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Narrative Economic Scenarios as an Actuarial Risk Management Tool

Summary

The economic turmoil caused by the COVID-19 crisis has hit insurance companies particularly hard. A surge in corporate downgrades and bankruptcies has eroded the quality of their assets, putting downward pressure on capital reserves and profits. Low to negative interest rates have inflated their liabilities, especially on guaranteed annuity products, and increased reinvestment risks in the cases where assets are of shorter duration than liabilities. Exacerbating these challenges is the uncertain near- to medium-term economic outlook reflected through higher volatility in the market value of financial assets and liabilities, and therefore, earnings and profits. Now more than ever, insurers need a robust internal risk management process that can quickly and efficiently identify vulnerabilities and opportunities across their entire business. Unfortunately, the unprecedented nature of the COVID-19 crisis, including the countervailing government action, means that reliance on past experiences as a guide can be neither an effective nor a reliable strategy.

This paper illustrates how in this uncertain business environment, insurers can benefit from forward-looking narrative scenarios. These scenarios reflect a range of possible future outcomes for the economy based on current conditions, economic models, and the expert view of economists, and can be used to understand how key metrics such as profit, liquidity, and capital are likely to change under various "what-if" states of the world. By projecting a holistic view of the future economy, narrative scenarios can add immense value to asset liability sensitivity exercises and stochastic risk analysis—both common practices among insurers. Moreover, since these scenarios consider the comprehensive set of risks facing the different lines of businesses, and the interdependencies between them, their use can enhance collaboration between different groups within the company, increasing overall process efficiency.

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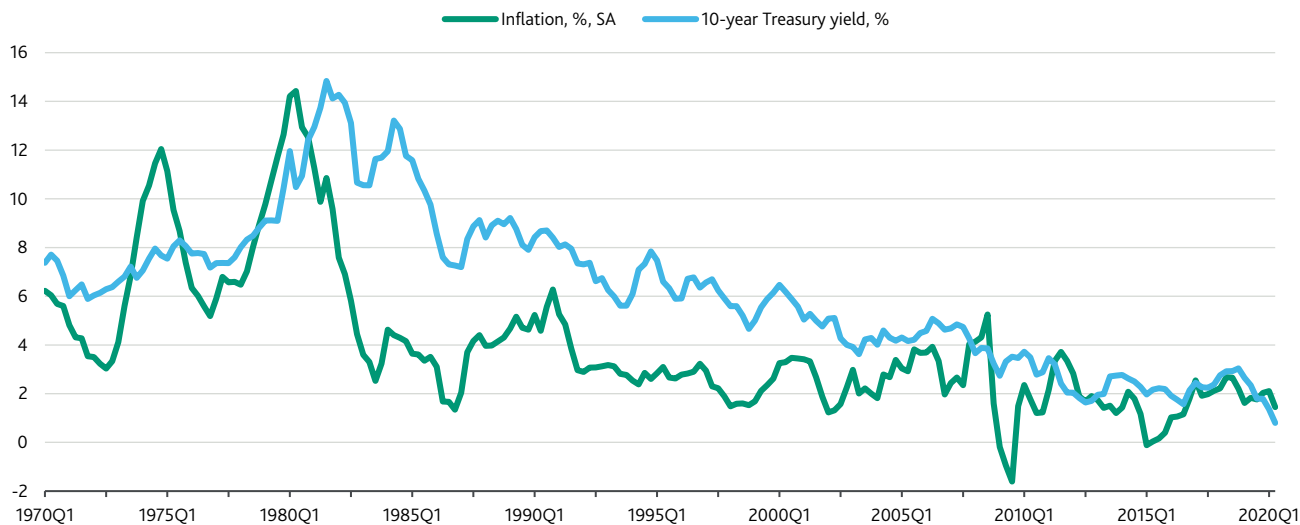
Scenarios allow 'what-if' analysis

Scenario analysis is not new to insurance companies. Most insurers are required to test the sensitivity of their assets and liabilities to changes in key risk factors as part of solvency and asset adequacy tests. As part of this process, regulators prescribe various interest rate and equity scenarios. Senior management within the company may also define scenarios to supplement prescribed scenarios for planning or other internal risk management activities. These scenarios may also require a nested stochastic scenario structure to allow for calculation of reserve, capital, or other risk metrics along the “outer loop” path of the projection. In many cases, the future paths of these scenarios may be defined by shocking or adjusting a limited set of risk drivers without an attempt or ability to connect them to the rest of the economy. In other words, these “prescriptive” scenarios are frequently neither complete nor internally consistent. They do not answer questions like the following: is the sudden increase in long rates a response to central bank policy, a rise in inflation expectations, or both? Or is it a consequence of a decline in safe haven flows into US Treasuries because of the improved growth outlook of the rest of the world? What about the performance of the real economy? Is output contracting and unemployment rising? Since insurance companies do not operate in a vacuum, an effective and holistic risk management approach will need to consider the answers to these questions to help understand the drivers of these scenarios and connect them to the implications for their business.

Sometimes, historical scenarios are used to perform what-if sensitivity analysis. The goal here is to see how business would be affected if faced with a repeat of certain stressed historical events such as the 2008-09 global financial crisis, Japan's economic stagnation and price deflation in the 1990s, or the 1970s stagflation in the United States. The problem with historical scenarios can be summed up in four words: “the world has changed.” As an example, a stagflation scenario in the United States today would likely look very different from what it did in the 1970s. First, it is inconceivable that inflation will rise to levels even close to those in the early 1980s (Figure 1). The primary reason is the reduced reliance on imported oil and the move away from a commodity-based to a service-based economy. Second, the monetary policy response to rising inflation will be different this time around; it will likely entail a mix of direct intervention through rate increases and indirect intervention through more unconventional methods such as reverse quantitative easing. Government backstops adopted since the financial crisis will also limit the immediate spillover impacts on corporate spreads. Incidences of default, as a result, will be less than what they were during the stagflation of the 1970s. Similarly, if the Federal Reserve (Fed) did allow the 10-year Treasury yield to drop below zero, the knock-on effects on the economy would be very different from those experienced by a structurally dissimilar country like Switzerland.

Backward-looking historical scenarios will not be able to accurately capture the ways in which the economy has structurally changed over the years and will therefore mask the true risks that insurers face. The only reasonable way to predict the effects of these what-if future scenarios is by taking advantage of a macroeconomic model and the expert views of economists.

Figure 1 US inflation and interest rates are on a downward trajectory



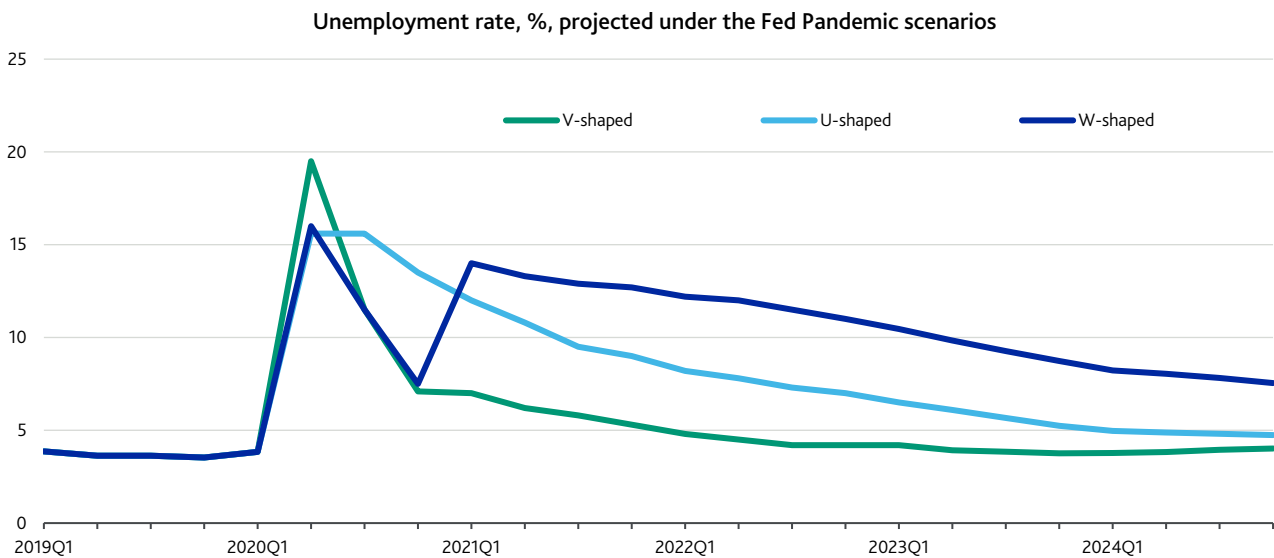
Sources: Federal Reserve Board, U.S. Bureau of Labor Statistics

Forward-looking narrative scenarios

The starting point of any narrative scenario is a carefully thought-out narrative that considers the current state of the economy and makes certain assumptions for its future state. These assumptions—such as those around employment, output, inflation, and fiscal and monetary policy—use economists’ views and reflect various hypothetical states of the future world in ways that are internally consistent. A macroeconomic model based on historical data, statistical equations, and economic theory expands these assumptions into a larger set of variables. Since the narrative is not limited to a single metric such as interest rates or equity prices, these scenarios represent the future economy more holistically. Narrative scenarios already drive an important component of the balance sheets of many US insurers. As of January 2020, publicly traded insurers that file under US generally accepted accounting principles (GAAP) are having to consider future economic conditions when setting aside reserves to account for the expected lifetime losses on their investment portfolios and receivables. Insurers that are not publicly traded, or file under IFRS® Standards, will be subject to similar forward-looking expected loss accounting standards starting in 2023.

Narrative scenarios can be a useful tool for analyzing alternative outcomes of the COVID-19 economic crisis. Today, economists, epidemiologists, and policy makers are divided over the shape and speed of the post-COVID-19 economic recovery. Will the recovery be sharp and quick, shaped like the letter V, or will it be more prolonged like a U, or worse, a double-dip like a W where infections surge again later this year? The Fed, acknowledging the impact this uncertainty can have on the financial system, recently tested the capitalization of 33 of the largest US banks under three pandemic scenarios reflecting different recovery assumptions.¹ The Fed disclosed the results of this sensitivity exercise only in aggregate but revealed that under the more severe U and W scenarios, many banks’ capital ratios will come close to the regulatory minimum. For the scenarios, the Fed provided only rudimentary assumptions for key variables. These assumptions were expanded to full narrative scenarios using economists’ views and a macroeconomic model. Figures 2 and 3 show the unemployment rate and 10-year Treasury yield under the V, U, and W Fed pandemic scenarios.

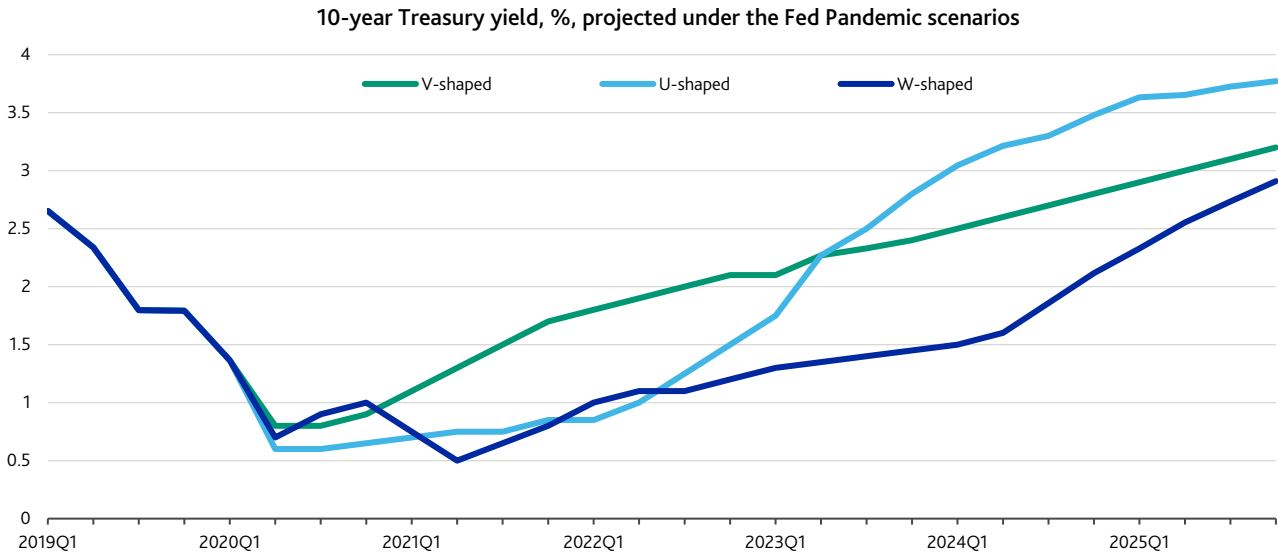
Figure 2 Joblessness improves this year, but surges again next year during the pandemic’s second wave



Sources: US Federal Reserve, Moody’s Analytics

¹ <https://www.federalreserve.gov/publications/files/2020-sensitivity-analysis-20200625.pdf>

Figure 3 Interest rates stay lower for longer under a W-shaped recovery



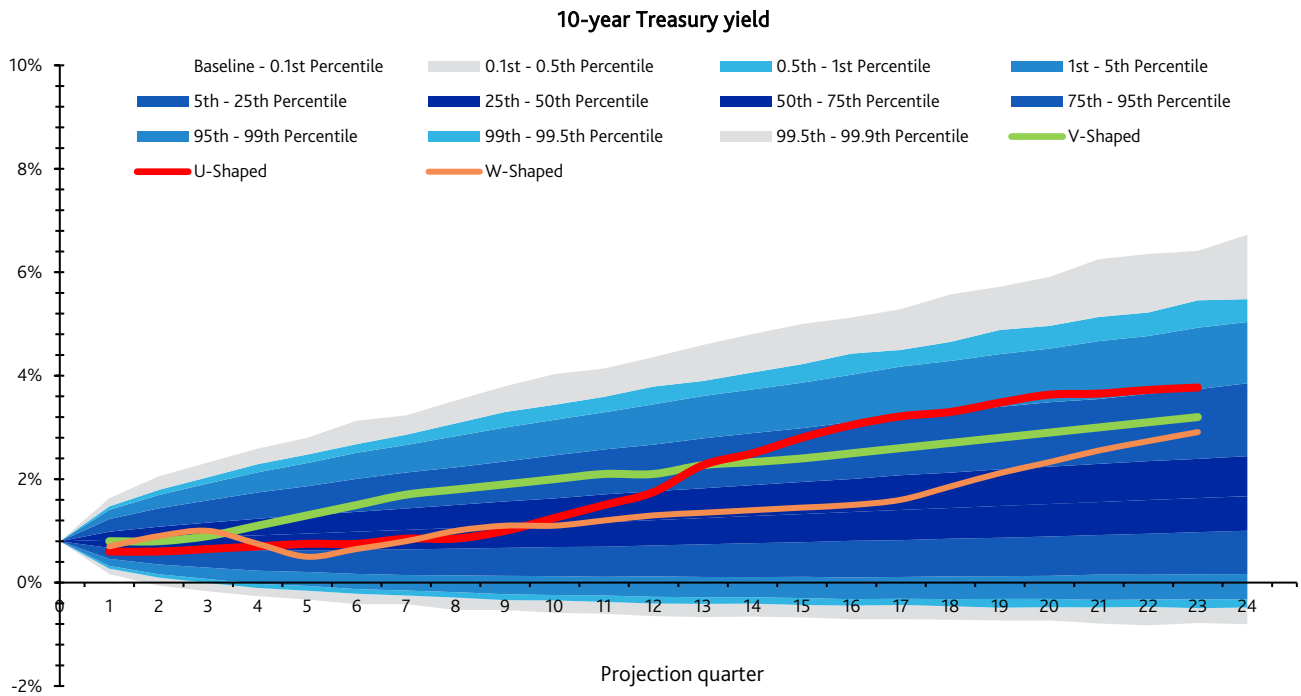
Sources: US Federal Reserve, Moody's Analytics

Complement to stochastic scenarios

Narrative scenarios can complement the simulation-based stochastic scenarios frequently used by actuaries. Such scenarios—hundreds and thousands of them—are stochastically generated from a collection of correlated asset models within an economic scenario generator system. They show a range of plausible outcomes for various risk factors and asset returns, along with their likelihood of occurrence, over various time periods. In the insurance world, the common uses of stochastic scenarios with real-world calibrations include identification of tail-risk in assets and liabilities as part of regulatory and economic capital calculations and assessment of investment strategies.

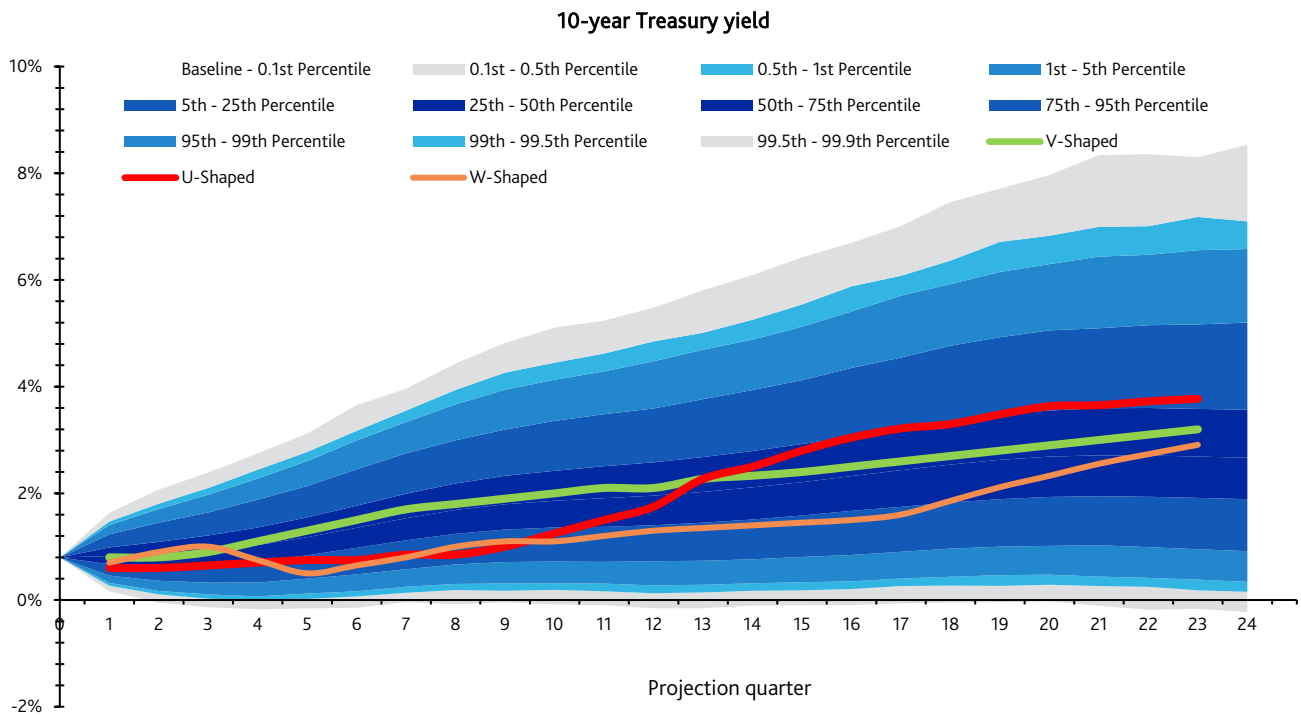
Narrative scenarios can add value to this stochastic process in a few important ways. First, a narrative scenario reflecting economists' baseline or most-likely view can be used to anchor the median outcome of the stochastic scenario distribution creating the base distribution. Such a calibration provides a narrative for the median outcome. Second, overlaying the narrative scenario on the base distribution of stochastic outcomes allows us to assign a likelihood to the deterministic event. Figure 4 shows where the projections of the 10-year Treasury yield under the Fed pandemic scenarios fall within the range of plausible outcomes for that variable generated by the scenario generator models. Finally, stochastic scenarios can also generate a distribution of outcomes *conditional* on a given narrative scenario. Figure 5 shows the projection funnel for the 10-year yield centered around the Fed's V-shaped scenario.

Figure 4 Fed pandemic scenarios relative to the full distribution of plausible outcomes



Sources: US Federal Reserve, Moody's Analytics

Figure 5 Distribution of outcomes centered around the V-shaped recovery scenario path



Sources: US Federal Reserve, Moody's Analytics

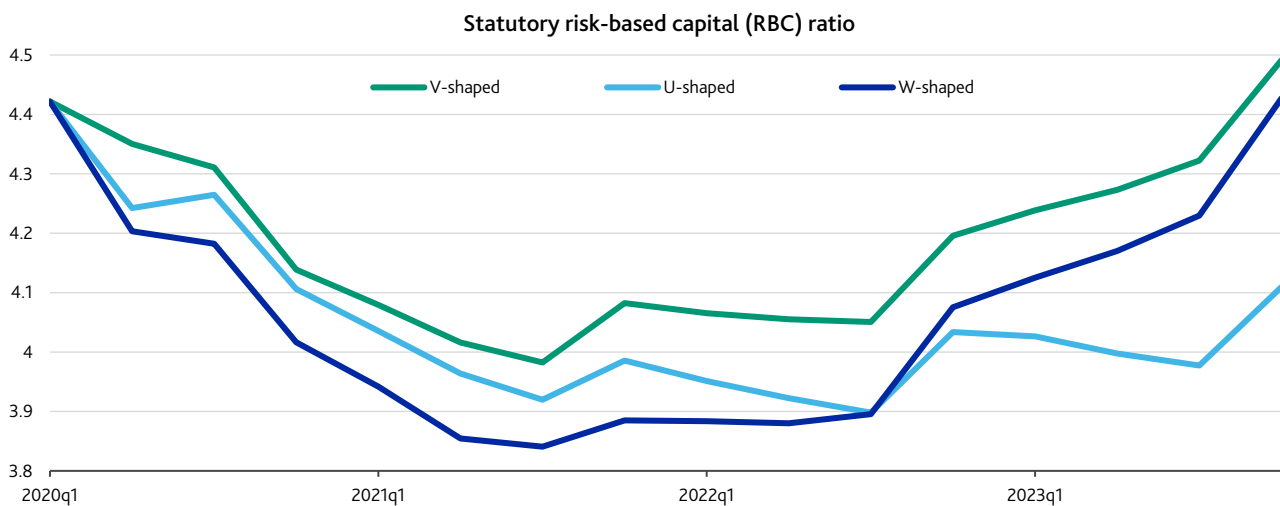
Bridging the gap between the risk, finance, accounting, and actuarial teams

The results from these narrative scenarios can be exported into actuarial models to project the components of income statements, balance sheets, and other key metrics around capital, liquidity, and pricing under various realistic alternative states of the world. Figure 6 shows the risk-based capital ratio for an illustrative life insurance company projected under the three Fed pandemic scenarios. The narratives describing the scenario-specific assumptions allow for more effective communication of these results to all stakeholders.

Not all insurers have the internal expertise needed to design narrative macroeconomic scenarios that are reasonable, internally consistent, and use the latest economic data and well-validated models. These features are necessary to ensure that the actuarial model outputs reflect realistic risks and opportunities facing the insurer. The scenarios should preferably also be updated at regular intervals to keep up with the rapidly evolving economic outlook during times of extreme volatility. Just consider how quickly a scenario constructed in February 2020 turned stale as the COVID-19 pandemic tightened its grip on the economy. Finally, since macroeconomic models will not produce projections for all the market risk variables needed as inputs into the actuarial models, financial models are needed to bridge the gap. For example, financial models will be required to generate forecasts for the full term structure of the risk-free and corporate yield curve based on a few key interest rates projected by the economic models. In many cases, these forecasts will need to satisfy arbitrage-free conditions so they can be used in pricing models. Using external expertise can often be the most time- and cost-effective way of checking all these boxes while also gaining senior management's confidence in the results.

Leveraging a common set of narrative-based scenarios can also foster better collaboration among the risk, finance, accounting, and actuarial teams which, in many insurance companies, still operate in silos. While the finance team's primary focus is financial planning and capital budgeting, the risk team's responsibility is to ensure that the company's risk exposures are being constantly evaluated. The investment group must ascertain that allocated assets are enough to meet future liabilities, and the accounting department must check that balance sheets are being reported per the binding accounting guidelines. Narrative scenarios, by recognizing the interdependencies between the individual risks faced by the different parts of the company, can help build enterprise-wide process consistency and improve efficiency and cost by stripping away redundancies.

Figure 6 Capital positions take longer to recover under an extended economic downturn



Sources: US Federal Reserve, Moody's Analytics

Conclusion

Narrative economic scenarios can be a useful tool for planning and risk-based decision-making for insurers, especially in an environment of heightened volatility and uncertainty. These scenarios show alternative views of the future economy and use the latest economic data, macroeconomic models, and economists' expertise. Actuarial models can incorporate these scenarios to project key business metrics under various what-if states of the economy quickly and efficiently. The results will provide valuable business insights to company stakeholders and make them better prepared for the next economic curveball.

Additional resources from Moody's and Moody's Analytics

Navigating Uncertainty Through Enhanced Business Insight

<https://www.moodyanalytics.com/-/media/whitepaper/2018/navigating-uncertainty-through-enhanced-business-insight.pdf>

Coronavirus (COVID-19): Aftershocks on the Insurance Industry

https://www.moody.com/researchdocumentcontentpage.aspx?docid=PBC_1219631

Large Banks Pass Fed's Stress Test, but Scope of Coronavirus Effects Remains Unresolved

https://www.moody.com/researchdocumentcontentpage.aspx?docid=PBC_1235509

Economic Forecast Scenarios for COVID-19

<https://www.moodyanalytics.com/microsites/covid-19-economic-forecast-scenarios>

Moody's Analytics AXIS Actuarial System

<https://www.moodyanalytics.com/product-list/axis>

Moody's Analytics RiskIntegrity Insight

<https://www.moodyanalytics.com/product-list/riskintegrity-insight>

Moody's Analytics Real-World Scenario Generator

<https://www.moodyanalytics.com/product-list/real-world-scenario-generator>

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