



Validating Algorithmic Underwriting Models – Expert Panel Report: COVID-19 Addendum





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Validating Algorithmic Underwriting Models – Expert Panel Report

Section 1: Background and Objectives

This report serves as an addendum to the report [Validating Algorithmic Underwriting Models – Expert Panel Report](#) that was published in March 2020. The original report was based on discussions that took place in December 2019, well before the Coronavirus pandemic impact on the economy and life insurance underwriting process.

The Actuarial Innovation and Technology Steering Committee of the Society of Actuaries (SOA) assembled an expert panel to discuss the impact that the Coronavirus pandemic is having on algorithmic underwriting. The panelists (listed in Section 5) included direct writers, reinsurers, and consultants. This report reflects a range of opinions expressed by those experts, but is not intended to form a consensus.

The objectives of the panel discussion held on April 22, 2020 were to consider how the Coronavirus had impacted algorithmic underwriting with respect to:

- Implications on life insurance underwriting, such as the impact that numerous shelter-in-place orders were having on underwriting practices
- The impact that the pandemic was having on the use of algorithmic underwriting, the potential impacts on future mortality experience, and the considerations around data gathering. The data considerations included both data adjustments for current modeling purposes, as well as implications for future use of data containing COVID-19 distortions
- Key risks and changes in algorithmic underwriting models (AUMs) that need to be considered in terms of the pandemic
- Regulatory concerns resulting from AUM usage in the current environment
- Model risk management

While the themes covered in this report could apply to multiple jurisdictions, the panel discussion was focused on the life insurance industry and regulatory oversight in the United States.

Section 2: Introduction

Algorithmic underwriting has become more important during the COVID-19 pandemic due to the greater difficulties associated with carrying out the procedures required by traditional underwriting, such as the collection of fluids. This has resulted in insurers placing greater emphasis on their algorithmic underwriting and seeking to adjust their models to reflect the current environment in which we are living.

In order to get greater utility from their models, insurers are looking to other big data sources that can be incorporated into their models, as well as looking for expert advice regarding how to adjust their models and minimize mortality risks that result from the pandemic.

Models and data interpretations will also be affected in the future as it will be important for future mortality risk assessments to adjust for the current increases in the number of deaths due to COVID-19. There are many considerations around how COVID-19 deaths are recorded and coded, which make this a more complex situation than may at first be surmised.

The panel also discussed some of the challenges that companies face as they seek to adjust their models in a rapidly changing environment.

Section 3: COVID-19: Implications for Algorithmic Underwriting

The shelter-in-place orders that have been declared in many jurisdictions in the United States have made traditional underwriting unfeasible, if not impossible. Traditional paramedical exams are far less desirable now and both insurers and those seeking insurance need to rely more on alternative underwriting methodologies, at least for lower face amount policies.

There has already been a cultural shift away from traditional underwriting amongst younger insurance purchasers. This is facilitated by the fact that the actual underwriting costs are generally lower for younger ages, and some of the information needed can be obtained by using a range of additional data sources. Due to COVID-19, the range of policies that have been written without traditional underwriting and paramedical exams has been increasing. Companies have had to be more responsive and willing to make radical changes due to the volatile environment where limitations are greatly impacting the underwriting environment.

A few experts noted that this pandemic appears to have increased the awareness of the need for insurance, which could result in increased sales for insurance companies. This increase appears to be more from a heightened awareness as opposed to an attempt by those infected with the virus trying to select against insurance companies.

We note that many of the experts on the call either represented, or consulted with, larger life insurance companies. As a result, the discussion that follows may not be representative of the COVID-19 experience of mid-size and smaller life insurance companies.

3.1 IMPACT ON ALGORITHMIC UNDERWRITING

Many companies have had to rely increasingly on algorithmic underwriting (AUW) techniques. This has resulted in a loosening of the algorithmic underwriting limits that insurers previously had in place. Algorithmic underwriting limits have been expanded in many cases for both face amounts and ages. Companies that were already relying significantly on algorithmic underwriting models have been in a good position to extend those models. While these companies are well positioned, the transition has been challenging, as explained in Section 3.10.

As companies have been pushed to rely more on AUW, they have looked further to additional external data sources to assist with their underwriting process. For example, some companies looking for alternatives to the traditional Attending Physician's Statement (APS) have turned to electronic data health companies that are providing access to alternative electronic medical data such as clinical labs, patient portals, medical claims information and electronic health records. One of the panelists also noted that the greater difficulty in getting a paramedical exam or APS would likely be a longer-term issue with the move to electronic health records, and would not resolve itself when the pandemic died down.

Companies are also looking for more advice from consultants and reinsurers about changes needed to underwriting practices during this period, as well as assistance with understanding the additional short- and long-term risks from the pandemic.

Traditional underwriting processes have also run into obstacles that did not exist before the pandemic. As an example, some labs have reduced their capacity for analyzing the fluid samples used in traditional underwriting so that they can move more resources to assist with COVID-19 testing. Another important point made was that traditional underwriting won't be of much help in limiting an insurer's exposure to COVID-19 claims.

Companies are concerned about infected people trying to get insurance. Addressing these concerns is more difficult in an AUW environment. For example, an applicant's temperature cannot be assessed if someone is not in physical contact with the applicant. Some companies are addressing this by delaying or deferring underwriting decisions for as long as three or six months. Ironically, the slower traditional underwriting process would be an advantage in this

environment. While the cost of underwriting has gone down, in this situation the risk of adverse selection is much higher.

3.2 IMPACT ON REINSURANCE

The panel briefly discussed the impact that the changed environment is having on reinsurers. One panelist noted that direct writers were looking more to reinsurers for additional guidance as opposed to changes in the retention limits. Also, reinsurers may not be reacting fast enough for direct writers to be able to adjust their own underwriting procedures.

Many insurers put processes in place around changes to their algorithmic underwriting practices without the expectation of having to change those processes so quickly. Changing those processes now is causing some problems as insurers need to work with their reinsurers to agree on changes.

3.3 MORTALITY AND COMORBIDITY RISK FROM COVID-19

There is a lot of interest in the mortality risk from COVID-19, especially as it impacts older ages. Companies are also asking about how the risk may change due to comorbid conditions associated with COVID-19. Applicants with many of the comorbid conditions that have been identified would already be required to pass through a more manual underwriting process so the existence of these conditions is seen as less of an issue for algorithmic underwriting. People who are regular travelers may also need to go through a different process.

Companies are also interested in increasing their ability to monitor their experience going forward because of the recognition that, with the expansion of AUW, more higher-risk policies will find their way through an automated process. One suggestion regarding screening was that, since these higher-risk policies will be underwritten for likely an extended period of time, companies may want to consider finding ways to offset these additional risks.

A useful comparison noted is that there are approximately 40,000 deaths from influenza each year in the U.S. The 2010 – 2019 flu seasons varied from 12,000 to 61,000 deaths per year with an average of 37,000.¹ As of April 28, 2020, there have been 57,000 COVID-19-related deaths in the U.S. This is, however, in a significantly shorter timespan than a typical flu season. There was also discussion around the reliability of the COVID-19 death counts. For example, the cause of death for a COVID-19-related death may be coded as low blood oxygen.

Another useful graphical comparison was published in *The Economist* showing the impact of COVID-19 versus expected deaths for numerous countries.²

3.4 OCCUPATIONAL RISK

There is a clear link between occupation and COVID-19 risk. One panelist noted that there was a U-shaped relationship between income and occupational risk.³ Healthcare workers are at the greatest risk while the pandemic exists, but it would be a very poor message to increase premiums for healthcare workers. The panel was also in general agreement that adjusting occupation ratings based on COVID-19 had numerous problems outside of concerns about perception. For example, it would be difficult to judge how much quantitative evidence was needed before making occupational adjustments. Another caution was that risks associated with certain positions may change. As an example, an older audit partner who used to spend significant time at a client may now have a more

¹ <https://www.cdc.gov/flu/about/burden/index.html>

² <https://www.economist.com/graphic-detail/2020/04/16/tracking-covid-19-excess-deaths-across-countries>

³ <https://www.visualcapitalist.com/the-front-line-visualizing-the-occupations-with-the-highest-covid-19-risk/>

junior staff member handle the direct liaison with the client while the partner works out of his home office. One possibility to get some additional risk differentiation would be to put a greater emphasis on geographical variations of policies underwritten than in the past.

3.5 IMPACT ON INSURANCE SALES

As previously noted, panelists observed that there appears to be an uptick in the appreciation for the need for insurance. This has not necessarily translated to increases in all types of insurance - there is evidence that sales of term insurance have increased more than other lines. While the increase has not been a straight line, it is definitely an increase. Some indicators show that part of the increase is from younger people purchasing through direct channels, and that Canada appears to be more impacted by the general sales increase than the U.S.

One panelist noted that data from social networks indicated that many social network users know people who have contracted COVID-19 and that the deaths from the disease are relatively close socially versus deaths from infections in the past, which were rare. The breadth of people directly impacted by this disease may explain the increased demand for insurance. In another ironic twist, it was also noted that the increased demand comes at a time when the industry is least able to deal with it.

3.6 ALGORITHMIC UNDERWRITING USAGE AND IMPACT ON INSURANCE COMPANY OPERATIONS

While this report does not discuss impacts outside of algorithmic underwriting, some effects of the pandemic are affecting insurance companies and model interpretation. For example, there are reports of some companies struggling to keep up with the death claims, not because of the number, but because the coroners cannot keep up and issue death certificates in a timely fashion.

One panelist noted that in the UK there are usually around 10,000 deaths per week whereas in April, that number had spiked to about 22,000 per week due to the impact of COVID-19.⁴ Of the 12,000 increase, 9,000 were due to COVID-19, suggesting an increase in other causes of death of around 3,000. There have been reports of people not seeking medical attention because of concerns about contracting the virus. This may have contributed to the additional observed deaths. From a mortality risk point of view, COVID-19 deaths are strongly associated with obesity and obesity-related conditions which, in the U.S., have socio-economic ties likely resulting in many of the excess deaths being from people without policies or policies with lower face amounts. A significant body of research also shows that COVID-19 disproportionately affects lower socio-economic classes.⁵

The panelists were not aware of a study of life-years lost due to the pandemic, but such a study would clarify the economic impact since it could assist with incorporating other financial elements – like how much future premium is lost – into the calculation.

3.7 CURRENT AND FUTURE DATA INTERPRETATION

If COVID-19 deaths are not correctly recorded, current and future interpretations of mortality data could be inaccurate. In some situations, COVID-19 deaths may be ascribed to other causes. Conversely, there could be situations where a death that may have occurred in any event – for example a younger person with HIV-related pneumonia who would have died from that cause - but ultimately succumbed to COVID-19. New York recently

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<https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/deaths/bulletins/deathsregisteredweeklyinenglandandwalesprovisional/weekending17april2020>

⁵ <https://jamanetwork.com/journals/jama/fullarticle/2765524>

updated their statistics to include a surge of deaths that occurred at homes around the city, but where definitive COVID-19 tests were not available.⁶

These types of issues complicate future data usage or analysis since if one wanted to use this data, but remove the impact of COVID-19, it would be difficult to do so if the cause of death information was not reliable. One panelist noted that, if a model had a mortality analysis factored by various morbidities such as diabetes, respiratory, etc., one could reflect the COVID-19 impact by applying a factor to the parameters already in the model.

3.8 KEY MODEL RISKS AND CHANGES IN MODEL VALIDATION FROM COVID-19

Because of the difficulties of processing traditional underwriting in the current circumstances, insurers are pushing to use more data from Electronic Health Records (EHR) and other sources. The EHR's could be used as a monitoring tool as well and help reduce the need for random holdouts. The EHR information could also be used as target variables, which could help automate the monitoring process.

The implications of deaths from a pandemic being excluded from policy coverage were considered by the panel. This was seen by the panel as a very unlikely course and one that many regulators would likely not allow. For example, the Connecticut Insurance Department released a notice that insurers could not ask any questions about COVID-19 on applications for insurance.⁷ It was also discussed that, regardless of what the policy said, the larger question was whether a regulator would allow a benefit not to be paid because of a pandemic-related death, even if it was excluded in the policy. One way to alleviate the increased risk from the current, and possibly future, pandemics would be to look at the COVID-19 comorbidities and increase the risk adjustments related to them.

The panel also considered the modeling risks for some companies with smaller and less experienced modeling departments. Experience is needed to fully understand and appropriately adjust the model to allow for the additional COVID-19 deaths. Without the requisite experience, model adjustments could incorrectly reflect future mortality risks. There was also a risk where models were using third-party data as part of the inputs. While most companies understood their own data very well, they were less likely to understand the nuances and adjustments needed for third-party data.

3.9 REGULATORY CONCERNS

Two regulatory concerns were noted above related to applications asking about COVID-19 related symptoms and the difficulties involved if a company wanted a pandemic exclusion in a policy. The panel discussed that many regulatory concerns would still apply, such as around data privacy and ensuring that any algorithmic decisions were not discriminatory. While there has been significant press around discrimination in healthcare coverage regarding COVID-19, there has been less such coverage regarding life insurance companies, but this topic can get a lot of coverage very quickly if the status changes. One panelist noted that, if there were concerns about hidden discrimination in algorithmic underwriting, this would be a good time to remove it when altering models for COVID-19.

⁶ <https://www.bbc.com/news/world-us-canada-52303739>

⁷ https://portal.ct.gov/-/media/CID/1_Notices/COVID-19-LifeInsQuestions.pdf?la=en

3.10 MODEL RISK MANAGEMENT

This pandemic has highlighted that some of the risk management discussions need to change. Previously, situations like the risk of a data center going down would have been a common discussion area, but no one was talking about what may happen under a pandemic.

Panelists also noted that model-change protocols had often been put in place without anticipating the need for the rapid changes that the pandemic could require. While actuaries and data scientists may have built the models, the models have sometimes been implemented by the IT Department. When a change is needed, there are many steps required to accomplish the change, and a long sign-off process. This is good from the perspective of reducing the risk of poorly designed changes, but results in limited flexibility and slow responses when the environment changes rapidly. With employees not being in the office and working remotely, this has made it difficult to make the necessary model adjustments. In some cases where model maintenance had been offshored, it has not been possible to get offshore employees to work remotely and the models had to be brought back onshore.

Section 4: Closing Remarks

The COVID-19 epidemic has had a significant impact on algorithmic underwriting and its usefulness to insurance companies. The most significant points that were raised and discussed during the panel meeting were:

- The pandemic appears to have raised an awareness amongst consumers for the need for insurance. The panelists did not feel that this awareness was specifically from an anti-selection perspective.
- In the absence of specific COVID-19 infection information from insurance applicants, insurers may want to review their assessment of COVID-19 comorbidity risks.
- Companies that already relied significantly on algorithmic underwriting were better positioned to make the changes needed to adjust to underwriting in a pandemic environment.
- Conversely, some companies have implemented rigorous protocols and required extensive authorizations for changes to their algorithmic underwriting requirements. This has resulted in a lack of flexibility when swift changes were needed on account of a rapidly changing environment.
- Current and future data interpretation, to allow for the impact of COVID-19 deaths, will require experience and judgement

Section 5: Acknowledgments

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About The Society of Actuaries

With roots dating back to 1889, the [Society of Actuaries](#) (SOA) is the world's largest actuarial professional organizations with more than 31,000 members. Through research and education, the SOA's mission is to advance actuarial knowledge and to enhance the ability of actuaries to provide expert advice and relevant solutions for financial, business and societal challenges. The SOA's vision is for actuaries to be the leading professionals in the measurement and management of risk.

The SOA supports actuaries and advances knowledge through research and education. As part of its work, the SOA seeks to inform public policy development and public understanding through research. The SOA aspires to be a trusted source of objective, data-driven research and analysis with an actuarial perspective for its members, industry, policymakers and the public. This distinct perspective comes from the SOA as an association of actuaries, who have a rigorous formal education and direct experience as practitioners as they perform applied research. The SOA also welcomes the opportunity to partner with other organizations in our work where appropriate.

The SOA has a history of working with public policymakers and regulators in developing historical experience studies and projection techniques as well as individual reports on health care, retirement and other topics. The SOA's research is intended to aid the work of policymakers and regulators and follow certain core principles:

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