

Episode 7: Stochastic Exclusion Ratio Test

In episode 7 of the Everything GOES podcast, Daniel Finn and Bill Pauling discuss the stochastic exclusion ratio test.

SEGMENT 1—OPENING

[Joe Golaszewski] Hi, and welcome to the Everything GOES podcast, where we discuss the NAIC's upcoming transition from the Academy Interest Rate Generator scenarios to the new GOES scenarios. I'm your host, Joe Golaszewski, and I'm joined today by Daniel Finn and Bill Pauling, who are both part of Conning's Risk Solutions unit.

Today's episode is about the stochastic exclusion ratio test, or SERT. Dan, can you please tell our listeners what the stochastic exclusion ratio test is?

SEGMENT 2—ABOUT SERT (0:48)

[Dan Finn] Sure, Joe. So the basic that we've been talking about up until now is a stochastic set of scenarios following a specific calibration that we've agreed on, and that's appropriate for economically sensitive policies—think variable annuities and FIAs. But there are a number of policies out in the life space that aren't as economically sensitive—think a classic whole life policy—and so the regulators don't necessarily want companies for those types of policies to have to go through all of the iterations of a stochastic simulation to be able to prove that the reserves don't change that much. So they've set up a couple of different methods for determining whether or not a type of policy or a group of policies is sensitive enough to economic conditions to need the full stochastic run.

One of those is the stochastic exclusion ratio test, essentially sixteen scenarios that are relatively stressful—interest rates going up to the 90th percentile and equity dropping down to the 10th percentile. Companies can run just those for a set of policies on a periodic basis, and if the reserve calculation under those is below some threshold, then it passes this test and the company doesn't need to do the full stochastic, they can just use one of the SERT scenarios called the DR scenario, or #12, to calculate the reserve.

[JG] Thanks Dan. And why does SERT need to change?

[Bill Pauling] So the short answer to that is that the model is different. The current SERT scenarios that are built into the AIRG have a structure so that the variables can be shocked independently and specifically. However, the GEMS® model that underlies the GOES scenarios is different. The models are different and more complex and don't lend themselves to the type of shocks that the AIRG was able to do.

The way that the SERT scenarios are implemented in GEMS® is to use some existing functionality called User Paths, which allows users to create deterministic scenarios, and these deterministic scenarios can be regulatory-based scenarios or stress scenarios, but that functionality can be extended to do the SERT methodology. Some of the models will need to be simplified to fit the requirements of the SERT scenarios. For example, the equity model, which has jumps in them, for the SERT scenarios, those jumps will be turned off.

SEGMENT 3—SERT AND GOES (3:46)

[JG] Thanks. And how will GOES approach SERT?

[DF] So there are a couple of different components to this. For the equities, as Bill was mentioning, we use the this User Path functionality, and those were calculated off specific percentiles. So for instance for the scenario 1, where equity returns are calling pop up, going up to the 90th percentile, will have a calculation based off the full distribution, and the model will simply follow that. That link, even though the scenarios themselves have a link between equity and Treasury, there won't be a link within the SERT scenarios, so scenario 1 and scenario 3 that have the same equity but different Treasury will still follow the same path. Treasury, on the other hand, we've gone through a process of basically converting those shocks that were in the AIRG in order to make a representation of them in the in the GOES model. So instead of shocking all three states, we're going to shock mostly the third

state with some additional components on the second state to try and mimic the behavior that we were intending for each of these different scenarios. And then everything else within the model, its randomness is going to be turned off. Now that means you'll still have some flow through. So for instance, corporates are linked to both the Treasury and the equity within the GOES framework. So they will have some follow-down effect from what's happening in the above scenarios, but there's going to be no random component within the corporates. But it does mean that you may see differences in corporates that weren't there before. So for instance, scenario 1 and scenario 2 have the same Treasury but different equity, and because that equity is flowing into the corporates, you'll see different corporate returns in those two scenarios, whereas you wouldn't have previously.

[JG] OK. Did any of these scenarios need special treatment?

[BP] Yes, scenario 12 that Dan mentioned earlier is the deterministic reserve scenario. So that scenario is used for evaluation if a group of policies passes the SERT test. Previously, that did not revert to the median scenario. The medians of the state variables don't add up to the median yield curve, and so there was some adjustments that needed to be made to make that the case.

[DF] Yeah, another set that that was different are all the delayed shock scenarios. So, those are the last four, 13 through 16. What we found when we went and looked at those was that they specifically mention a delay in the Treasury. So they're similar to the 1 through 4, except the Treasury is supposed to happen after roughly a decade. But in the AIRG, we found that those delays were also being applied to the equity. but that's not what was written into the description. So you'll now see in in the GOES scenarios that while the Treasury is delayed, the equity on all of those scenarios is now happening immediately. So scenario 13 has the same path as scenario 1 for the equity returns.

[JG] OK, and if the SERT method is changing, does that mean that my product may now fail this test even if it passed under the AIRG method?

[DF] So, I think we have to break that down into two parts. First, let's focus on the SERT and whether or not it would pass. So, part of the field test was actually testing these different methodologies, and that followed all the way through to the model office testing. And while we tried to keep the method the same, or at least fairly similar in terms of outcomes, the GOES calibration is substantially more volatile than the AIRG's calibration, especially in today's low interest rate environment. So a 90th percentile under the GOES scenario is likely to be much more severe than a 90th percentile under the old AIRG. So we saw a number of policies that were passing under the AIRG were now failing, and the NAIC has responded to that by changing the threshold. They've upped the threshold. They've also given a phase-in period, so if you've passed under the AIRG, you've got a couple of years where you can use that to continue to use the SERT scenarios and not have to do the fully stochastic. So they're trying to to make this as seamless as possible for certain types of policy.

The other question is then going to be on the DR scenario—that number 12—which as Bill mentioned is used for valuation purposes. That we do expect to see a decent amount of change because the the targets for a lot of these parameters on the Treasury side are quite different. As Bill mentioned, that scenario is designed to sort of revert to the median, but we've changed what the median is. Under the AIRG, that was reverting to a sort of weighted average across different periods and in low rate environments like we had at 2020, it did sort of come down. The GOES process is looking at a longer history but weighting the more recent data, something called the PEW, so that we actually have in today's environment slightly higher level that it's moving towards. So all in all, we expect that the DR might be a little bit less punitive than under the AIRG, but that could change depending on where interest rates go. So more to come on that.

SEGMENT 4—CONNING'S SERT SCENARIO FILES (10:09)

[JG] OK, thanks. I think that gives everyone a good basis of understanding of what these scenarios are about. How are these scenarios going to be delivered?

[BP] So the scenarios will be delivered in a single file with all sixteen scenarios and all the variables. It's going to be a similar layout to the stochastic file. The rows will contain the scenario and the month data, and the columns will hold all the variables—Treasury rates, asset class returns, et cetera. This file is going to be part of the monthly package and will be published to the scenario website each month, and that file will be available for download by 5:00 PM Eastern Time on the first business day of each month.

Now, for GEMS software clients and API clients, we will also have tools to allow them to incorporate the SERT scenarios into their customized models.

[JG] Thanks, Bill. Is there anything else people should know?

[DF] There's there's one other item that I think people may be interested in. We found during the field tests that a number of people saw the structure and realized these were deterministic scenarios and tried to duplicate them in sort of an Excel-based framework. And they didn't find the same results or in some cases even close, and I think it's important to sort of understand why it goes to some of the methods that we've implemented. So the GOES model is what's called a continuous-time model, so stochastic differential equations, and that means we have to come up with an approximation method. The most common way to do that is the one that a lot of the field test participants tried, which is called the Euler. You're basically just replacing continuous time with discrete selections from a normal variable, but that's not how we we approximate that. That is an approximation. But when you're doing something like a 100-year run, you're making that same approximation over and over. You can start getting very large errors, especially with something like the DR scenario where most of the the shocks are going to be 0 to try and keep it at that median level. So what we actually do in the GOES is try and understand the true distribution of these. So for instance, the Treasury model has a non-centralized chi-squared distribution, and we go directly into that because it's more accurate, it reduces the error. And so when you try and do these simplifications, especially with that scenario #9, you'll see potentially very big differences. That's sort of expected, but it can be somewhat surprising to people until they understand sort of what we've done within the model and trying to continue to use that model for the SERT framework.

SEGMENT 4—CLOSING (13:28)

[JG] Thanks, Dan. If our listeners have any questions about the SERT scenarios or anything else GOES-related, they can contact us at naicscenarios@conning.com. Our next episode will be on the topic of model validation. Until then, thanks for listening and keep on modeling!

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