Bond Asset Class Construction

NAIC Basic Data Set

The Basic Data Set provided free of charge to insurers is the standard scenario file set delivered as part of the NAIC scenario service. Users can access the scenarios online by downloading a file containing stochastic scenarios from the GEMS® Economic Scenario Generator for real-world interest rates, equity, and bond fund returns. The typical application for these scenarios is in calculations of life and annuity statutory reserves according to the Valuation Manual (e.g., VM-20, VM-21) and capital under the NAIC RBC requirements (e.g., C3 Phase 1, C3 Phase 2).

This file contains several bond asset classes including Short Govt, Long Inv Corp, Money Market and High Yield. This document will outline some of the key approaches used in constructing the returns for these asset classes. It will also cover key ways in which that process differs from the prior model's (i.e., the Academy Interest Rate Generator's) approach.

Fixed Income Investments

Unlike equity investments, simply knowing the type of fixed income investment isn't sufficient to calculate their simulated returns. For example, the yield at purchase, which will tend to vary with both maturity and rating, will have a large impact on the asset class's projected returns (see **Figure 1**). This is particularly important for the GOES scenarios, since those yields will also be used for discounting future liability cash flows. To account for this, we selected the following mapping for each of the bond classes:

Asset Class	Maturity Mix	Rating Mix
Money Market	100% 3-Month	100% A
Short Govt Bonds	50% 1-Year, 50% 5-Year	100% Treasury
Int Govt Bonds	50% 5-Year, 50% 10-Year	100% Treasury
Long Govt Bonds	50% 10-Year, 50% 30-Year	100% Treasury
Short Inv Corp Bonds	50% 1-Year, 50% 5-Year	50% A, 50% BBB
Int Inv Corp Bonds	50% 5-Year, 50% 10-Year	50% A, 50% BBB
Long Inv Corp Bonds	50% 10-Year, 50% 30-Year	50% A, 50% BBB
High Yield Corp Bonds	50% 5-Year, 50% 10-Year	100% BB

Table 1: Selected baseline construction for each of the bond asset classes. Prepared by Conning, Inc. Source: ©2026 Conning, Inc.

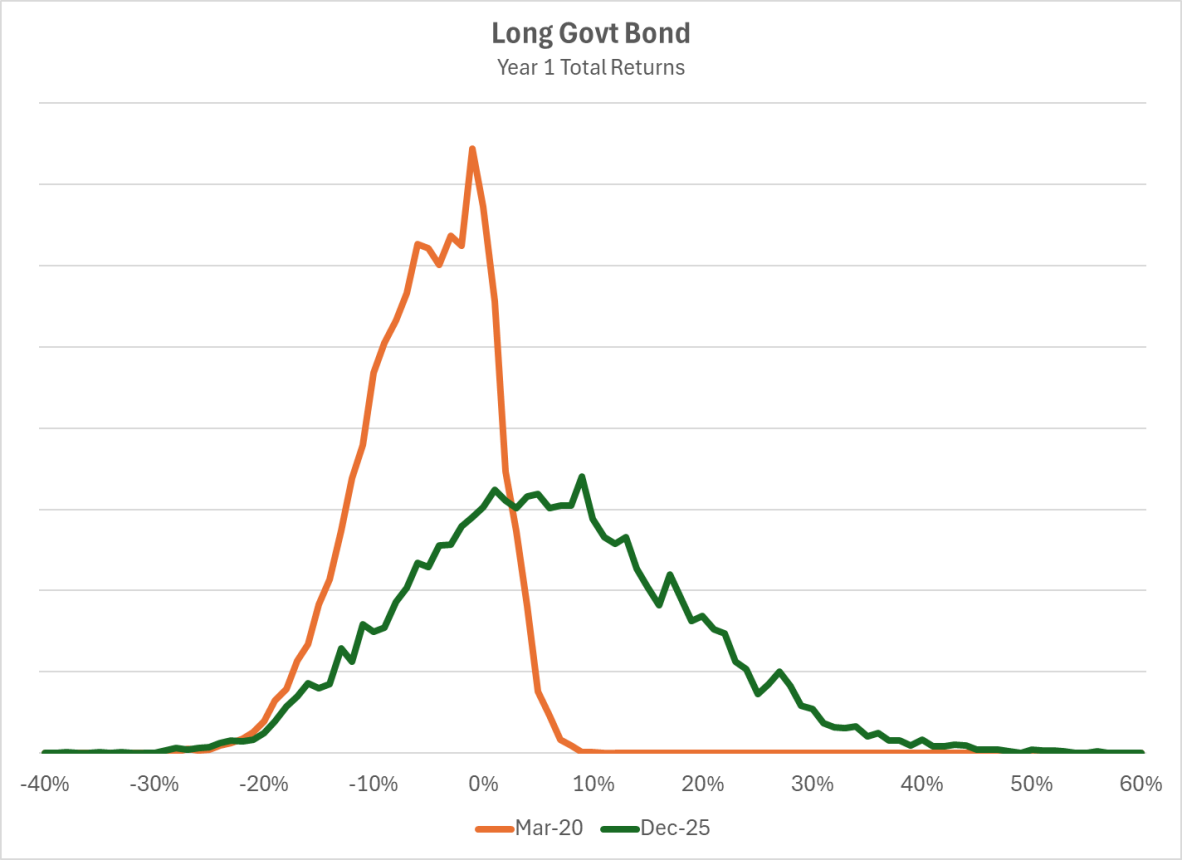

Figure 1: Comparison of Long Govt Bond total returns between March 2020 and Dec 2025 start dates. ©2026 Conning, Inc. Source: GEMS® Economic Scenario Generator.

It is worth noting that this construction was not specifically designed to align with any particular mutual fund families' or index provider's mapping. Instead, these were meant as generic proxies that align with the typical separation. For example, in most cases, "long" categories tend to include bonds with 10+ years to maturity. This will have a marked increase on the return volatility for several of these asset classes when compared to the AIRG. For example, in the AIRG, the Long Corporate bond investment (i.e., LTCORP) was modeled with a 5.8 duration and the 10-Year yield. In GOES, the corresponding asset class will have a duration closer to 13. This will somewhat be offset by the use of longer yields (i.e., an average of the 10- and 30-Year) since they have less volatility in the GOES Treasury model. However, the net impact will be a marked increase even before considering the impact of the change in the underlying Treasury yield calibration.

Model Mechanics

At the beginning of each simulation month, the GOES model will calculate the par yield for each of the relevant indices. For example, with the Int Inv Corp Bond asset class, the model will do this for the following items:

- 5-Year, A-rated index
- 5-Year, BBB-rated index
- 10-Year, A-rated index
- 10-Year, BBB-rated index

At the end of that simulation month, the model calculates the return associated with those investments. Those returns will be impacted by a number of factors including changes in Treasury yields, changes in corporate spreads, shortening of the investments, transitions and defaults. In particular, this return calculation is based on the actual remaining cash flows of each of the initial investments.

This is quite different from the AIRG approach in several key ways. First, in the AIRG, the impact of the change in interest rates was simply estimated by applying a duration to that relevant Treasury yield change. Then, there was an error term added to cover all of the residual differences from this estimate and actual historical returns. In the GOES process, pricing the actual cash flows eliminates the need for this residual term. Consider the two yield curves from the end of year 10 of the December 2025 projection in Figure 2. For both of these scenarios, the Long Govt Bonds class will have similar income returns for the next month, since the long end of the Treasury yield curve is fairly similar. However, there is quite a difference in the expected price returns for this asset class. In scenario #8254, we have a regular, positively sloped Treasury curve. In this case, the shortening of the assets over the next month will lead to a slight uptick in expected returns. On the other hand, in scenario #6795, we have a steeply inverted curve. Therefore, when assets shorten in this environment, we can expect their market yields to go up, leading to a slight drop in the expected returns. The AIRG has no such mechanism, so there would be no reason to expect different returns in these two very different yield curve environments. While the difference might be marginal in any one simulation month, the fact that these types of yield curves are likely to revert very slowly suggests that the same impact may affect multiple months or even years in a particular scenario.

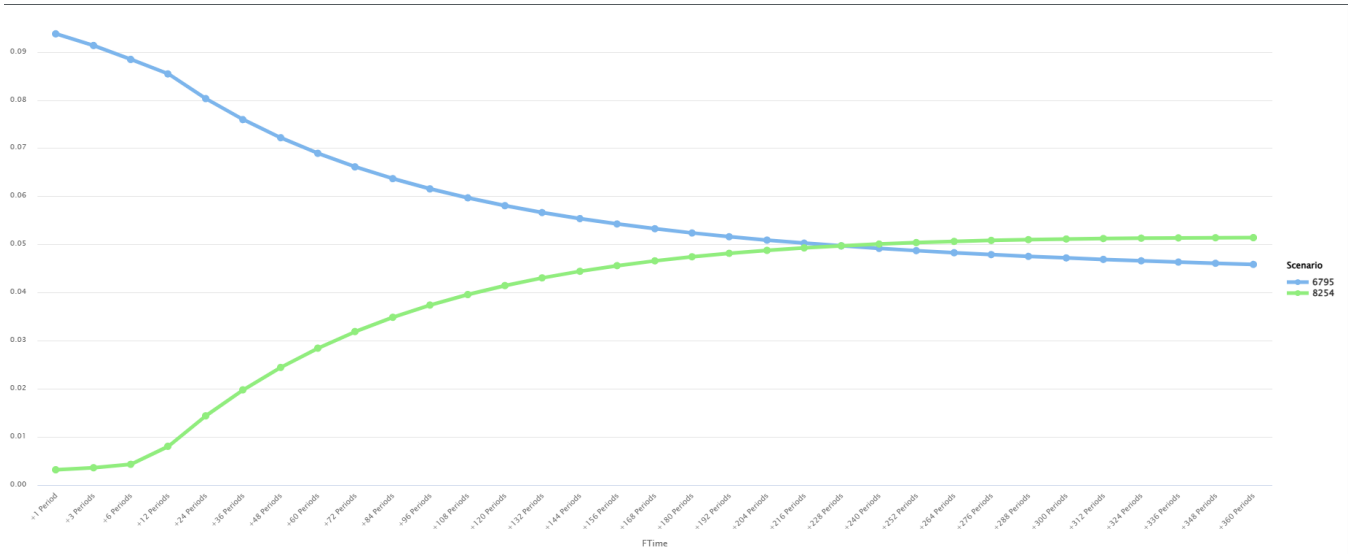

Figure 2: Comparison of Treasury curve at end of Dec 2035 for the Dec 2025 GOES simulation. ©2026 Conning, Inc. Source: GEMS® Economic Scenario Generator.

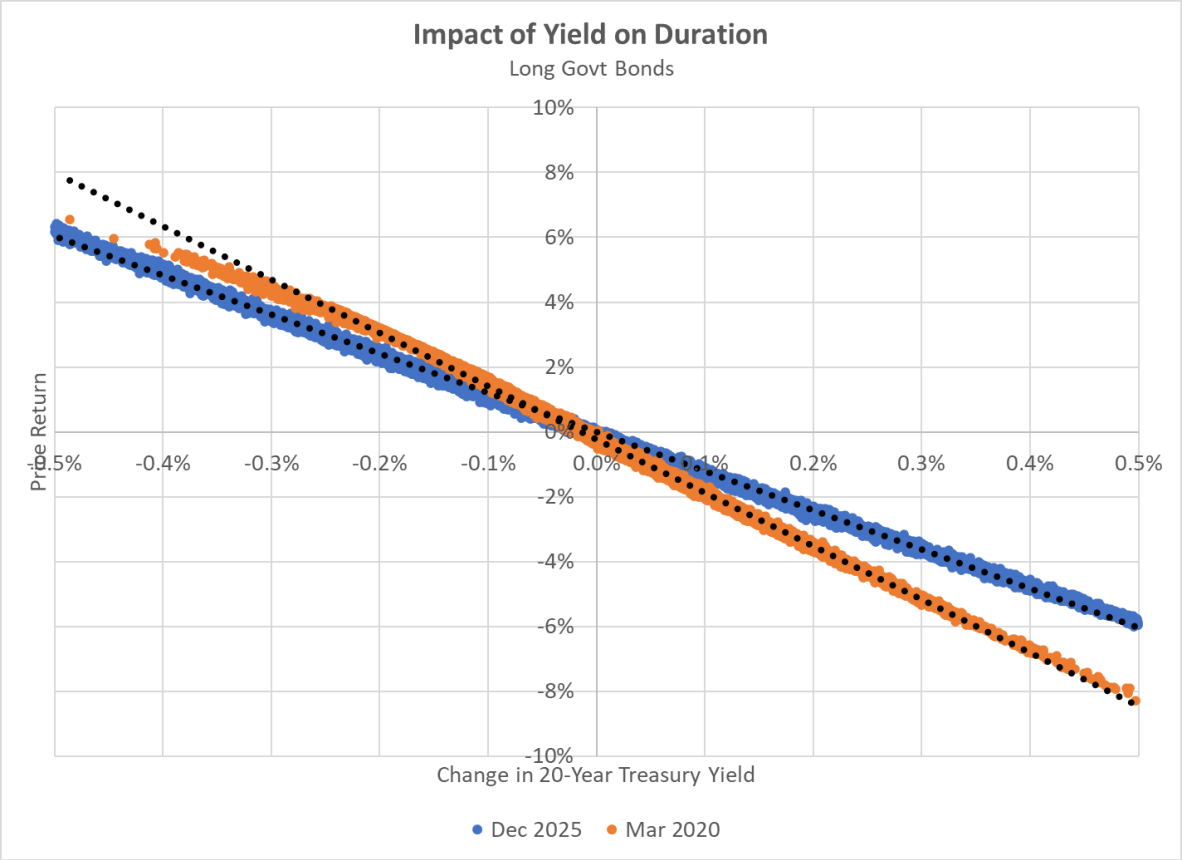

Figure 3: Comparison of impact of change in Treasury Yields on Long Govt Bond Price returns. ©2026 Conning, Inc. Source: GEMS® Economic Scenario Generator.

Another key difference is how changes in yields impact returns. As mentioned above, the AIRG estimated the impact of the change in interest rates by applying a fixed duration. While GOES doesn't use a duration, we can estimate one by comparing the Treasury price return to the corresponding change in Treasury yields. In particular, we have a very clean estimate if we do this for the first month of the simulation, since there are no differences across scenarios in the initial yields. **Figure 3** shows the results of this approach for both the December 2025 run and one with March 2020 conditions. What it shows is that when yields are lower (i.e., March 2020 in this example), the GOES approach will produce longer durations (i.e., the curve in the graph is steeper). This is consistent with the fundamental duration calculation for a bond, since lower yields increase the weight on later cash flows which leads to longer durations.

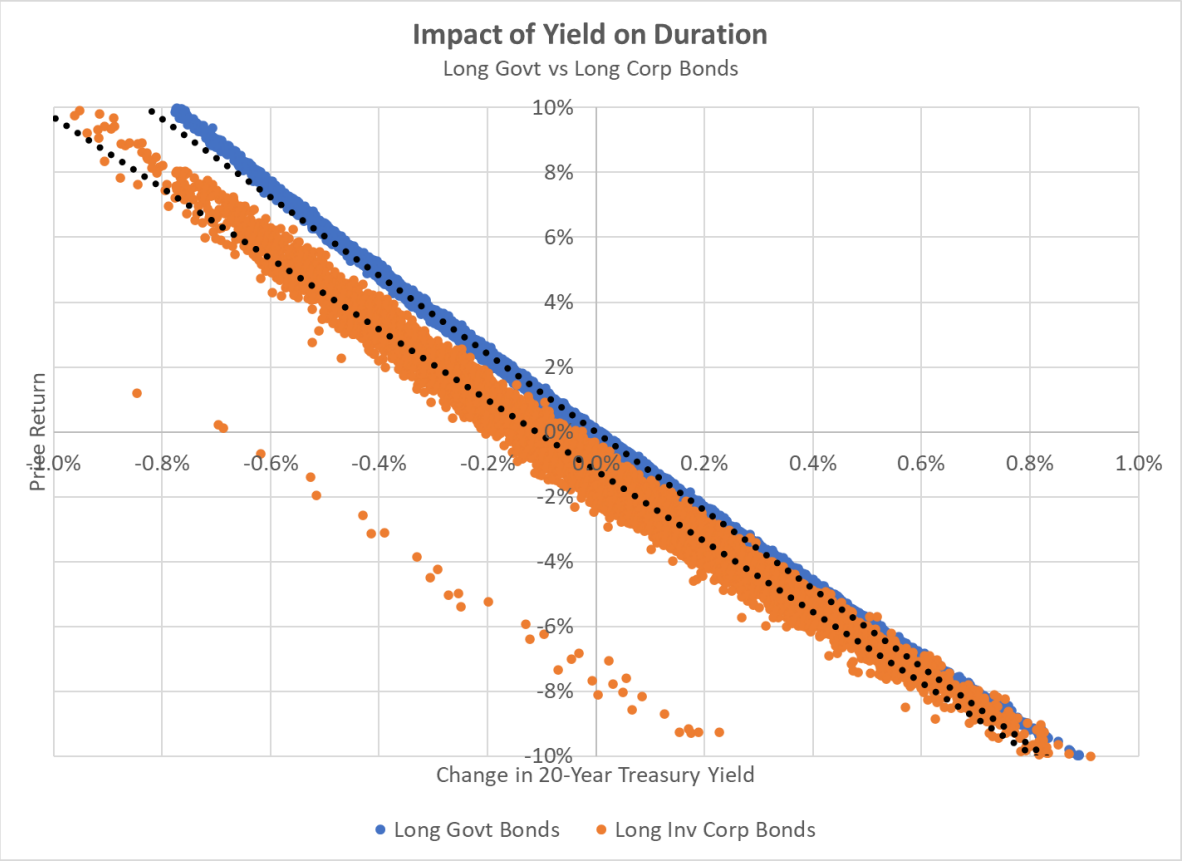

Figure 4: Comparison of impact of change in Treasury yields on Long Govt and Long Inv Corp Bond Price returns. ©2026 Conning, Inc. Source: GEMS® Economic Scenario Generator.

We can also do a similar calculation for the Corporate Bond asset classes. While the change in Treasury yields explain less of the price returns for these investments because of the additional risk drivers (see **Figure 4**: Comparison of impact of change in Treasury yields on Long Govt and Long Inv Corp Bond Price returns. ©2026 Conning, Inc. Source: GEMS® Economic Scenario Generator.Error! Reference source not found.), we can still see that this direct approach also produces shorter durations for the corporate than the government asset classes even when they have the same maturity structure. This is a function of the same characteristic. Specifically, the spread that corporates earn above Treasuries make them behave like yields are higher (i.e., have a shorter duration).

The final difference relates specifically to corporates. Unlike Treasuries, corporates react to more than just yield movements: they are also impacted by changes in spreads, transitions, defaults and recoveries. In the AIRG, all of these additional components were captured by a single error term. The GOES model, on the other hand, directly models the impact of each of these items in an integrated approach. For example, there is a link in the model between current spreads and expected future transitions including defaults (see **Figure 5**).[1] Since we are modeling indices, not individual bonds, these transition probabilities will be applied exactly. So, in the highlighted scenario (i.e., #33), the return calculation for the ensuing month will include the impact of 2% of the investment getting downgraded.

[1] See the GEMS Equity and Corporate Model - 12.17.2020-LATF presentation for more info on this model.

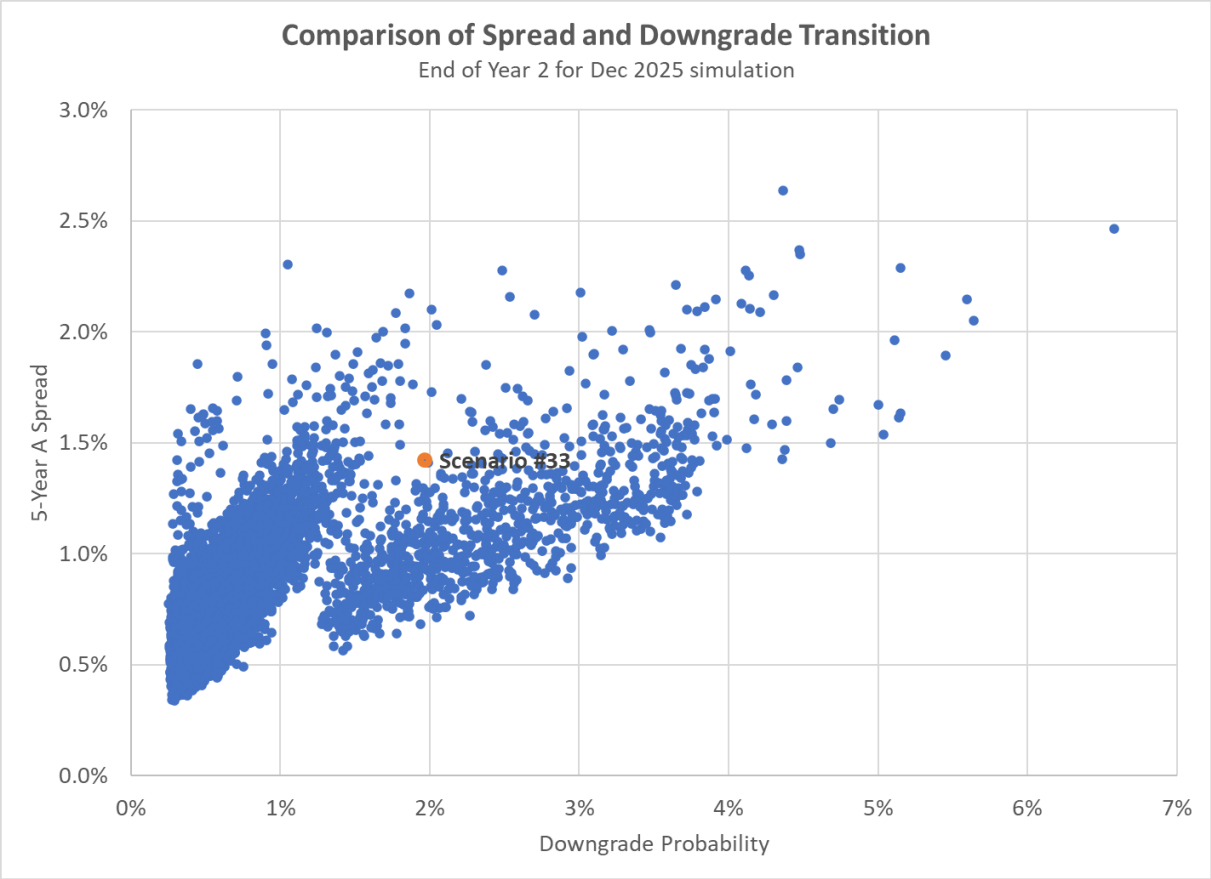

Figure 5: Comparison of 5-Year A Spread and Monthly Downgrade Probability. ©2026 Conning, Inc. Source: GEMS® Economic Scenario Generator.

Adjustments

In order to ensure consistency, the GOES corporate model is calibrated based on US industrial curves such as Bloomberg's Valuation (BVal). However, as part of the calibration process, the decision was made to use some Bloomberg indices to help set targets. For example, the Bloomberg US IG Corp 1-5 index was used to help set targets for the Short Inv Corp Bonds asset class. All of these indices include non-US corporates (e.g. Supranationals), subordinated tranches, and securities with call and put options as long as they meet certain criteria. Since these additional assets tend to have higher spreads than US senior, unsecured industrials, this created a gap between both the initial and long-term yields for these categories.

To help bridge this gap, the returns for the asset class listed in **Table 2** were adjusted by a scaling factor. Specifically, the final returns for each of these asset classes will reflect a long investment in underlying assets and an offsetting short position in the corresponding Government Bond investment.[2] Effectively, this scales up the Excess Returns to better align the final spread with the broader investment universe.

[2] The High Yield Corp Bonds use the Int Govt Bond Asset Class.

Asset Class	Scaling Factor	Mean Adjustment
Short Inv Corp Bonds	1.214997342	-0.0013
Int Inv Corp Bonds	1.228610520	-0.0035
Long Inv Corp Bonds	1.125986725	-0.0044
High Yield Corp Bonds	1.421498141	-0.0296

Table 2: Adjustment factors for GOES Corporate asset classes. Prepared by Conning, Inc. Source: ©2026 Conning, Inc.

Finally, in order to ensure that the expected returns were aligned with this same historical data, there is also a linear adjustment applied to each of these asset classes. Specifically, in each month of the simulation, the calculation adds 1/12 of the **Mean Adjustment** column from **Table 2**.

Detailed Example

To see how this comes together, let's consider a detailed example. Specifically, let's go back to the scenario highlighted in **Figure 5**: #33 for month 24 of the December 2025 simulation. At beginning of this month, the intermediate portion of the Treasury curve averages a little under 6.5% (see **Figure 6**). This leads to an income return for the Int Govt Bond asset class of roughly 0.54% over the selected simulation month. Over that month, the Treasury yield curve drops about 50 bps. This movement, combined with the positive impact of roll-down, leads to a price return for that same asset class of 3.11%.

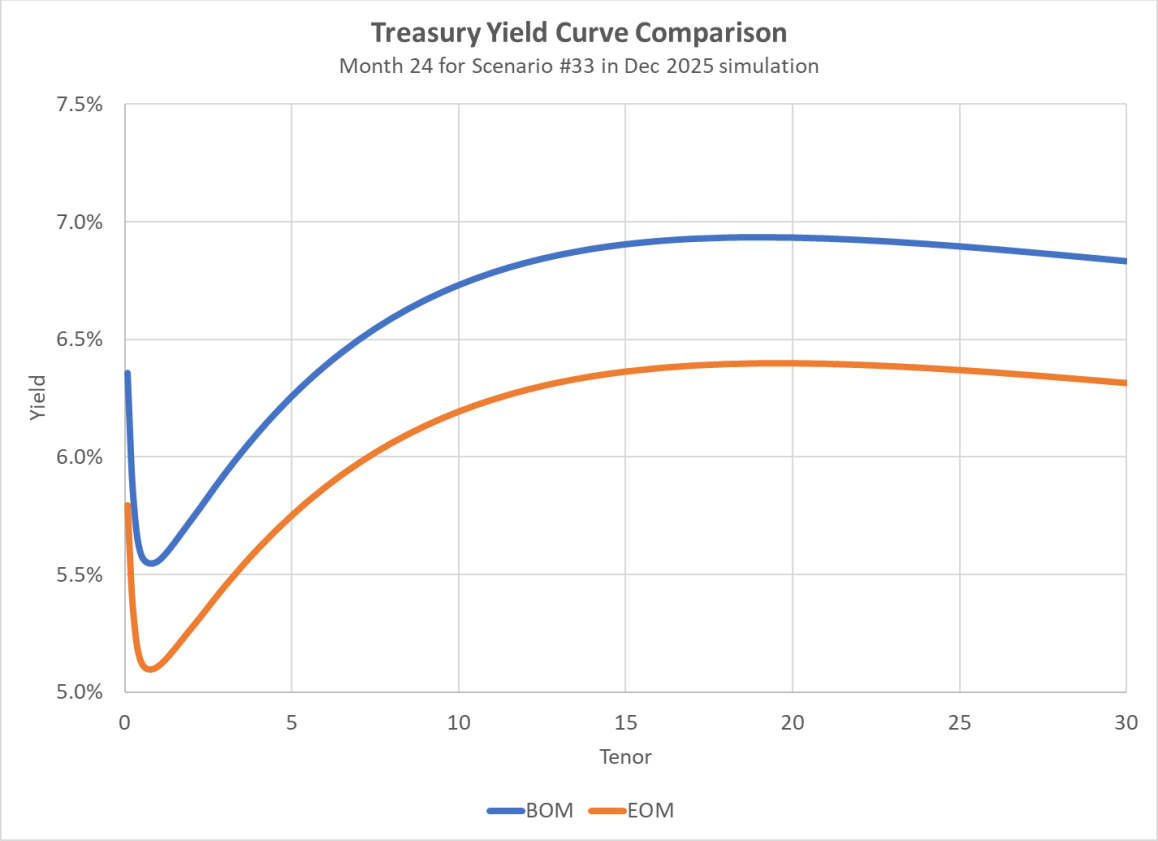

Figure 6: Comparison of Treasury Par Yield and start and end of Simulated Month. ©2026 Conning, Inc. Source: GEMS® Economic Scenario Generator.

Let's now move on to the Int Inv Corp Bonds asset class. As mentioned in Table 1, the base for this asset class is an equal combination of 4 Bond Indices:

- 5-Year, A Bond
- 5-Year, BBB Bond
- 10-Year, A Bond
- 10-Year, BBB Bond

Given the spread curve at the beginning of that month (see **Figure 7**), the A Bonds have a spread over Treasuries of about 120 bps. So, their Income Returns are about 10 bps higher than the Int Govt Bonds asset class. On the other hand, the BBB spreads at that same point are closer to 200 bps. So, their Income Returns are closer to 15 bps higher. When we average these together, we get and Income Return of 0.68% for the base asset class. To get the final Income Return, we take these values together with the Scaling Factor from Table 2 for this asset class (i.e., 1.228610520) to get a final value of 0.71% which is 1.22 * 0.68% - 0.22 * 0.54%.

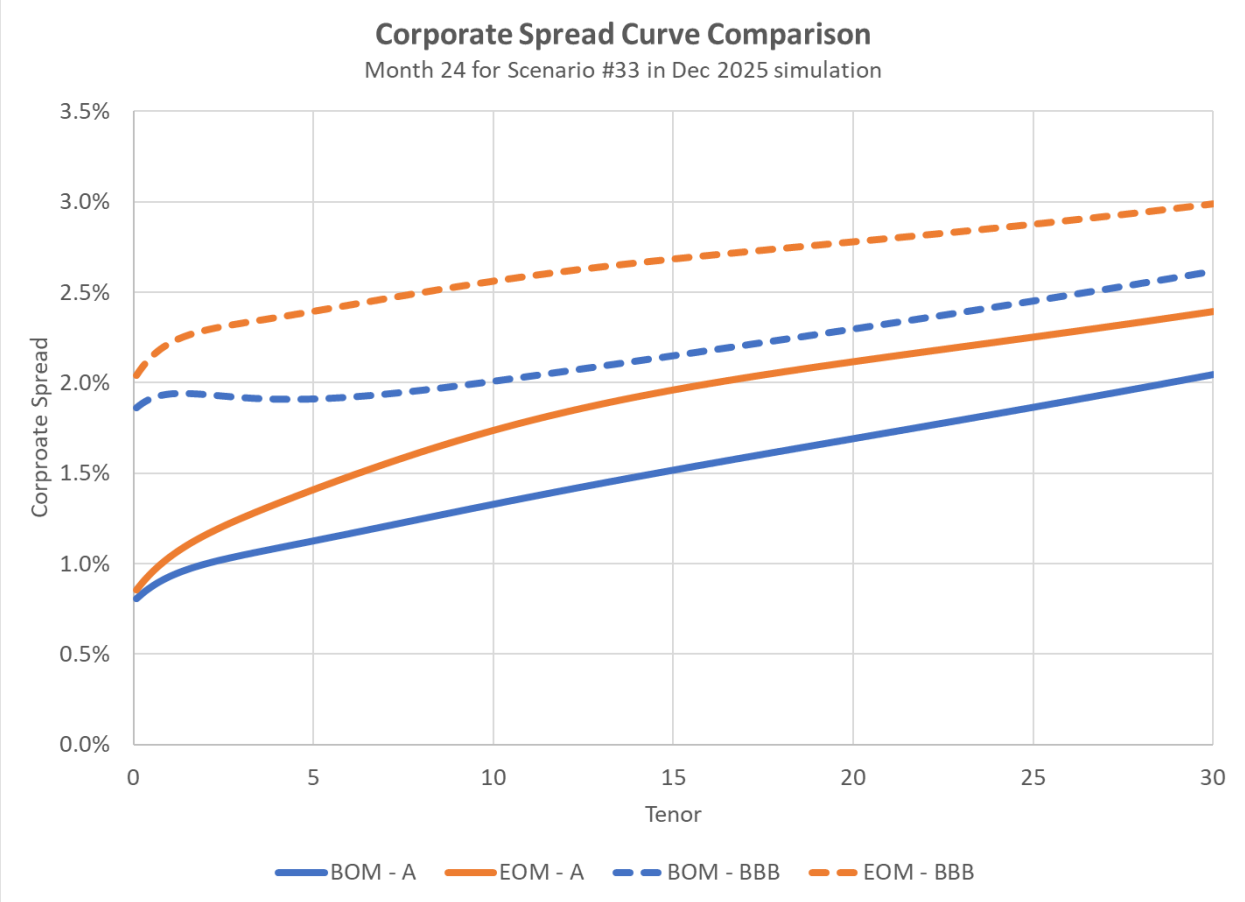

Figure 7: Comparison of corporate zero spreads at start and end of simulated month. ©2026 Conning, Inc. Source: GEMS® Economic Scenario Generator.

Finally, we can do a similar process for the price returns. In this scenario, the A curve goes up by about 35 bps over this simulation month. That partially offsets the benefit from the dropping Treasury yields we saw with the Int Govt Bond discussion above. However, they still have positive price returns,

slightly below 1%.[3] On the other hand, the BBB curve goes up by over 50 bps. This is enough to produce negative price returns for both of those investments. When we average those values together, we get a base price return of 0.43%. Once again, we need to scale these results, but we also need to include the impact of the mean adjustment. That process leads to a final value of -0.22%, which is 1.22 * 0.43% - 0.22 * 3.11% - 0.35% / 12.

Asset Class	Income Return	Price Return
Int Govt Bonds	0.54%	3.11%
5-Year, A Bond	0.62%	0.90%
5-Year, BBB Bond	0.69%	-0.02%
10-Year, A Bond	0.67%	0.99%
10-Year, BBB Bond	0.73%	-0.17%
Average	0.68%	0.43%
Int Inv Corp Bonds	0.71%	-0.22%

Table 3: Simulated price and income returns during simulated month. Prepared by Conning, Inc. Source: ©2026 Conning, Inc.

[3] As mentioned in the Model Mechanics section, the Price Return will also be impacted by Transitions. As shown in **Figure 5**, these will be more titled towards downgrades than average.

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