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S-Curve Reserve for Universal Life

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Abstract

The S-Curve reserve for Universal Life was developed under a cash flow valuation methodology. 550 scenarios (combinations of 11 mortality scenarios and 50 interest rate scenarios) were used for the construction of the S-Curve. The S-Curve represents a distribution of amount of assets needed under these 550 scenarios, which together with future premiums will fund all future policy benefits and expenses. The reserve is defined as a specific point on the S-Curve. The S-Curve reserve is asset dependent and analogous to Value-at-Risk in its determination.

A Practitioner's View of S-Curve Reserve for Universal Life

By Lone Yee

State Farm Insurance Co[illegible]es

A Practitioner's View of S-Curve Reserve for Universal Life

S-Curve Reserve

- ✓ Assets needed to support obligations at a certain (e.g., 85%) level of adequacy
- ✓ Asset dependent
- ✓ Level of adequacy

A Practitioner's View of S-Curve Reserve for Universal Life

Current Formula Reserve

- ✓ Asset independent
- ✓ Level of adequacy unknown

Universal Life Example

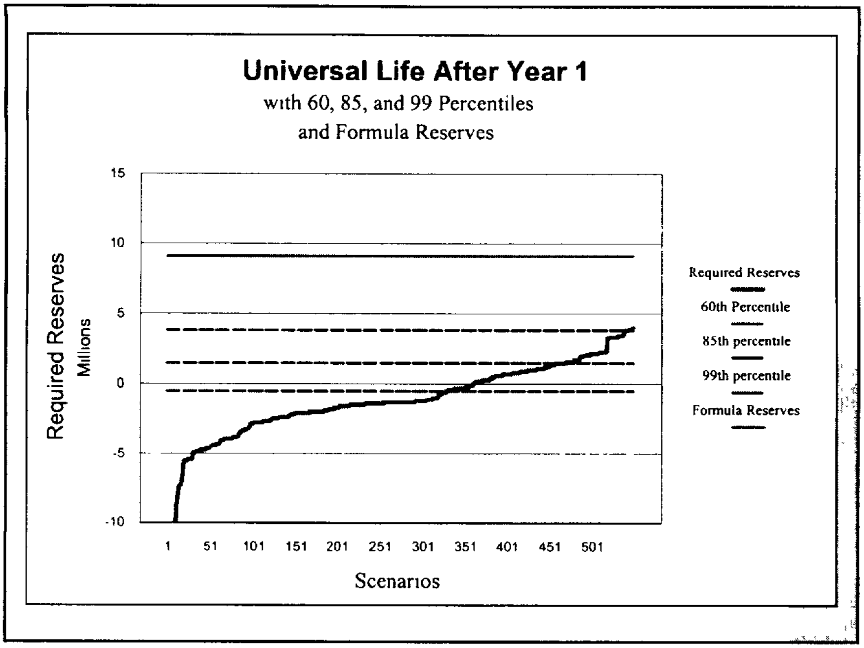
Flexible premium adjustable benefit life insurance

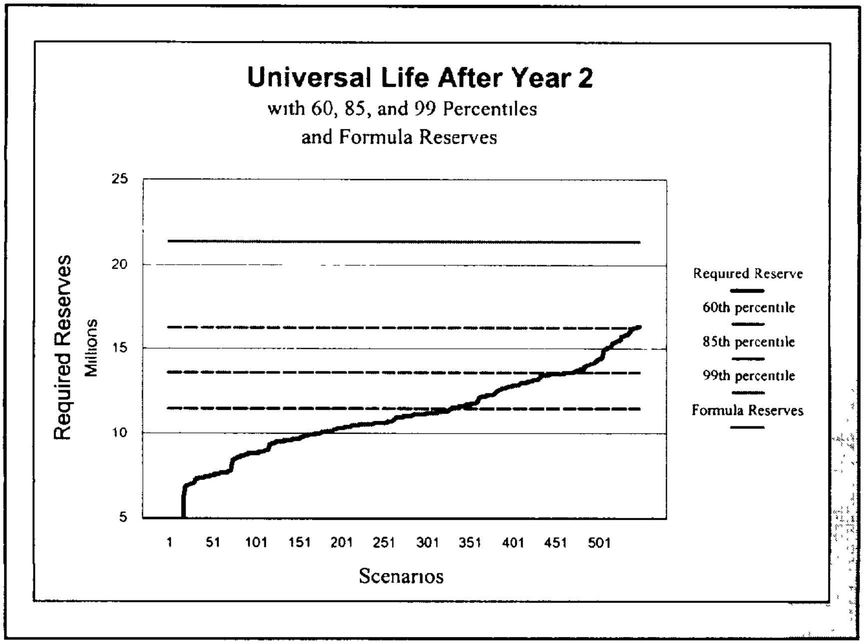
- ✓ Embedded Options
- ✓ Interest Rate Sensitive (Policyholder Behavior)

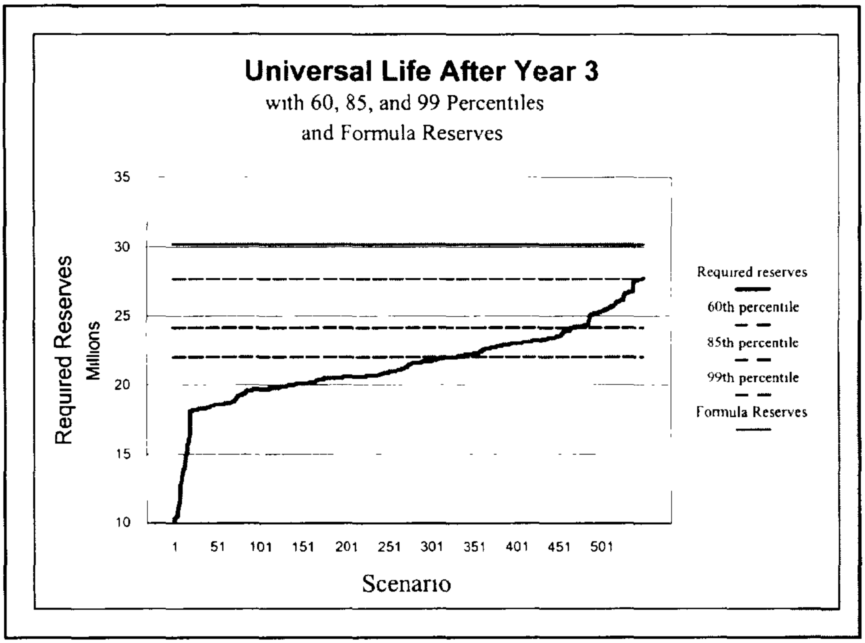
A Practitioner's View of S-Curve Reserve for Universal Life

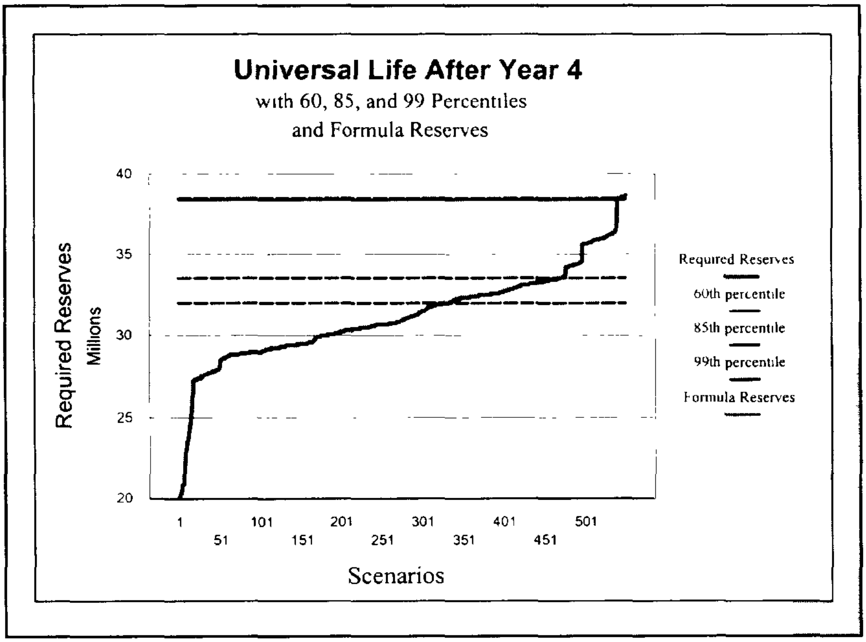
Process

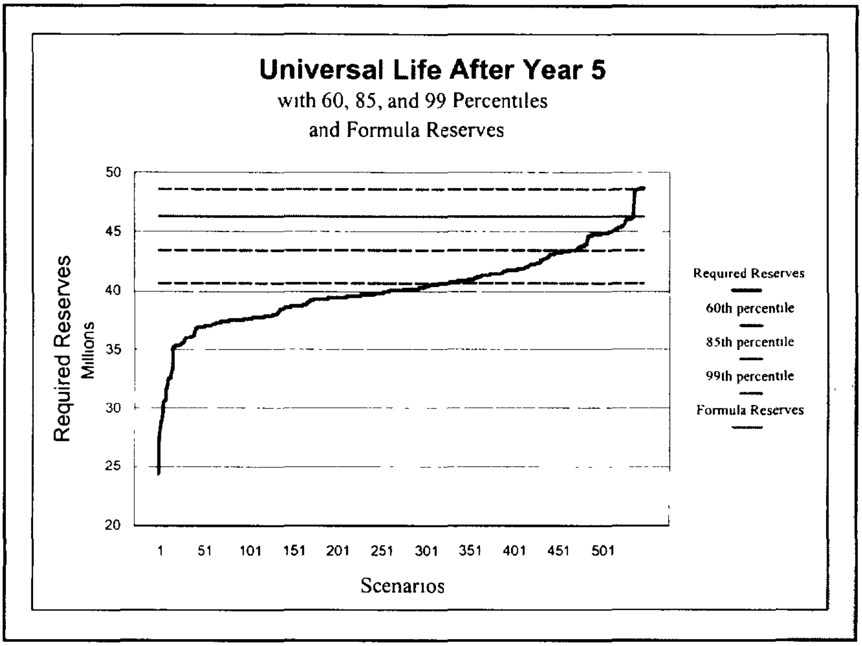
- ✓ A block of policies
- ✓ A basket of assets
- ✓ Interest rate scenarios (50)
- ✓ Mortality scenarios (11)
- ✓ Company's pricing and Investment Strategies
- ✓ Policyholder behavior functions
- ✓ Other cash flow assumptions (e.g., expenses, taxes, etc.)
- ✓ Cash flow testing tool


Universal Life After Year 1
with 60, 85, and 99 Percentiles
and Formula Reserves
15
10
5
0
-5
-10
Required Reserves
Millions
1 51 101 151 201 251 301 351 401 451 501
Scenarios
Required Reserves
60th Percentile
85th percentile
99th percentile
Formula Reserves

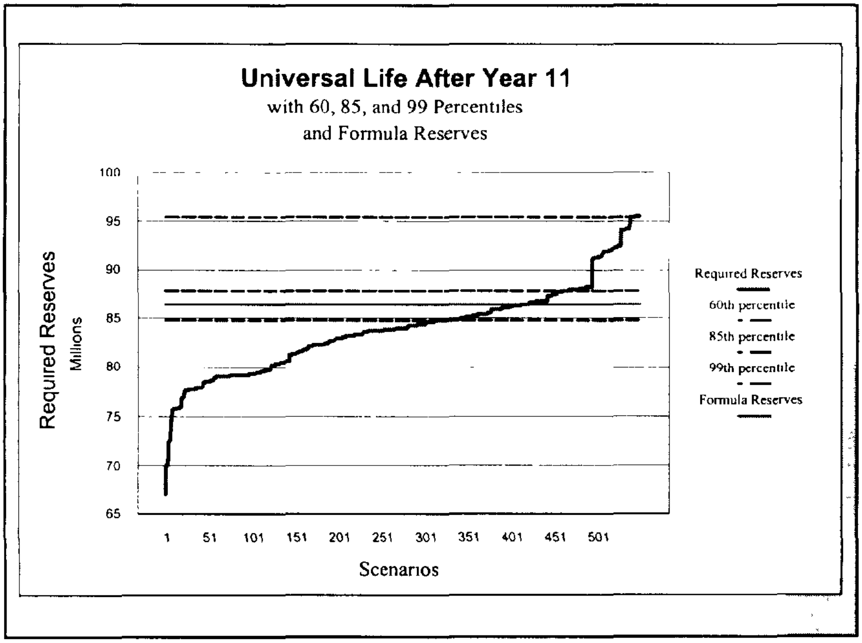

Universal Life After Year 2
with 60, 85, and 99 Percentiles
and Formula Reserves
25
20
15
10
5
Required Reserves
Millions
1 51 101 151 201 251 301 351 401 451 501
Scenarios
Required Reserve
60th percentile
85th percentile
99th percentile
Formula Reserves


Universal Life After Year 3
with 60, 85, and 99 Percentiles
and Formula Reserves
Required Reserves
Millions
35
30
25
20
15
10
1
51
101
151
201
251
301
351
401
451
501
Scenario
Required reserves
60th percentile
85th percentile
99th percentile
Formula Reserves

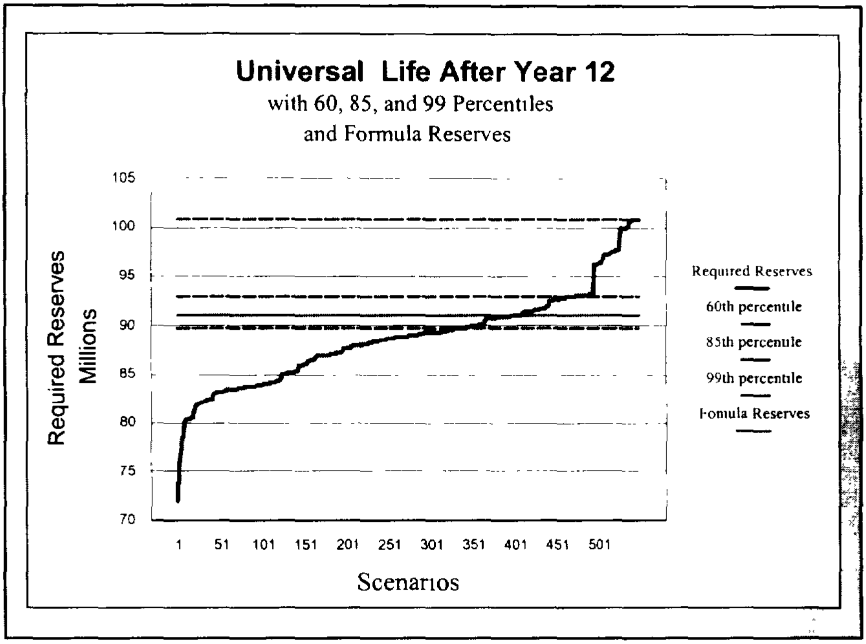

Universal Life After Year 4
with 60, 85, and 99 Percentiles
and Formula Reserves
Required Reserves
Millions
40
35
30
25
20
1
51
101
151
201
251
301
351
401
451
501
Scenarios
Required Reserves
60th percentile
85th percentile
99th percentile
Formula Reserves



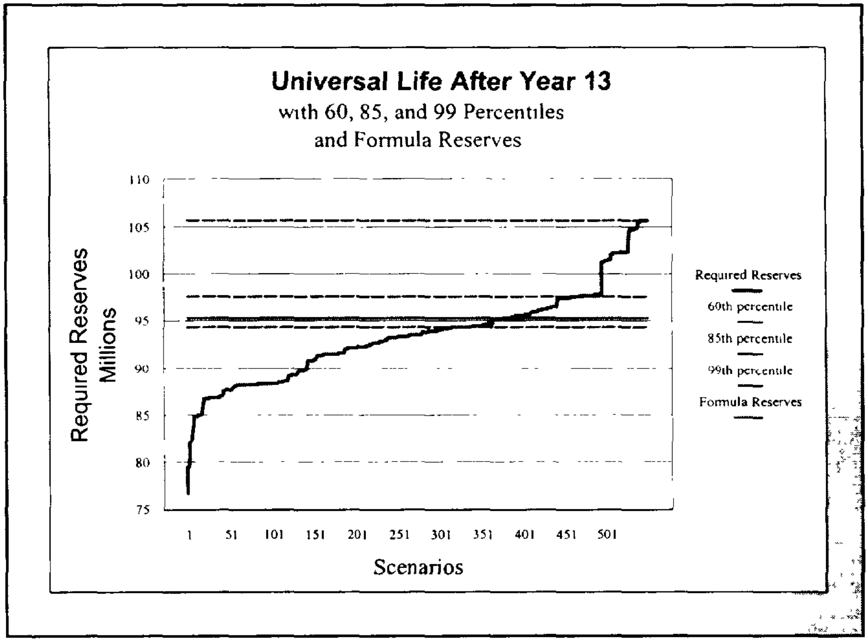
Universal Life After Year 5
with 60, 85, and 99 Percentiles
and Formula Reserves
Required Reserves
Millions
50
45
40
35
30
25
20
1
51
101
151
201
251
301
351
401
451
501
Scenarios
Required Reserves
60th percentile
85th percentile
99th percentile
Formula Reserves



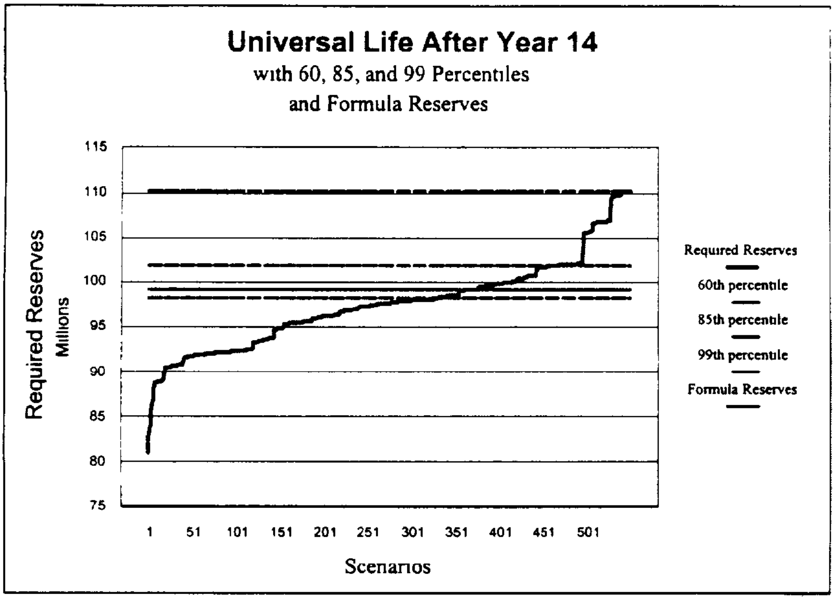
Universal Life After Year 11
with 60, 85, and 99 Percentiles
and Formula Reserves
Required Reserves
Millions
100
95
90
85
80
75
70
65
1
51
101
151
201
251
301
351
401
451
501
Scenarios
Required Reserves
60th percentile
85th percentile
99th percentile
Formula Reserves



Universal Life After Year 12
with 60, 85, and 99 Percentiles
and Formula Reserves
Required Reserves
Millions
105
100
95
90
85
80
75
70
1 51 101 151 201 251 301 351 401 451 501
Scenarios
Required Reserves
60th percentile
85th percentile
99th percentile
Fomula Reserves



Universal Life After Year 13
with 60, 85, and 99 Percentiles
and Formula Reserves
Required Reserves
Millions
110
105
100
95
90
85
80
75
1 51 101 151 201 251 301 351 401 451 501
Scenarios
Required Reserves
60th percentile
85th percentile
99th percentile
Formula Reserves



Observations

It can be done!

Meaningful distribution of level of adequacy?

- ✓ 50 interest rate scenarios probably do not address the interest rate risk adequately

Results are highly sensitive to assumptions

- ✓ Risky strategy and aggressive assumption will lower the reserve

Negative numbers, what do they mean?