Generalized Fractional Floor

- The Conning GEMS Treasury model has the capability of producing negative interest rates, which have been a feature prevalent in other countries currently and in recent history.
- While the basic formula for the generalized fractional floor (see below) is relatively simple, the implementation of the floor in the Conning Calibration is more complex. In this particular implementation, the Treasury model is fit to an implicit yield curve that is chosen such that the actual yield curve is matched at time zero after the floor has been applied.
- Applying a generalized fractional floor methodology to the scenarios from the Conning Treasury calibration allows for increased control of the frequency and severity of negative interest rates.
- After testing, Conning has chosen a threshold value of 40 BPs and a factor of 20% to reduce the frequency and severity of negative interest rates while ensuring that other regulator objectives, such as low for long, are met.
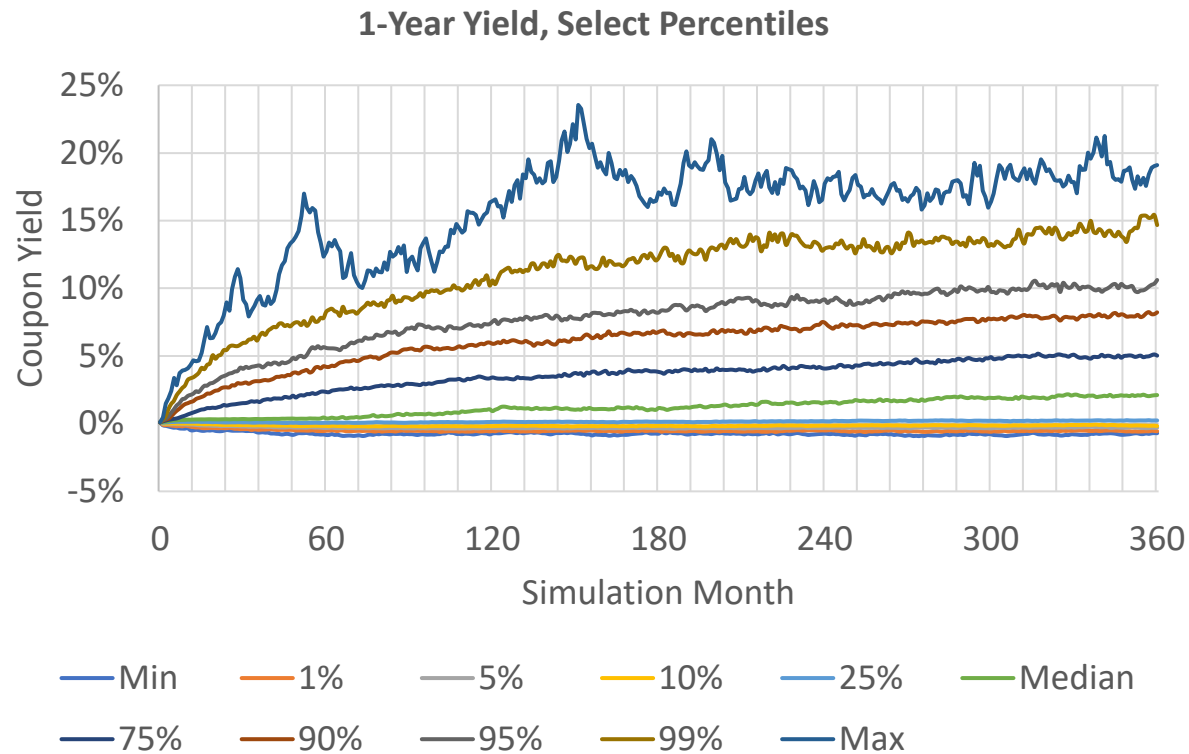
Generalized Fractional Floor Formula:
- If Unfloored Rate < Adjustment Threshold,
    - Floored Rate = Adjustment Threshold + Factor * (Unfloored Rate - Adjustment Threshold)
- Otherwise,
    - Floored Rate = Unfloored Rate

Example:
Unfloored Rate = -1%   Threshold = 40BPs   Factor = 20%
Floored Rate = 0.4% + 20%*(-1% - 0.4%) = **0.12%**

Generalized Fractional Floor
40BP Threshold, 20% Factor

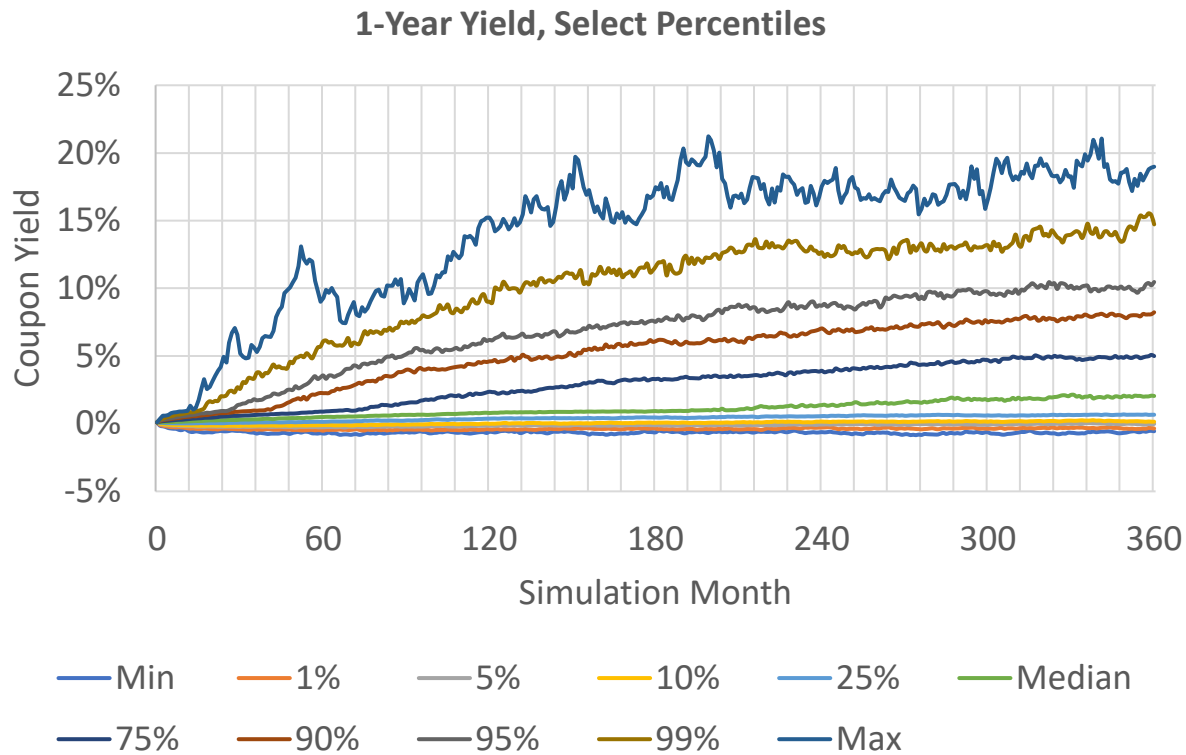**1-Year Yield, Select Percentiles**

Low for Long Criteria:

a) At least **10%** of scenarios should have a 10-year geometric average of the 20-year UST that is below 1.45%* - **19.5% PASS**

b) At least **5%** of scenarios should have a 30-year geometric average of the 20-year UST that is below 1.45%* - **5.2% PASS**

Negative Rate Frequency and Severity by Maturity:

	Frequency < 0		Minimum	
Treasury Maturity	EOY 1	EOY 30	EOY 1	EOY 30
1-Month	35.42%	18.77%	-0.76%	-0.98%
3-Month	22.08%	17.23%	-0.66%	-0.86%
1-Year	9.38%	14.45%	-0.50%	-0.72%
5-Year	0.29%	3.92%	-0.14%	-0.34%
10-Year	0.00%	0.17%	0.09%	-0.05%

Generalized Fractional Floor
100BP Threshold, 25% Factor

1-Year Yield, Select Percentiles

Low for Long Criteria:

a) At least **10%** of scenarios should have a 10-year geometric average of the 20-year UST that is below 1.45%* - **20% PASS**
b) At least **5%** of scenarios should have a 30-year geometric average of the 20-year UST that is below 1.45%* - **4.2% FAIL**

Negative Rate Frequency and Severity by Maturity:

	Frequency < 0		Minimum	
Treasury Maturity	EOY 1	EOY 30	EOY 1	EOY 30
1-Month	30.96%	10.41%	-0.69%	-0.87%
3-Month	32.03%	9.04%	-0.69%	-0.72%
1-Year	23.38%	5.39%	-0.60%	-0.56%
5-Year	0.07%	0.18%	-0.10%	-0.09%
10-Year	0.00%	0.00%	0.30%	0.28%