AMERICAN ACADEMY of ACTUARIES

November 24, 2025

Mr. Mike Yanachek, Chair
Generator of Economic Scenarios (GOES) (E/A) Subgroup
National Association of Insurance Commissioners (NAIC)

Re: GOES Exposures

Dear Chair Yanachek:

On behalf of the Economic Scenario Generator Subcommittee (Subcommittee) of the American Academy of Actuaries,[1] we appreciate the opportunity to comment on the Generator of Economic Scenarios (GOES) Subgroup's recent GOES exposures.

The Subcommittee appreciates the challenge that comes with developing a comprehensive governance framework, which is likely to evolve over time as experience is gained. It is important to keep in mind how an economic scenario generator (ESG) is designed and managed when defining the governance process.

The development or selection of an ESG includes many considerations. In our experience, some of the more important considerations include:

- Identifying the key financial variables to be modeled, e.g., interest rates, asset classes, returns.
- Identify data sources for the key financial variables. Insofar as possible, the data sources should be available for all users to obtain.
- Establishing stylized facts across the key financial variables.
- Identifying the most important stylized facts for the given use case. General requirements, such as generating scenarios for which the financial variables reside in a target range and meet statistical criteria, are typical. More specific dynamic attributes, such as low for long and volatility clustering, are other examples.
- Establishing calibration targets and criteria.
- Selecting model components that are capable of producing the most important stylized facts.
- Establishing an estimation process for the selected model components.
- Documenting the models and their associated estimation routines.
- Developing a validation process and overall validation report, including failure metrics. Identifying sound failure metrics is hard to do and usually involves expert judgment. If a calibration fails the validation, then a recalibration is needed.
- Establishing a process under which repeated validation failures result in the initiation of model change.

We believe a best practice for an ESG governance framework would be to start by recognizing the three

[1] The American Academy of Actuaries is a 20,000-member professional association whose mission is to serve the public and the U.S. actuarial profession. For 60 years, the Academy has assisted public policymakers on all levels by providing leadership, objective expertise, and actuarial advice on risk and financial security issues. The Academy also sets qualification, practice, and professionalism standards for actuaries in the United States.

pillars of the ESG life cycle management process (LCMP), models, calibration, and validation.

Within the LCMP framework, not only do these three pillars interact with each other on an ongoing basis, but the way in which they interact is an integral part of the model governance process. The ESG models sit above the entire LCMP, because the choice of models is the limiting factor in what the ESG can do. The most routine interaction between calibration and validation involves setting the model to current market conditions and retaining the existing parameterization. If that passes validation, the model calibration is considered viable under current market conditions. If not, a recalibration will be considered. At some point, it may be found that no recalibration passes the validation process and a model change is needed. The need to introduce a model change usually becomes apparent as the validation process indicates increased failure against criteria. When sudden market changes occur, such as a move to ultra-low rates resulting from a zero-interest rate policy (ZIRP) and quantitative easing (QE), knowing if the changes are temporary or long-term may not be obvious and it is typical to gradually conclude that a model change is needed.

The validation process should be done as part of each scenario release. Identifying the appropriate validation checks is difficult and should be reviewed regularly. The tools that the NAIC is proposing for this purpose are sound, but the Subcommittee would recommend frequent ongoing review to ensure that the tools are sufficient, particularly as market conditions fluctuate as that may bring the models under greater tension for a given parameterization. The Subcommittee also recommends that the "GOES Stats w Dashboard" tool also include a mean-variance plot of the major asset class returns. This is a good check on the relative performance across the investment opportunity set. Ideally, one would compute the steady state returns (e.g., last 20 years of simulation data) and plot the standard deviation of these returns on the x-axis and the average of these returns on the y-axis.

One of the most important stylized facts of the GOES project is the requirement that the treasury rates exhibit low for long behavior. The multi-factor CIR model is not among the class of models that can produce low for long scenarios that are consistent with low for long behavior actually observed in history. In the multi-factor CIR model, short-term interest rates always move more than long-term rates. This is a mathematical feature of the model. A consequence of this has been that a range of flooring mechanisms needed to be developed in order for the model to produce reasonable outputs. This added another layer of complexity to the GOES models, which consequently makes governance a greater challenge due to these extra steps involved in the flooring process.

Expert judgment plays an important role in the LCMP and is a necessary consideration when developing the governance framework. One of the best ways to understand the role of expert judgment is to have careful validation reports, full model documentation, and a broad and diverse review process. Careful documentation ensures that all participants know what to expect, which allows for the appropriate assessment of the model features and limitations. It is then much easier to determine where expert judgment is appropriate and playing a role.

Part of the LCMP should involve a regular estimation of the models incorporating more recent data. This allows for the determination of the stability of the model parameters and the identification of the effects that changes in market conditions may have on the model. The Subcommittee would recommend that the GOES models be estimated more frequently than the five years as currently proposed. We also recommend that other interested parties, including the Academy and the ACLI, be invited to actively participate in the formal annual model review and update process that the NAIC has proposed.

There are many aspects of the GOES model that have incomplete or no substantial documentation:

- Aspects of the treasury bond initialization process, including offering details of the low yield adjustment, the procedure for handling of the negative state variable case, and the algebraic form of the decay factor/parameter for which a value of 3 has been stated.
- The link between various equity indices when a jump occurs for one of the indices. For example, we would not expect a large jump in one index to not affect the others. How are large jumps transmitted across the equity indices?
- The corporate credit model for which no substantial details appear to be publicly available.
- The SERT scenario process, specifically explicit documentation on how to create the scenarios. While the Academy's specification was used, there appears to be some other adjustments made in the treasury case which could be helpful to share publicly.
- The credit scenarios for SERT.
- The process by which the credit scenarios are being adjusted to align with NAIC excess return targets. The why and the how of this adjustment process is vital for users to understand. Providing a clear and complete description of the rationale and the procedure would be helpful in getting users comfortable with the credit scenarios and would be even more valuable in light of the recent corrections that have been made to the adjustment process for these scenarios.

The Subcommittee remains concerned that without full documentation on the corporate credit model, implementation of GOES could be challenged. Of particular concern is the uneven availability of the documentation to all users without employing a non-disclosure agreement (NDA). For models such as GOES, having open discussions about the model and its performance is beneficial to the actuary, the regulator, and to industry. One concern with requiring an NDA relates to the ability of the free and open discussion by actuaries about the corporate credit model's performance at meetings, including with the NAIC's GOES Subgroup. Another concern with the need for an NDA relates to the corporate model documentation. Should access to the documentation be restricted by an NDA, it introduces a need for an independent expert analysis to assess the level of detail included in the corporate model documentation to help a user understand several key details, including the model dynamics, how credit is linked to the treasury interest rate model, the role of floored treasury yields, and how the model is estimated.

The Subcommittee would ask for some additional clarification related to the calibration adjustments (i.e., rescaling of scenarios) in the corporate credit model that have been identified. It is expected that the corporate credit model would calibrate to NAIC targets and that the native model output would then be provided for the bond return series. It has been shared that significant adjustments have been made to the native model output on a post-processing basis, in order to align the returns with the NAIC targets. Clarification on why an indirect route to obtain the bond return series would be helpful, particularly given that the current corporate credit model is a powerful, state-of-the-art model and it should be able to directly produce the required bond return series as native output.

It is important to remember that the NAIC calibration targets (i.e., targeting criteria) for the corporate credit model are excess returns. Spreads are not part of the targets, although they were used to inform the excess return targets. It has been explained that the adjustment process begins by making an upward adjustment to align spreads, which then resulted in scenarios for which the excess returns are too high. The returns of the various credit classes are then adjusted downward, in order to once again align them with the NAIC targets. The downward adjustment is made by subtracting a constant from the respective price returns of the corporate credit classes. In contrast to this adjustment process, our experience with many classes of corporate credit models would lead the Subcommittee to expect that the corporate credit model would produce spreads and returns that depend on its calibration parameters and that these spreads and returns are produced as simultaneous native outputs of the model. Adjusting spreads should not affect returns, since the returns are not being fed the spreads for the purpose of their computation. Rather, the returns and spreads are intrinsic model outputs that depend on the default, migration, credit cost, and stochastic factor assumptions of the model. The Subcommittee believes that being able to reconcile the adjustment process with the view of credit modeling as outlined would be very helpful.

The Subcommittee did have some questions about the credit model adjustments. As the credit model is undocumented, the combined effect creates a material challenge to model governance. The use of ad hoc adjustments to scenario output overrides model dynamics, which can lead to unintended consequences across other financial variables. For example, a sophisticated and intricate corporate credit model may embed appropriate tail behavior across various asset classes. Ad hoc rescaling of simulated output may disturb these relationships. In the September 2025 scenarios release, the following ratio of high-yield (HY) to S&P 500 gross wealth factors was observed.

Gross Wealth Factors 30Sep2025

Ratio HY/SP500	1 Yr	5 Yr	10 Yr	20 Yr	30 Yr
Min	1.49	2.42	18.27	13.44	18.71
1.0%	1.13	1.73	2.45	3.04	3.79
2.5%	1.09	1.49	1.98	2.48	2.85
5.0%	1.06	1.34	1.68	2.10	2.38
10.0%	1.02	1.20	1.42	1.72	1.86
25.0%	0.96	1.00	1.11	1.29	1.41
50.0%	0.91	0.86	0.89	0.98	1.10
75.0%	0.87	0.76	0.74	0.82	0.94
90.0%	0.84	0.69	0.66	0.72	0.82
95.0%	0.83	0.65	0.62	0.67	0.80
97.5%	0.81	0.61	0.61	0.65	0.77
99.0%	0.79	0.59	0.58	0.61	0.79
Max	0.67	0.54	0.53	0.76	0.98

In the October 2025 scenarios, based on the modified rescaling parameters, the corresponding chart is:

Gross Wealth Factors 31Oct2025

Ratio HY/SP500	1 Yr	5 Yr	10 Yr	20 Yr	30 Yr
Min	1.51	2.49	17.89	11.73	15.31
1.0%	1.14	1.75	2.39	2.63	2.89
2.5%	1.10	1.51	1.94	2.15	2.16
5.0%	1.07	1.36	1.64	1.81	1.76
10.0%	1.03	1.22	1.39	1.47	1.38
25.0%	0.97	1.02	1.09	1.10	1.03
50.0%	0.92	0.88	0.87	0.83	0.80
75.0%	0.88	0.77	0.72	0.68	0.67
90.0%	0.85	0.70	0.63	0.60	0.59
95.0%	0.83	0.65	0.60	0.55	0.56
97.5%	0.82	0.62	0.58	0.53	0.53
99.0%	0.80	0.60	0.55	0.49	0.56
Max	0.68	0.53	0.48	0.67	0.76

This is an improvement to what one might expect in downside tail risk, but it remains that HY has a very favorable downside risk profile relative to large cap equity.

Further clarification on how the relatively small changes to the corporate credit adjustments (i.e. rescaling parameters) are able to bring HY bond returns down by over 100 basis points would be helpful. Is it possible that some other changes were made, particularly in the case of the September 2025 scenarios, resulting in such large changes in returns? The model process would be greatly enhanced by providing improved transparency by sharing details around the need for and rational behind the generation of the corporate credit scenarios.

Finally, the Subcommittee would recommend that the scenario sets be kept once they are posted. Released scenarios are part of the LCMP and given the amount of effort that they require, along with the ability to share mutual understanding and awareness of the process in developing such scenarios would benefit everyone. If there is an error and a scenario set is revised, it might be best to move the original to an archive and document why it is obsolete.

We appreciate the GOES Subgroup's efforts to establish a model governance framework. The Subcommittee remains available to answer any questions or provide additional support as you continue to work through this process. Please contact Amanda Barry-Moilanen (barrymoilanen@actuary.org), the Academy's policy project manager, life, with any questions on this comment letter.

Sincerely,

Hal Pedersen, MAAA, FSA
Chairperson, Economic Scenario Generator Subcommittee
American Academy of Actuaries