRE PICARD | Professor of Economics, CREST-Ecole Polytechnique

ABSTRACT

The COVID-19 crisis has highlighted the deficiencies of business interruption insurance when the economic activity is deeply impacted by a worldwide pandemic. Pandemics have a systemic nature, which distinguishes them from other catastrophic risks such as natural disasters or large-scale industrial accidents. This specificity makes it impossible to mutualize the pandemic risk through insurance or reinsurance. In facing this challenge, capitalization-based insurance mechanisms – so far limited to life insurance – offer a renewed perspective on corporate risk management and provide new opportunities to the insurance industry. In this perspective, we explore the reasons why business interruption insurance should be backed by a specific portfolio-management strategy, and how such a combination would allow insurers to offer coverage against pandemic risk.

1. THE SYSTEMIC DIMENSION OF THE PANDEMIC RISK

In many countries, COVID-19 has inflicted dramatic losses on a large number of businesses. Workers, customers, and entrepreneurs were prevented from conducting their activities normally because of social distancing, lockdowns, and limits to transport of goods and people. Huge losses have resulted from this unprecedented health crisis. As a result, many firms turned to their insurers, in the hope of receiving coverage through their business interruption policies. Unfortunately, most of these hopes were dashed. Indeed, such a coverage is typically included as part of a company's commercial property insurance policy, and is triggered when there is direct physical damage to insured property due, for instance, to a fire or a natural disaster like a flood. Many insurers have thus denied coverage, contending that claims do not meet the "direct physical loss" requirement contained within standard business interruption policies. Although many legal actions are

still underway, and without expressing a view on the validity of the arguments made by firms and insurers, it is clear that corporate insurance had not been conceived by insurance companies to protect firms from such a pandemic risk. Hence, if one keeps in mind the risk of new pandemics in the future, the design of an efficient business interruption cover remains an open question for the insurance industry.¹

It is well known that insurance is based on two pillars: mutualization and capitalization. Mutualization works through risk-pooling when risk exposures are independently distributed. It is based on the law of large numbers, which allows policyholders to be covered through non-participating contracts after paying a fixed premium. In brief, through mutualization, the misfortunes suffered by a few policyholders are compensated by the contributions of all the others. In contrast, capitalization refers to mechanisms through which policyholders cover their own risks (either directly, or more usually through a financial intermediary) by purchasing

¹ See OECD (2021) on the economic disruptions caused by the COVID-19 in countries around the world, and on how business interruption against pandemic risk could be provided with support from governments.

financial assets and they are protected against risks through a portfolio management strategy. It is usually considered that mutualization and capitalization are relevant in areas that are clearly separate from one another: P&C lines and health insurance are based on mutualization, while life insurance works through capitalization.²

So far, the business interruption risk exposure has been considered by insurers as an indirect loss induced by property damage, with the implicit consequence that it could be covered through the same mutualization mechanisms. More recently, the emergence of cyber risk has meant that many have started questioning whether mutualization of business interruption risk could be undermined by common factors affecting the whole economy. COVID-19 has also led to similar concerns, but on a much larger scale and with far-reaching consequences for the design of insurance contracts. Although from the perspective of the insured firm there is no difference between business interruption losses being caused by property damage or health issues, mutualization is possible in the case of the former but not in the latter.

There are important differences between pandemic risk and other catastrophic risks that need to be taken into account when considering the types of exposure coverage available. Catastrophic risks are low-probability high-severity risks with correlation between individual exposures, which reduces the efficiency of mutualization as a risk-sharing mechanism.³ In particular, property damages resulting from natural or industrial disasters are correlated at a local level, hence the mutualization within a portfolio of insurance contracts has to be complemented either by mutualization at a higher level (i.e., between portfolios) or by the transfer of risks to financial markets. This is mainly done through reinsurance, which acts as a worldwide risk-spreading mechanism. From this standpoint, the increase in the number and cost of insured catastrophic risks has certainly played a role in the consolidation of the reinsurance sector during the last decades. This complement to mutualization may also be provided by specific financial instruments, such as cat-bonds, industry loss warranties (ILWs), or other forms of alternative risk transfer mechanisms, with the purpose of transferring risk to dedicated investors, outside the sphere of the insurance and reinsurance industry.

Pandemic risk, on the other hand, increases the correlation issue at the global level, because all countries are simultaneously affected, which reduces the benefit of using reinsurance as a risk spreading instrument. It also differs from catastrophic P&C risk exposures (such as large-scale natural disasters) because of its systemic nature. This is a crucial point. Cummins & Weiss (2013) describe as systemic “the risk that an event will trigger a loss of economic value or confidence in a substantial segment of the financial system that is serious enough to have significant adverse effects on the real economy with a high probability.” In this definition, the transmission chain starts with an economic event that destabilizes the financial sector and thereby causes a severe decline in the real-sector activity. The bursting of the U.S. housing bubble that peaked in 2006 – a major contributor to the global credit crunch of 2007-2008, which resulted in huge losses on global stock markets, which in turn created a worldwide downturn in economic activity – is a typical example of such a sequence of events that begins with the financial markets and is transmitted to the real economy. In the case of COVID-19, the causality chain is reversed: the triggering event (i.e., the health crisis and its consequences on social distancing and limits to mobility) is in the real sphere. It spreads worldwide in the global economy, and is ultimately transmitted to the financial markets. Whatever the direction of causality, in both cases the risk is systemic because it affects the real and financial spheres of the global economy, and not only a limited number of victims. Natural disasters and industrial catastrophes, unlike the pandemic risk, and irrespective of their severity, do not have this systemic dimension.

2. TOWARDS A CAPITALIZATION-BASED CORPORATE INSURANCE MECHANISM

Because of the high degree of correlation and the low-probability high-severity nature of pandemic risk, looking for a mutualization-based pandemic insurance is probably not the way to go. It seems more appropriate to think in terms of capitalization. To put the matter differently, so far mutualization and capitalization have been relevant in areas that are clearly separate from one another: a Chinese wall separates non-life and life insurance, with mutualization on one side of the wall, and capitalization on the other. We think that this dichotomy

² Some insurance contracts may be based simultaneously on mutualization and capitalization, as for example in the case of P&C participating contracts offered by mutual insurers.

³ See Louaas and Picard (2021a) on the insurability of low-probability catastrophic risks.

has to be abandoned in the case of corporate pandemic insurance, since the coverage of business interruption is a key line of business for P&C insurers, yet it cannot be mutualized in the event of pandemics.⁴

A superficial approach to this issue might suggest that the capitalization channel conflicts with the systemic nature of pandemic risk. In simple terms, protecting firms affected by business interruption through risk-sharing mechanisms is all the more difficult because pandemic events coincide with severe macroeconomic downturns and financial crises. While this concomitance is obviously a challenge to capitalization-based insurance mechanisms, a closer inspection reveals the specificity of the financial effects of pandemic events.

Firstly, as documented by Dingel and Neiman (2020), Hensvik et al. (2020), and Koren and Petö (2020), pandemics affect different sectors of the economy differently, depending on the effects of social distancing constraints, lockdowns, and mobility restrictions on their activities. Some, as we have seen, have in fact benefited from the crisis. Accommodation and food services, transport and distribution, manufacturing and crafts, the entertainment, retail and luxury industries, and all industries reliant on an international supply chain have been severely impacted by COVID-19, while pharmaceutical and biotech industries, online B2B and B2C platforms, and high-tech industries have benefited from the increase in demand for healthcare, from changes in consumption patterns, or from the propensity of firms to digitize their activities. Pagano et al. (2021) have highlighted how this differentiated exposure to the pandemic risk is reflected in stock returns during the COVID-19 crisis.

Secondly, as in any period of financial instability, and particularly from late March to December 2020 – which Pagano et al. (2021) refer to as the “post-fever” period – fund managers have reallocated their portfolio choices toward assets perceived as more defensive, either because of their low correlation with the market return (small beta) or because factor models have highlighted their intrinsic quality. While distinguishing cyclical and defensive sectors is the usual practice of financial analysts and portfolio managers,

considering the effects of social distancing and mobility restrictions on stock performances is quite a new perspective.

In a recent paper [Louaas and Picard (2021b)], we explored how a capitalization-based insurance scheme could be built, specifically through exploiting this differentiated exposure to pandemic risk. More specifically, we analyzed the performance of a portfolio of stock options and/or long-short positions, including call options and/or long positions for stocks whose returns are expected to be fostered by a pandemic event, and put options and/or short positions for stocks expected to be strongly penalized by such an event. Such a portfolio allows the owner (say, a firm seeking coverage through a capitalization-based self-insurance mechanism) to reduce their non-pandemic risk through a mixture of call-put or long-short positions, as in a straddle portfolio management strategy, while allowing them to achieve a strong capital appreciation should a new pandemic occur.

This approach is based on the premise that pandemics have differentiated structural effects on the economy, according to the vulnerability to social distancing in different sectors of activity, and that this uneven vulnerability is reflected in stock returns during a pandemic event. Taking long positions and/or purchasing call options on stocks more resilient to a pandemic shock, and simultaneously going short and/or purchasing put options on less resilient stocks allows the policyholder to be covered against the risk of a new pandemic, while hedging non-pandemic risks.

3. STRUCTURAL FINANCIAL EFFECT OF A PANDEMIC SHOCK: THE COVID-19 CASE

To give more substance to these premises, we may consider how good or bad news on the spread of the COVID-19 pandemic has been reflected in changes in stock returns. To do so, we use French data on the daily number of new hospitalizations due to COVID-19, and we check whether this information correlates with stock returns on the French stock exchange. This allows us to classify stocks in three groups, with positive and negative correlation in groups 1 and 2, and without significant correlation in the residual

⁴ We have deliberately ignored the role that governments may play, either by acting as reinsurers of last resort or by promoting a legal framework for insurance. In particular, arguments in favor of an insurance regime in which the government would provide the upper layer of coverage often confuse their ex-ante role in making an insurance scheme viable and effective with the ex-post assistance and financial aid they provide to victims once a catastrophe has occurred. Governments have an important role to play in both cases, but distinguishing between them is of utmost importance in clarifying the issues at stake. For instance, in the U.S., the National Flood Insurance Program (NFIP) is one of the instruments of the Federal Emergency Management Agency for the coverage of flood insurance, which fundamentally differs from the financial aid to victims and local governments that the government may provide after a Presidential Disaster Declaration.

group. We restrict our sample to the largest stocks listed on the French stock exchange, included either in the CAC40 or in the CAC Next20.⁵ We may evaluate whether good or bad news on the pandemic front, measured by the daily number of new hospitalizations, affects the performance of a stock in comparison with the average market return. This leads us to the following regressions:

$$r_{it} - r_{mt} = \alpha + \beta_1 h_t + \beta_2 h_{t-1} + \varepsilon_{it}$$

where i , m , and t refer to the specific stock under consideration, to the stock market, and to the date (on a daily basis), respectively.^{6,7} We denote r and h as the daily stock return and rate of change of hospitalizations related to COVID-19. Hence, we test whether the return on stock i in excess of the stock market return has been affected by changes in hospitalization, possibly with one-day lag. The regressions (one for each stock in the sample) are performed over the period March 18, 2020 to May 18, 2020.⁸

Table 1 includes the results of these regressions for stocks, such that the estimate of coefficient β_1 is significantly different from zero. When groups 1 and 2 are selected through the sign of this estimate, eight stocks are included in group 1 and nineteen stocks are in group 2. Taking a closer look at the list of companies in each group allows us to determine, in an intuitive way, why some are more negatively impacted by the spread of the pandemic than others. Group 1 includes stocks in sectors that have been boosted by the pandemic for various reasons (biotech, pharmaceuticals, business services, and videogames), were intrinsically defensive (alcohol, luxury goods), or were relatively sheltered from fluctuations in consumer demand (chemicals, oil and gas). In group 2, the stocks were in sectors whose activities are strongly impacted by the decrease in household demand (automobile, real estate, consumer demand), reliant on governmental investment decisions (aerospace/defense, engineering/construction, railway), or whose services were required by other firms (steel, chemicals, electrical equipment). Banks and insurance reflect the general state of the economy, and they are negatively impacted by bad news about the spread of the pandemic.

Table 1: Results of the regression analysis

NAME	β_1	P-VALUE	SECTOR
GROUP 1			
Air Liquide	0.0630	0.00	Chemicals, healthcare
Biomerieux	0.2529	0.00	Biotechnology
LVMH	0.0668	0.00	Luxury goods
Pernod-Ricard	0.0392	0.00	Alcoholic beverage
Sanofi	0.0516	0.02	Pharmaceuticals
Total Energies	0.0999	0.00	Oil, gas
Ubisoft	0.0838	0.00	Videogames
Worldline	0.0978	0.00	Business services
GROUP 2			
Alstom	-0.0769	0.00	Railway
Arcelor Mittal	-0.1328	0.01	Steel
Arkema	-0.1463	0.00	Chemicals (specialties)
AXA	-0.0637	0.01	Insurance
BNP Paribas	-0.0880	0.00	Bank
Bureau Veritas	-0.0325	0.00	Business services
Dassault Systemes	-0.0878	0.01	Aerospace/defense
Eiffage	-0.0926	0.02	Engineering/construction
Engie	-0.0698	0.06	Gas (distribution)
Gencina	-0.0886	0.02	R.E.I.T.
Essilorluxottica	-0.1208	0.00	Household product
Klepierre	-0.0504	0.07	R.E.I.T.
Legrand	-0.0495	0.07	Electrical equipment
Peugeot	-0.1119	0.00	Automobile
Safran	-0.1629	0.08	Aerospace/defense
Saint Gobain	-0.0518	0.00	Chemicals
Société Générale	-0.0753	0.00	Bank
Solvay	-0.0732	0.00	Chemicals (specialties)
Teleperformance	-0.1812	0.00	Technology

⁵ The CAC40 index is a capitalization-weighted measure of the 40 largest stocks listed on the Euronext Paris. We have extended our sample of stocks to the CAC NEXT20, i.e., the 20 stocks next in line, because the two sets are separated by a very porous frontier: stocks may move between CAC40 and CAC NEXT20 from one year to the next, according to changes in their capitalization.

⁶ Omission of the lagged variable h_{t-1} would create an omission variable bias since the series h_t is auto-correlated.

⁷ The daily hospitalizations are taken from the French government website data.gouv.fr.

⁸ It was not possible to include the period before March 18, 2020 in the sample because of the lack of daily data on hospitalization related to COVID-19. Extending the sample beyond May 18, 2020 has no significant impact on our conclusions.



4. CONCLUSION

Although this is only a sketchy analysis, the results highlight the specificity of pandemics in comparison to other systemic shocks. By its very nature, a pandemic affects activities severely, according to their exposure to social distancing and to the rise or fall in demand for specific products. In addition, the macroeconomic dimension of a large-scale pandemic like COVID-19 encourages a shift toward defensive sectors in portfolio management. The effects of a pandemic event on stock returns result from the interaction between these two mechanisms, with timings that may not coincide. It is, therefore, difficult for insurers to build portfolios of assets and financial positions that will provide the best coverage, should

a new pandemic occur, while hedging usual market risks as long as there is no pandemic. In this non-pandemic period (or, if we may say so, while the asset owner is waiting for the next pandemic), we may interpret the difference between the expected return of such a pandemic-insurance portfolio and the return of a portfolio that would be optimal if the pandemic risk was ignored, as an insurance premium. Insurance is often viewed as a mechanism that allows the policyholder to substitute wealth from no-loss states to loss states, and using a capitalization approach to pandemic insurance achieves just that. This requires using financial instruments that are not part of the usual toolkit of insurers, but with new uses for them in the management of catastrophic risk, and also new business opportunities.

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Capco, a Wipro company, is a global technology and management consultancy specializing in driving digital transformation in the financial services industry. With a growing client portfolio comprising of over 100 global organizations, Capco operates at the intersection of business and technology by combining innovative thinking with unrivalled industry knowledge to deliver end-to-end data-driven solutions and fast-track digital initiatives for banking and payments, capital markets, wealth and asset management, insurance, and the energy sector. Capco's cutting-edge ingenuity is brought to life through its Innovation Labs and award-winning Be Yourself At Work culture and diverse talent.

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