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Lessons for Business, the Finance Industry and Policy Makers
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Insurance Risk Management During Pandemics

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Abstract The insurance sector plays a key role in absorbing systemic risks under normal conditions and its role is particularly important in taking losses following a pandemic or natural catastrophe. Strong risk management and contingency planning frameworks have ensured that insurers and reinsurers are well capitalised to withstand the economic shock of a pandemic. An estimate of the current impact of the coronavirus puts losses at more than US $200 billion, half of which is attributed to general insurance business, and the other half is attributed to losses due to volatile investment markets.

Keywords Solvency 2. Pandemics. Solvency ratio. Credit default risk. Market risks. Business interruption risk.

1 Introduction

Risk management in insurance companies requires careful contingency planning. The plans incorporate the actions that management would take following well predefined stress and scenario tests upon the realisation of very low probability events. Insurance groups have been well prepared for this crisis with strong capital positions. Still, the current pandemic raises many questions regarding the sector's product offerings and investment portfolio mix.

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Section 2 of this chapter briefly reviews the impact of past crises on economic output. Section 3 discusses the role of insurance and the impact of the current crisis on the sector.

2 A First Glance on the Impact of Pandemics on the Wider Economy

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) will reclassify[1] the emergence of infectious diseases amongst the key top risks, in terms of impact and likelihood of occurrence, that should be anticipated in financial institutions' business planning. Given the right conditions, COVID-19, the name of the disease caused by the highly virulent pathogen SARS-CoV-2, unexpectedly spread across borders to disrupt the longest run of world economic growth on record, to devastate communities, cities and continents posing unprecedented health and financial stability challenges.

This event is not the first pandemic event in history. Pandemics are amongst the deadliest events in human history. Events such as the 1918-19 'Spanish Flu' and the medieval 1347-51 bubonic plague known as 'Black Death' tortured the world causing pronounced increases in excess mortality.[2] DeWitte (2014) reports that Black Death is estimated to have killed 30% to 50% of the European population at that time. In addition to widespread increases in mortality and morbidity, pandemics can cause fiscal deficits in the short-term and can be the primary cause for long-term pronounced negative shocks to economic growth. Table 1 presents a non-exhaustive list of these events over the last century, and details the significant blow to life and to the economy that these have delivered in the past.

1 Infectious diseases were kept consistently outside the World Economic Forum's (WEF) top five risks. The WEF, in its 2020 Global Risks Report, classified infectious diseases amongst the top 10 risks in terms of impact, but assigned a lower probability of realisation than the average probability assigned to other risks (http://www3.weforum.org/docs/WEF_Global_Risk_Report_2020.pdf).

2 Excess mortality is a term used in epidemiology and public health to refer to the number of deaths above the level expected under normal conditions. The World Health Organisation define 'excess mortality' as the "mortality above what would be expected based on the non-crisis mortality rate in the population of interest. Excess mortality is thus mortality that is attributable to the crisis conditions. It can be expressed as a rate (the difference between observed and non-crisis mortality rates), or as a total number of excess deaths" (https://www.who.int/hac/about/definitions/en/).

Table 1 Notable pandemics and epidemics and the impact on human life and the economy. Adapted mainly from Madhav et al. 2018 and other sources as stated in the table

Starting Year	Event	Estimated mortality	Estimated economic impact
1918	'Spanish Flu'	20mn-100mn deaths (Johnson, Mueller 2002)	GDP loss of 11% in the US, 17% in the UK and 15% in Canada (McKibbin, Sidorenko 2006)
1957	'Asian flu'	0.7mn-1.5mn deaths (Viboud et al. 2016)	GDP loss of 3% in the US, UK, Canada, and Japan (McKibbin, Sidorenko 2006)
1968	'Hong Kong Flu'	1mn deaths (Mathews et al. 2009)	US $23bn to US $26bn direct and indirect costs in the US (Kavet 1977)
1981	HIV/AIDS	36.7mn death	2%-4% annual loss in GDP growth in Africa
2003	SARS	744 deaths across 37 countries (Wang, Jolly 2004)	Overall economic loss of US $50bn (FT 2009)
2009	'Swine Flu'	151.7k to 575.5k deaths (Dawood et. 2012)	GDP loss of US $1bn
2013	Ebola outbreak	11,323 deaths Mainly West Africa	US $2.8bn for Guinea, Liberia and Sierra Leone (World Bank 2014)
2015	Zika virus outbreak	2,656 reported cases of microcephaly (WHO 2017) across 76 countries	US $7bn to US $18 bn loss in Latin America and the Caribbean (UNDP 2017)

The coronavirus pandemic is savaging the world economy. By the end of Q2 2020, the "global economy is in its most precarious position since the global financial crisis",[3] and was entering the deepest and possibly the shortest recession in living memory. That view is reflected in the IMF's recent update on the growth of the world economy. The IMF forecasts a contraction of -4.9% in world GDP, a change of -1.9% from its previous update in April. At the end of 2019, world GDP is reported at c. US $142 trillion in purchasing power parity terms (i.e. international dollars). The IMF's estimate would imply a staggering contraction of c. -$6.95 trillion from the 2019 year-end figure in purchasing power parity terms.

At the time of writing (end of May-mid June 2020), the latest economic data point to a rapid slowdown to economic activity resulting

3 Quote from Laurence Boone's, OECD Chief Economist, article "Tackling the Fallout from the Coronavirus", published at https://oecdecoscope.blog/2020/03/02/tackling-the-fallout-from-the-coronavirus/.

in widespread business closures, near-universal event cancellations, remote working, and a general disruption of supply chains. Some of these key risks can be covered privately through insurance.

3 The Role of Insurance and the Impact of the Pandemic Crisis on the Sector

The insurance sector plays a key role in absorbing systemic risks under normal conditions, and its role is particularly important in taking losses following a pandemic or natural catastrophe caused by an earthquake or extreme weather event. Insurers and reinsurers act as financial intermediaries to provide effective risk transfer of financial and biometric risks, natural catastrophes and man-made disasters and pandemic risks. Reinsurers provide cover to life insurers against adverse mortality experience and stand to incur losses as big as the economic losses inflicted by natural catastrophes. Traditional retrocession and risk pooling methods provide the mechanisms for effective risk transfer and accumulation of capital.

For example, the Swiss Re Institute (2020) reports that in 2019, insurance provided cover for US $60 billion of the US $146 billion of economic losses inflicted by disasters. This cover is lower than in each of the previous two years due to the absence of severe hurricanes in the US, and is below the annual average of US $75 billion over the previous 10 years.

SCOR, the French reinsurance group, limits its exposure to natural catastrophes to 10% of its eligible own funds[4] (i.e. €980 million) and 20% for pandemic risks (i.e. €1.970 billion). SCOR monitors its key risk drivers and extreme scenario exposures against predefined risk tolerance limits. Table 2 provides SCOR's expected loss in extreme scenarios calibrated to the 1-in-200 year single events. The cost of a pandemic event is estimated just under €1.5 billion.

4 Eligible own funds as the name implies are the insurers/reinsurers' own capital that are available to absorb losses. Pursuant to Article 88 of the Solvency 2 Directive (EU Directive 2009/138/EC), own funds are composed of the excess of assets over liabilities and subordinated liabilities. Own funds items are classed into three tiers.

Table 2 Controlling risk appetite. Lessons from SCOR. Source: Company disclosure[5]

	in €mn	Risk Capacity* in €mn
North Atlantic Hurricane	660	980
U.S Earthquake	460	980
EU Wind	670	980
Japanese Earthquake	250	980
Terrorist Attack	230	980
Pandemic	1,470	1,970

* The exposure amount by risk that SCOR is willing to accept in pursuit of its business objectives.

Pandemics could also have serious consequences for insurers. The economic loss caused in 2003 by the SARS epidemic is estimated at c. US $50 billion and was mostly attributed to decreased travel and consumer spending. It is conceivable that all the shocks in table 2 could eventually materialise someday, but it is highly unlikely that all these single events will occur in the same year.

Today, the current impact of the coronavirus is being felt on both sides of insurers' balance sheets. Lloyd's of London projects total industry losses[6] amounting to more than US $200 billion, half of which is attributed to general insurance business, and the other half is due to losses from volatile investment markets. The lines of general insurance business that are likely to generate a larger proportion of the overall insured losses are event-cancellation cover, and US, UK and European business interruption cover. Other lines such as Contingency, Director and Officers, employment practices liability, general liability, mortgage, marine aviation, trade credit and surety and workers compensation will contribute less to the total insured losses. Other lines of business such as motor classes provide a positive offset to the bottom-line earnings along with an expected reduction in expense ratios.

Figure 1 illustrates the industry's largest reported losses realised in Q1 2020 in the EMEA region **[fig. 1]**. Munich Re's and Allianz Group's losses are associated mostly with general insurance business lines, but are mixed with losses realised due to natural catastrophes. No material COVID-19 claims impact (either mortality or critical illness) emerged in the first quarter of 2020.

5 Kessler 2019. Presentation to investors.

6 See https://www.ft.com/content/51d32286-5264-4c93-80c3-3d0b0fd4558a.

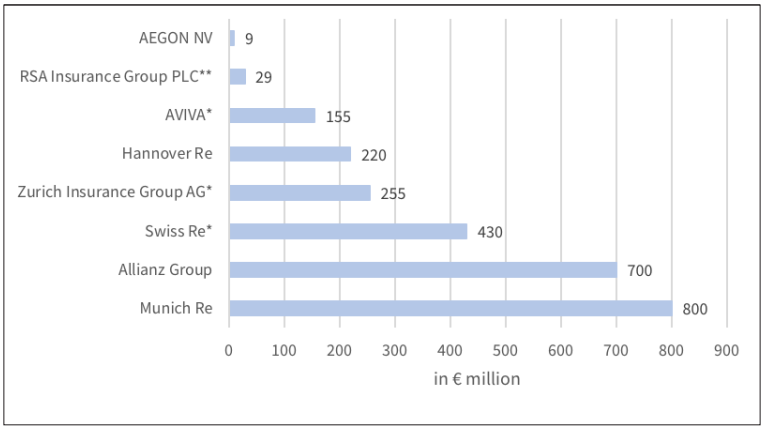

Figure 1 Q1 of 2020 pandemic losses reported by selective European insurance groups. The figure illustrates that in Q1 Munich Re and Allianz Group reported the largest losses associated with the pandemic and natural catastrophes. Loss estimates reflect the actual figures reported in the interim reporting figures of the selected insurance groups: * denotes a conversion of the loss in € using the average exchange rate over Q1, ** denotes only travel insurance and disability insurance claims

3.1 Business Interruption (BI) Cover

BI cover protects a business against economic losses due to property damage inflicted during periods of suspended operation. Most businesses carry BI insurance as part of their property insurance. In most cases, contagious diseases do not constitute property damage, especially when passed from person to person. Most of the BI cover provides cover against flood, fire and other physical damage to buildings. Only a minority of insurance policies have extensions that provide cover for infectious diseases. For example, in 2003, Mandarin Oriental hotels in Hong Kong, Malaysia, Singapore and Thailand suffered economic losses due to cancellations and reduced restaurant sales stemming from the SARS outbreak. Mandarin Oriental International Ltd recovered US $16 million from its insurers to pay for such business interruption losses.[7]

Following the aftermath of the SARS epidemic, insurers sought to re-design the type of insurance cover offered by adding exclusions for bacterial or viral infections to their coverage. Most insurers applied ISO standard wordings to exclude business interruption claims caused by an infectious disease. However, displeased policyholders, especially small businesses, argue that these new additions are subject to interpretation. In particular, they argue that policy wording such as the "in-

7 Page 3 of Jardine Strategic Holdings Ltd 2003 Press release recovered from SEC's archive at https://www.sec.gov/Archives/edgar/vprr/0401/04010312.pdf.

ability to use the office due to restrictions imposed by a public authority during the period of insurance following *an occurrence of notifiable human disease*" implies that cover is provided for the current crisis.

An industry wide solution is required, and concessions need to be made. This is a key controversial area and the UK's financial regulator[8] is seeking answers to the question "should insurers remain liable?" at the High Court in late July. This involves 17 disputed policy wordings offered by eight insurance groups. This existential battle for some UK businesses has a global audience, given that European, US and Asian insurers are also facing the same issue.

3.2 Variability in Investment Returns

The sharp downturn in economic activity resulting from the COVID-19 outbreak has put significant pressure on insurer's profitability in the near term, as already reflected in insurers' equity prices. Figure 2 illustrates the sharp change in risk appetite which caused a panic 'sell-off' across all major stock market benchmarks **[fig. 2]**. The shares of insurance groups in most jurisdictions have also fallen. At the end of Q2 2020, the sector's performance, approximated by the fall in the MSCI Global Insurance Index, experienced a drop of c. 22%. During the Great Financial Crisis (GFC), the sector experienced a dramatic fall of c. 53%, underperforming the broader equity indices, as illustrated in panel 1 of figure 2.

Falling equity prices (panel 1) were accompanied by widening corporate spreads (panel 2), which were marginally offset by declines in government yields, as illustrated in figure 3. This further exacerbated the under performance of the insurance sector, relative to broader stock market indices. Insurance companies' portfolios are heavily invested in long-term sovereign and corporate bonds, and the market's reaction anticipated potential mark-to-market losses on the investment portfolios of insurers. Large falls in the market prices of corporate bonds are linked to the widening of credit spreads **[fig. 2, panel 2]**. These losses are largely offset by gains on government bond portfolios due to the negative change in government yields **[fig. 3, panels 1 and 2]**.

Over Q1 2020, the dislocation in financial markets was more pronounced in the sub-investment grade corporate bond markets. Figure 2, panel 2, illustrates the widening of the credit spreads across four different credit indices over three different periods. The change to the Barclays high yield credit spreads reached levels not seen since the 2007 GFC, although they fell short of touching the GFC peaks. This index along with the widening of spreads in investment grade iBOXX indices indicate pronounced levels of credit risk. These are

8 See https://www.ft.com/content/fafc4037-b86d-4feb-8c98-0ac6afa5da83.

associated with the weakening credit quality of borrowers in vulnerable corporate sectors (i.e. the retail, travel, transportation, leisure and gambling, hotels and oil and gas sectors), some of which operate with significantly higher liquidity requirements, maturity mismatches and leverage. Further weakening of the corporate sector for the above reasons could significantly increase the credit downgrade and default losses experienced by insurance groups.

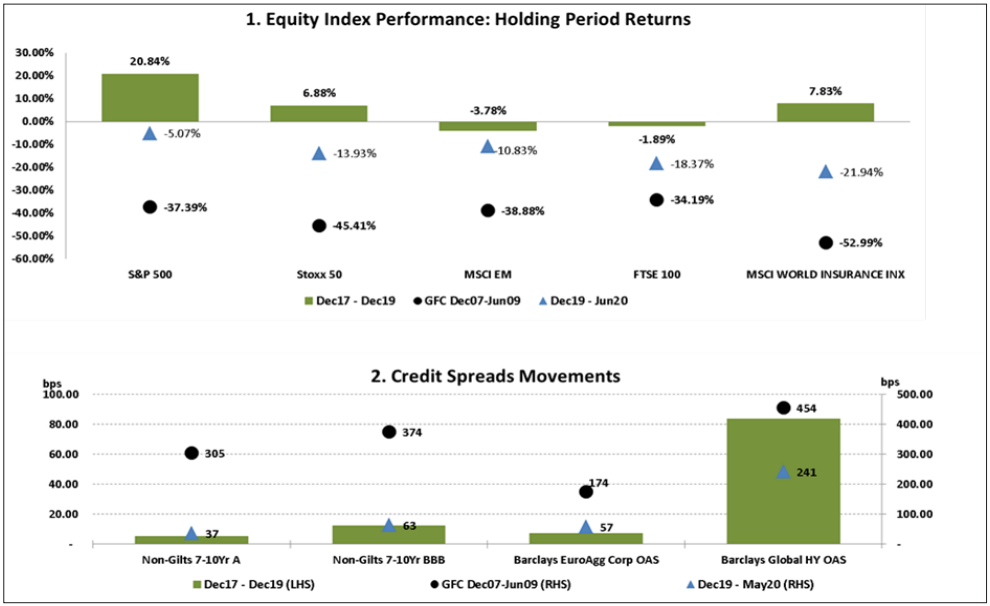

Figure 2 Equity and bond market performance over selected periods. Source: Author's calculations, Bloomberg, IHS Markit. Panel 2 includes the UK Non-Gilts iBOXX 7-10 Year indices that include bonds rated A and BBB with terms to maturity between 7 to 10. The quotes spread is the change of the OAS (option adjusted spreads) over the stated period

3.3 Sensitivity of Solvency Capital to Key Risk Drivers

Declines in interest rates are not necessarily associated with strong solvency[9] positions. Life insurance groups' balance sheets are generally more sensitive to declines in short-term interest rates. That sensitivity is associated with the long-dated nature of policy holder annuity

9 In Europe, the Solvency 2 directive requires insurance and reinsurance groups to have enough capital buffers in place over one year to be able to survive with at least a 99.5% probability (i.e. having assets in excess of its liabilities in one year's time) and then being able to fully de-risk its balance sheet. In Switzerland, the aim of the Swiss solvency test (SST) is similar. The required capital is calibrated at the 99th percentile. The solvency ratio is defined as the ratio of eligible own funds to the required solvency capital.

liabilities, and with investment guarantees embedded in the investment products that are usually wrapped by life insurance contracts.

Life insurance companies usually seek long duration assets, in order to match the long-term duration of their annuity liabilities, and in effect minimise any duration gaps in their asset and liability management processes. This active management is required due to the biometric nature of their liabilities. Life insurance companies are exposed to changes in life expectancy, which in turn affects the duration of the insurers' annuity liabilities. If this change in duration is left unmanaged, it will affect the company's earnings and solvency capital position. Therefore, insurers engage actively in managing duration gaps by ensuring that cash flows from their fixed income portfolio match the annuity liability outgoings, either through lengthening the maturity of their asset portfolio, and/or engaging in hedging activity.

Insurance groups also maintain a high-quality asset portfolio, primarily consisting of government bonds, corporate bonds (average credit quality of A) with limited exposure to sub-investment grade bonds (i.e. average 2%, but varies between 0% to 8%), and to the most vulnerable corporate sectors impacted by the coronavirus pandemic. The fixed income portfolios also include portfolios of privately rated assets (i.e. up to 30% to 40% of the overall portfolio) made up of commercial real estate loans secured by property assets, equity release mortgages, infrastructure loans and loans extended to housing associations and universities.

Panels 3 and 4 of figure 3 illustrate the solvency ratio as at the year-end 2019 and the change to the solvency ratio of major European insurance groups recorded over Q1 2020, respectively. For instance, AXA's solvency ratio was 182% on March 31, 2020; down 16% points on its year-end 2019 position. The negative change in AXA's solvency ratio, as for most groups, is mainly driven by unfavourable market conditions, primarily higher corporate and sovereign spreads and lower interest rates. Thus far, the COVID-19 crisis and the volatility market environment have depleted earnings and reduced solvency capital within each group's acceptable ranges. Q1 losses were offset by positive operating returns for the quarter.

Given that events are still unfolding, credit risk remains a pronounced exposure for European insurers. Groups with holdings of direct property and commercial real estate loans have provided rent concessions to tenants in response to the 'Great Lockdown' and in accordance with the authorities' guidance. Depending on the duration of this lockdown, these rent concessions could create short-term cash flow mismatches that could lead to bigger concerns in terms of liquidity, asset-liability management and capital. If this is prolonged, insurance groups will experience further downgrades and defaults in their fixed income portfolios associated with non-financial businesses operating in the most vulnerable sectors of the economy.

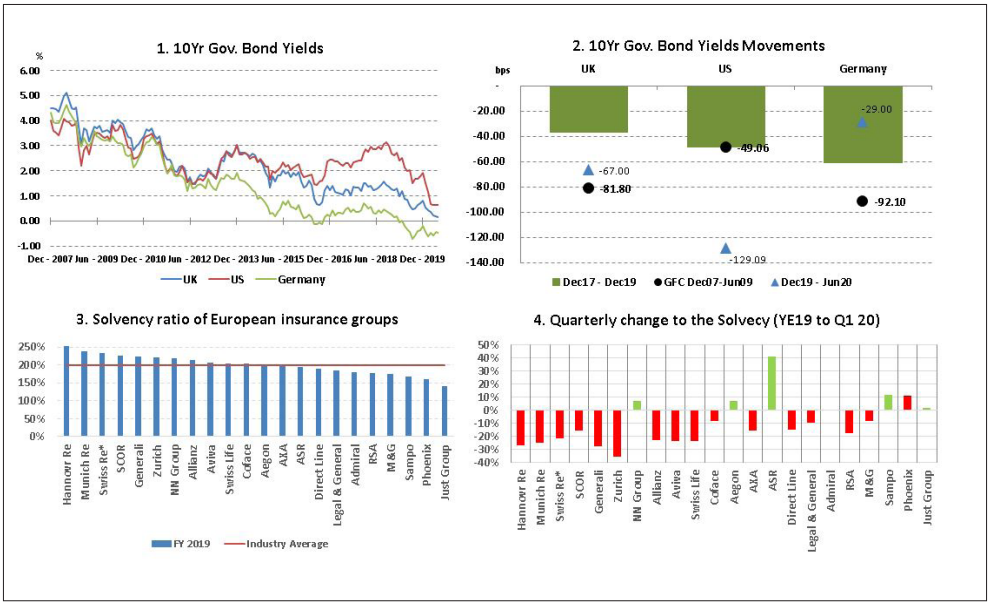

Figure 3 Long-term rates and solvency of selected European groups. The figure illustrates the levels and changes to the 10-year government nominal rates and to the solvency levels as reported in the year-end 2019 audited financial disclosures of each insurance group. Almost all European groups are on a Solvency 2 basis. Only Swiss insurance groups, Zurich, Swiss Re and Swiss Life are on a Swiss Solvency Test (SST) basis. Note: Swiss Re's (denoted with *) quarterly change to its solvency ratio (panel 4) is an estimate, and not an actual disclosed figure. Swiss Re noted in its recent quarterly announcement that the Solvency ratio for Q1 2020 is comfortably above 200%

The impact of current defaults remains below the 2009 peak level.[10] AXA has disclosed that its solvency sensitivity is -6% points to a credit rating migration that assumes a full letter downgrade (i.e. three notches) to 20% of its corporate bonds (including privately rated debt). This is not an unlikely scenario given the IMF's current outlook on the world economy, as discussed in section 2.

4 Conclusions

Thus far insurance groups have comfortably covered their losses caused by the current pandemic. The duration of the lockdown impacts the speed of the economic recovery, which in turn determines

10 As per Moody's most recent default report. This forecasts an increase in sub-investment grade bond default rates from the current level of 4% to 10.4% by the end of 2020.

the extent of the impact on the grown of the economy and on the insurance sector. Further vulnerabilities in the corporate sector could lead to further falls in financial markets. This would adversely impact earnings and could marginally reduce the solvency position of large life insurance groups. Impairments and revaluations due to credit rating migrations would further impact investment income, creating liquidity concerns and asset and liability mismatches. The key focus is disciplined asset-liability management, through duration extension and increased use of traditional retrocession. Life annuity writers could see an increase in their liabilities over the next five years, driven by a slow down in life expectancy improvements.

In the non-life segment, there is uncertainty around the underwriting performance of the property and casualty business. Few groups have withdrawn their earnings guidance partly due to the potential for further COVID-19 relation claims, as well as the lower investment yield environment. The current High Court case on business interruption claims adds litigation and reputational risks to the repertoire of risks that concern insurers.

Coming out of this crisis, insurance groups will need to re-design specific product lines to align more closely with policyholders' needs and meet regulators' expectations. Regulators will also be focused on the adequacy of the industry's solvency capital, the appropriateness of their regulatory frameworks and on the effectiveness of the industry's current risk management frameworks.

Finally, in a post COVID-19 world, governments could play a more active role in providing pandemic insurance. The US insurance industry is supporting new legislation that would allow federal states to share pandemic losses with the industry. This would not be unprecedented, as the Terrorisms Risk Insurance Act (TRIA), which was introduced in response to 9/11, allows for a federal loss sharing programme for certain insured losses resulting from certified act of terrorisms.

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