Stochastic Exclusion Ratio Test (SERT) Calculation

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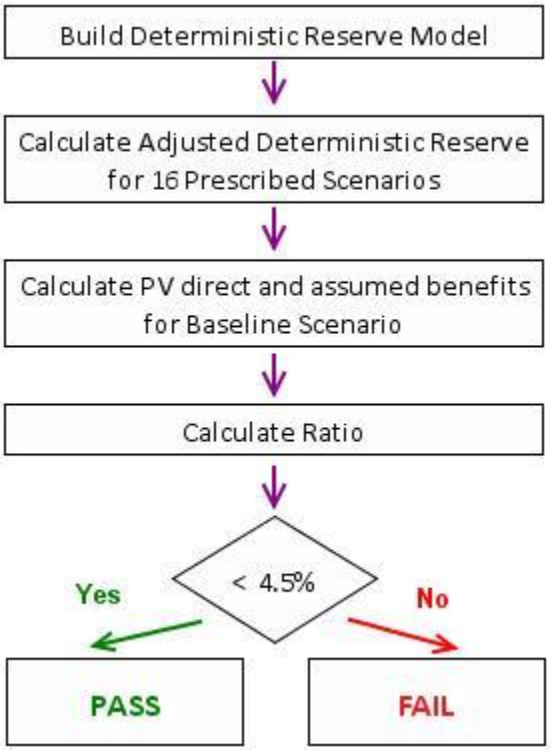
This article illustrates how to calculate the SERT (Stochastic Exclusion Ratio Test) given the required inputs as described in the Valuation Manual VM-20 (based on the December 2, 2012, version). The calculation itself is quite simple. The hard part is producing the inputs which we assume have been calculated as given. A future PBR Corner article will discuss how to leverage existing models to calculate the required inputs (i.e., deterministic and stochastic reserves).

SERT consists of calculating an adjusted deterministic reserve on a group of policies for each of 16 prescribed scenarios and calculating a ratio. The adjusted deterministic reserve (DR') is the deterministic reserve (DR) calculation with some differences, namely, assumptions with no margins. Contract types with significantly different risk profiles may not be grouped together for purposes of calculating the exclusion ratio.

The numerator of the ratio is the maximum DR' over 15 nonbaseline scenarios less the DR' for the baseline scenario. The denominator is the present value of benefits for direct and assumed benefits for the baseline scenario from DR' (that is, all aspects of ceded reinsurance are excluded). The test passes if the ratio is less than 4.5%.

SERT Flow Chart



$$Ratio = \frac{Max_A\ DR' - DR'_B}{PV_B(direct\ \&\ assumed\ Benefit)}$$

DR' = DR except no margins are applied

B = Baseline Scenario (#9)

A = Scenarios {1–8 and 10–16}

Contract types with significantly different risk profiles may not be grouped

SERT Illustrated Example

Scenario Number	Scenario Description	Adjusted Deterministic Reserve	Delta from Baseline
1	Pop Up, High Equity	198,466	(61,290)
2	Pop Up, Low Equity	198,466	(61,290)
3	**Pop Down, High Equity**	**308,601**	**48,845**
4	**Pop Down, Low Equity**	**308,601**	**48,845**
5	Up/Down, High Equity	225,479	(34,277)
6	Up/Down, Low Equity	225,479	(34,277)
7	Down/Up, High Equity	271,499	11,743
8	Down/Up, Low Equity	271,499	11,743
9	Baseline	259,756	-
10	Inverted Yield Curves	280,856	21,100
11	Volatile Equity Returns	259,756	-
12	Deterministic scenario for valuation	285,421	25,665
13	Delayed Pop Up, High Equity	229,607	(30,149)
14	Delayed Pop Up, Low Equity	229,607	(30,149)
15	Delayed Pop Down, High Equity	287,477	27,721
16	Delayed Pop Down, Low Equity	287,477	27,721

(A) Max Delta from Baseline	**48,845**
(B) PV Benefits in Baseline	1,516,925
Ratio A/B	**3.22%**

The Ratio is < 4.5%; therefore this Segment passes the SERT.

This block does not have equities which is why the High and Low Equity results are identical. The maximum delta occurs in Scenarios 3 and 4. The Present Value of Benefits were determined when calculating the reserve for the baseline scenario #9.