
11th Global Conference of Actuaries

Modified Approach to Dynamic Solvency Testing

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Presenter: **Sachin Saxena, AIAI**

Not Discussed

- The word 'Dynamic' is sometimes mis-interpreted as 'Stochastic'
- Stochastic Modeling
- Real World or Risk Neutral Scenarios
- Solvency Timeframe
 - One year
 - Run off
- 99.5th Percentile OR 95th Percentile OR 90th CTE

Overview

- What is Dynamic Solvency Testing
- Professional Guidance
- Suggested Approach
 - Methodology
 - Audience
- Opportune time for doing such analysis
- How to Create Scenarios
- Presentation of Results
 - Caveats
 - Interpreting the Results
- Summary

What is Dynamic Solvency Testing

- Dynamic Solvency Testing (DST) involves projecting a company's solvency position into the future under varying assumptions in order to assess its financial strength and identify the major risk factors affecting the company
- Also known as Dynamic Capital Adequacy Testing
- In India, DST is a part of the Financial Condition Report (FCR)
 - FCR is submitted to the Board

Relevant Professional Guidance

■ GN3 Section 1.1

- “...it is advisable for the Appointed Actuary to provide to the Board of Directors of the life office with a more extensive written report into the **current** solvency position of the life office and its possible **future** development.”

■ GN3 Section 1.4

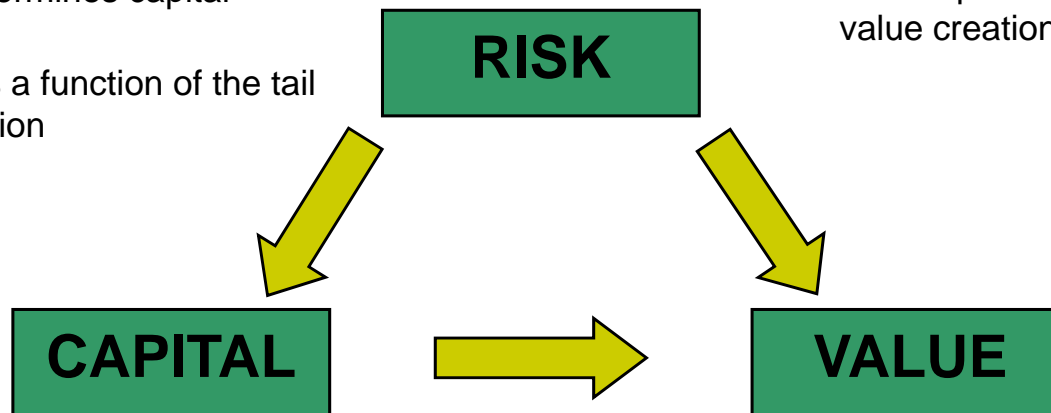
- “In this report, the Appointed Actuary shall assess the ability of the life office to withstand changes in both the **external** economic environment and the particular **experience** of the life office. The **combined** effect of a change in **two or more related assumptions** will in many cases be more important than a change in any one of them in isolation.”

- However no further guidance on how to carry out DST and in particular how to create scenarios

Suggested Approach – Methodology

- Companies need to reflect the fact that Risk, Capital and Value are inextricably linked
- Certain management actions though creating value for company might require very high capital injections in future and threaten solvency

- Risk exposure determines capital needs
- Required capital is a function of the tail of the risk distribution



- Market price of risk is a key driver of value creation

- Amount of capital held modifies shareholder value through frictional costs

Suggested Approach – Methodology...

- The Board will be as much interested in knowing the impact of a particular scenario on Value (VNB/EV) in addition to Capital
- Need to have a base plan against which the impact on Capital and Value will be quantified
- Most logically it should be the ‘Management Approved Business Plan’
- The suggested approach then should not be called DST/ DCAT but should instead be referred to as “Business Plan Scenario Testing” (BPST)

Suggested Approach - Audience

- DST is submitted to the Board of the life office as part of *Financial Condition Report*

 - No formal filing of DST with the Regulator
 - Though the Regulator can request a copy of the FCR from the insurer
 - Current system involves insurers filing retrospective solvency position every quarter with the Regulator

 - But what about threats to future solvency?

 - To bring much needed rigour and transparency
 - DST/BPST results should be filed with the Regulator
 - Taking it to the next level, the Regulator/Professional body can specify 7- 10 standard scenarios which every insurer should carry out
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Opportune Time for BPST Analysis

- Such analysis would be most useful when done along when the company is doing its **business planning** for future years
- The management usually looks at various scenarios involving only change in sales volume and product mix while doing planning
- However, the Board should consider the implications of adverse but plausible scenarios and then decide upon taking any mitigating actions to moderate any major risks threatening the plan
- **BPST shouldn't be done to satisfy any regulatory requirement but should be embedded in the company to serve as a Risk Management tool**

How to Create Scenarios

- Principles to be followed
 - Choose adverse but plausible scenarios
 - The event should have a reasonable probability of happening
 - The impact on either Capital or Value should be quantifiable
- Usually we construct scenarios by thinking what will happen say if our expenses increase by 10%
- Thinking about what can go wrong is a kind of guessing exercise
 - Usually all possible *known risks* are covered in the ERM framework
 - But what about unknown risks? Can risk management identify and mitigate such risks?

How to Create Scenarios...

- Combination Scenario - Instead of thinking in this way first define the tolerance level for Capital
 - Conceive all possible combinations that will breach Capital tolerance levels
 - Will it prevent institutions from insolvency in future?
 - Good supplement to the way we create scenarios. Example - scenario 8

 - Ripple Effect Scenario
 - Better if small deviations in parameters is considered

 - Scenarios can also be created if for a particular parameter Finance and Actuarial have different views
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9 Example Scenarios

Scenario	Base plan – Management approved business plan
1.	Sales higher than planned by 20%
2.	Sales higher than planned by 20% and the 20% increase is due to the sale of most capital intensive product
3.	Linked policies become paid up after paying 3 years premium
4.	Linked Lapse rates for 4 th year become 50% (absolute) following the removal of surrender penalty in most linked products
5.	Lapses increase by 20% at all durations
6.	Operating expenses increase by 20% given high inflation
7.	Ripple effect scenario (stock market crash) – Sales reduce by 10% year on year, shift towards participating business in the near term, lapses increase by 10% for policy duration > 3 years (no surrender penalty), FMC reduces by 10 bps for linked business
8.	Combination scenario – combination of scenario 2 and 6
9.	Stochastic scenario – Debt assets valued at Min (BV, MV) for the purpose of solvency

Impact on Capital and Value

In INR Cr	Capital	% Change	VNB	% Change
Base – Business Plan	1,000		400	
1. Sales higher than planned by 20%	1,300	30%	480	20%
2. Sales higher than planned by 20% due to capital intensive product	1,500	50%	420	5%
3. Linked policies become paid up after paying 3 years premium	1,040	4%	360	-10%
4. Linked Lapse rates for 4 th year become 50% from 20% (absolute)	1,180	18%	380	-5%
5. Lapses increase by 20% at all durations	900	-10%	370	-8%
6. Operating expenses increase by 20% given high inflation	1,600	60%	250	-38%
7. Ripple effect scenario	700	-30%	275	-31%
8. Combination scenario – combination of scenario 2 and 7	2,100	110%	290	-28%
9. Debt assets valued at Min(BV,MV) for the purpose of solvency	1,450	45%	NA	NA

Note:

1. Numbers are illustrative only
2. Assuming the base plan VNB corresponds to a New Business Margin (NBM) of 20%, a reduction of 10% in VNB would imply a 2% drop in NBM

Presentation of Results

- Actuaries have always found it challenging to present complex actuarial matters to management
- Results should be presented in a manner which not only takes the severity of an event into account but also the probability
- The Board decides the risk appetite and tolerances with regards to the Capital and Value. The same is documented in the Enterprise Risk Management framework of an insurer

ERM Framework

- The concepts of *Likelihood* and *Consequence* need to be combined with the risk *Impact Areas* to define *Risk Tolerance*, which flows into *Risk Exposure*

LIKELIHOOD	Probability over Planning Horizon
Highly Probable	> 50%
Probable	30 - 50%
Likely	10 - 30%
Possible	< 10%

IMPACT AREA	CONSEQUENCE			
	Negligible	Moderate	Large	Severe
VNB	< 2.5%	2.5% to <10%	10% to < 20%	Over 20%
Capital	< 5%	5% to < 20%	20% to < 40%	Over 40%

ERM Framework...

Risk Exposure				
Likelihood	Consequence			
	Negligible	Moderate	Large	Severe
Highly Probable	Green	Amber	Red	Red
Probable	Green	Amber	Amber	Red
Likely	Blue	Green	Amber	Red
Possible	Blue	Green	Amber	Amber

Risk Tolerance

Category	Overall Risk	Action Steps
Blue	Minor	No action required
Green	Moderate	Monitor frequently but no action required
Amber	Major	Try to reduce the risk to moderate level if possible otherwise live with it
Red	Severe	Take action to reduce the risk to moderate level

Risk Exposure

Scenario	Likelihood	Consequence	
		Capital	VNB
1. Sales higher than planned by 20%	Likely	Large	+ve impact
2. Sales higher by 20% due to capital intensive product	Likely	Severe	+ve impact
3. Linked policies become paid up after paying 3 years premium	Likely	Negligible	Large
4. Linked Lapse rates for 4 th year become 50% from 20%	Highly Probable	Moderate	Moderate
5. Lapses increase by 20% at all durations	Possible	+ve impact	Moderate
6. Operating expenses increase by 20% given high inflation	Probable	Severe	Severe
7. Ripple effect scenario	Likely	+ve impact	Severe
8. Combination scenario – combination of scenario 2 and 7	Likely	INSOLVENCY	Severe
9. Debt assets valued at Min(BV,MV) for solvency purpose	Possible	Severe	NA

Note: +ve impact for capital implies a reduction in capital however +ve impact for VNB implies an increase in VNB.

Market Share Risk

- The 9 scenarios are basically operational risks scenarios
- Let's take 3 market growth rate scenarios and combine them with 5 different operational risk scenarios (sales related only)

Market Growth Scenarios	2009	2010	2011
Low – CAGR 20%	10	20	30
Most Likely – CAGR 30%	20	30	40
High – CAGR 40%	30	40	50

Market Share in 2011	Low	Most Likely	High
Base – Business Plan	11%	10%	9%
Sales higher than plan by 10%	13%	12%	11%
Sales lower than plan by 10%	9%	8%	7%
Accelerated new branch opening	15%	13%	11%
No branch opening	8%	7%	6%
Loss of leading corporate agent	10%	9%	8%

Caveats

- When presenting these results to the Board or Regulator it is absolutely necessary to state such type of caveats

“These factors reflect the Board and Shareholders’ risk tolerance levels and are not absolute conclusions.

Management should not be presumed to fail to act particularly if the driver is under direct control e.g. constraints on sales volume and mix as well as expenses.

Risk exposure matrix is arguably misleading in this respect but it is realistic to assume lag in implementation e.g. 12 months especially if involving action that counters prevailing sales culture.”

Interpreting the Results

- Most red zones are under stress conditions. Similar to stochastic approach
 - For e.g. may represent 10% chance of insolvency – assuming the insurer is solvent at the 90th percentile level
 - No one expects insurers to be solvent at the 100th percentile
 - Capital requirements such that life insurers should never be insolvent are impractical
 - Red zones will however highlight the *soft spots* of the insurer
 - This I believe is the intended purpose of the BPST “To serve as an Enterprise Risk Management tool enabling the Board and the Management to take informed decisions and demonstrate to the Regulator that the management is actively reviewing risks and putting in relevant monitoring and control measures”
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Summary

- ‘Dynamic’ does not mean ‘Stochastic’
 - The DST analysis will be enriched if it also considers impact on Value in addition to Capital
 - The BPST should be submitted both to the Board and the Regulator
 - The Regulator/Professional body should ideally prescribe a standard set of 7-10 scenarios
 - Another way of creating scenarios is to first define the tolerance level for Capital and then think what all events can breach the tolerance levels and how plausible they are
 - Present the results using “Traffic Light” system as defined in ERM framework
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Thank You...

- Special thanks to Mr. John Poole whose advice has enriched this paper a great deal
- The views expressed in this paper are mine and not necessarily of my employer