A Proposed Methodology for Setting Prescribed Default Costs on Existing Fixed Income Investments in VM-20

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Outline of Presentation

- State LHATF / Life PBR Subgroup objectives
- Summarize LRWG design features addressing objectives
- Describe the components of the proposed methodology
- Walk through 4 illustrative examples
- Demonstrate how the proposed LRWG methodology substantially satisfies these Life PBR Subgroup objectives
- Identify research and LHATF decisions needed to implement the methodology
- Questions welcome throughout!

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LHATF/Life PBR Subgroup Objectives

- **Default costs for the same or similar asset should be the same across all companies. They should be prescribed.**
- **Companies should not be able to lower reserves by investing in riskier assets beyond some threshold or "line in the sand."**
- In the short run, default costs should reflect the current economic environment and can grade into long-term conditions
- The prescribed method should be relatively simple

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LRWG Design Features to Address Principles

- Asset-by-asset approach
- Baseline default table based on long-term market data, set at appropriate level of conservatism
- Temporary baseline adjustment, + or -, to reflect current market environment
- Permanent adjustment to specific assets, + or -, to reflect higher or lower risk relative to baseline
- Overall constraints to assure minimum defaults and maximum net spreads
- Simple? Maybe not on first pass, but give it time!
- Transparent and auditable? Yes.

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Other Key Design Characteristics

- Risk is measured based on conditions at valuation date rather than at original purchase date
- Indicators of future default risk
  - Credit rating
  - Spread level
  - Structural risk
- Flexible design, with parameters that can be adjusted over time
- Naturally extends to setting prescribed spreads and default costs on new investments in a consistent manner
- Results in "market-responsive" default costs but degree of desired responsiveness and resulting volatility can be controlled through choice of parameter values

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LRWG's Proposed Methodology

- As directed by the Life PBR Subgroup, LRWG's proposed methodology is an asset-by-asset calculation of Projected Annual Default Costs
- Projected Annual Default Costs =
  - Generic Component (which varies by projection year)
  - + Specific Component (which is level for all years)
  - + Constraint Component (which varies by projection year)
- The calculation for each asset would involve
  - Five data fields for each asset
  - NAIC-prescribed tables and parameters
  - The calculation of a Benchmark

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The Formula for Default Costs Relies on 5 Data Fields for Each Asset

- Credit Rating (Rating)
  - Right now for simplicity we only consider the Moody's rating
- Option Adjusted Spread (OAS) over Treasuries
- Weighted Average Life (WAL)
  - For a bullet bond, the WAL equals the remaining years until maturity
- Asset Class Structural Risk (Risk)
  - Right now we use 3 Risk category labels (Low, Medium & High) with illustrative definitions as described below
  - Low = sr. debt that is not ABS nor callable except with a make-whole
  - Medium or High = subordinated debt, preferred stock, callable, Asset Backed Securities (ABS), mortgage loans
- Investment Expenses (Expenses)

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The Methodology has Several NAIC-Prescribed Elements

- NAIC-prescribed methodology would be used each Valuation Date (Val Date) to develop 3 tables that vary by rating & WAL
  - A "Baseline Defaults" table based on a 70 CTE cumulative default analysis for debt that is not Asset Backed Securities
  - Two spread tables developed from a bullet bond index
    - A "Mean Index" table of 7y mean gross spreads to interp Treasuries
    - A "Current Index" table of current gross spreads to interp Treasuries
  - (See the Appendix for graphs of illustrative prescribed tables)

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The Methodology has Several NAIC-Prescribed Elements (continued)

- The proposed formula to calculate Projected Default Costs includes several NAIC-prescribed parameters
  - Rating Threshold (T):
    - We assume in this presentation that T = an A3 Moody's rating
  - Number of years (N) to reflect current spreads:
    - We assume in this presentation that N = 3
  - Three percentages (X, Y and Z):
    - We have assumed values for each of these parameters, which will be explained later via illustrative examples

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The Proposed Formula for Projected Annual Default Costs has 3 Components

- Projected Annual Default Costs =
  - Generic Component (which varies by projection year)
  - + Specific Component (which is level for all years)
  - + Constraint Component (which varies by projection year)
- Projected Annual Default Costs grade from current conditions to ultimate conditions over N years

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The Generic Component

- Generic Component is a vector of bullet bond Annual Default Costs, interpolated based on the asset's WAL, for a Benchmark asset quality that is the stronger of the asset's actual ratings and a prescribed rating Threshold (T). In the examples herein we assume T = A3 Moody's
- The Generic Component grades to the Baseline Default Cost for the Benchmark over N years, and starts at Baseline Default Cost + X% of the Index XS Spread, where
  - Index XS Spread = Benchmark Current Index – Mean Index
  - X% is prescribed, and assumed equal to 25%

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The Specific Component and the Constraint Component

- Specific Component = Y% x Specific XS Spread, where
  - Specific XS Spread = OAS - Current Index
  - Y% is prescribed (as shown in the examples)
- Constraint Component = the larger of
  - Vector of Annual Default Cost Adjustments to Satisfy a prescribed Minimum Default Cost Constraint
  - Vector of Annual Default Cost Adjustments to Satisfy a prescribed Maximum Net Spread Constraint

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Let's Explain the Methodology in Stages with a Few Examples

- For all examples, we will assume
  - Val Date = 11/30/2007 (i.e. we use data as of that data)
  - WAL = 7.25 years (i.e. we'll need to interpolate between the 7y row and 8y row in each of the NAIC-prescribed tables)
  - Expenses = 10 bps per annum
- NAIC-prescribed parameter settings are illustrative
- We'll start with easier examples
  - 1st example only has the Generic Component
  - 2nd and 3rd examples also have a Specific Component
  - 4th example illustrates the Constraint Component

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Our 1st Example: A3 Low Risk Asset with OAS = Benchmark Current Index

- Assumed OAS: 201 bps (vs. 201 Benchmark, i.e. A3 7.25y interpolated value)
- For an asset with Rating = T, the Benchmark is T (A3)
- Mean Index Spread for A3 7.25y = 136 bps (interpolated value)
- Generic Component =
  - Baseline Default Cost for the Benchmark
  - + Index XS Spread Adjustment, defined as Index XS Spread for the Benchmark x X% x F, where
    - Index XS Spread = Current Index – Mean Index for the Benchmark
    - X% is the prescribed portion of (Current Index – Mean Index) presumed to be attributable to default cost (assume 25%)
    - F is a Factor based on N (3) that varies by projection year (Year)

Year:	1	2	3	4	5
F:	1	2/3	1/3	0	0

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Our 1st Example (page 2 of 3)

- Generic Component =
  - Baseline Default Cost for the Benchmark
  - + Index XS Spread Adjustment
- The Generic Component calculations are as follows:

			1	2	3	4	5
	Benchmark Rating by Moody's	A3					
	Benchmark 70 CTE Annual Default Cost	18.2					
	Index XS Spread (i.e. Benchmark Current Index Spread - Mean Index Spread)	65.0					
x	X% (as prescribed)	25%					
x	F (i.e. the Factor that phases out the Adjustment over the prescribed 3 years)		1.000	0.667	0.333	0.000	0.000
=	Index XS Spread Adjustment (i.e. Index XS Spread x X% x F)		16.3	10.8	5.4	0.0	0.0
	Generic Component (i.e. 70 CTE Default Cost + Index XS Spread Adjustment)		34.5	29.0	23.6	18.2	18.2
	Ratio of Generic Component / 70 CTE		190%	159%	130%	100%	100%

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Our 1st Example (page 3 of 3)

- The Specific Component & Constraint Component both = 0
- Projected Annual Default Cost Vector calculations are:

		1	2	3	4	5
	Generic Component (i.e. 70 CTE Default Cost + Index XS Spread Adjustment)	34.5	29.0	23.6	18.2	18.2
+	Specific Component	0.0	0.0	0.0	0.0	0.0
+	Constraint Component	0.0	0.0	0.0	0.0	0.0
=	**Projected Annual Default Cost Vector**	34.5	29.0	23.6	18.2	18.2

- The Net Spread if Bought on Val Date calculations are:

	Current Option Adjusted Spread (OAS) in bps	201
-	Investment Expenses used for Net Spread calculation	10

-	Projected Annual Default Cost Vector	34.5	29.0	23.6	18.2	18.2
=	**Net Spread if Bought Asset at OAS on Val Date**	156.5	162.0	167.4	172.8	172.8

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Our 2nd Example: A3 Low Risk Asset with OAS < Benchmark Current Index

- Assumed OAS: 180 bps (vs. 201 Benchmark)
- For an asset with Rating = T, the Benchmark is T (A3)
- Generic Component is the same as the 1st Example
- Specific Component = Specific XS Spread x Y% where
  - Specific XS Spread = OAS – Benchmark Current Index
  - Y% is set = to X%, since OAS < Benchmark Current Index

			1	2	3	4	5
	Specific XS Spread=Asset OAS - Benchmark Current Index Spread	-21.0					
x	Y% = if(Specific XS Spread <0, X%, lookup from a prescribed table)	25%					
=	**Specific Component**		-5.3	-5.3	-5.3	-5.3	-5.3

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Our 2nd Example (page 2 of 2)

- Projected Annual Default Cost Vector calculations are:

		1	2	3	4	5
	Generic Component (i.e. 70 CTE Default Cost + Index XS Spread Adjustment)	34.5	29.0	23.6	18.2	18.2
+	Specific Component	-5.3	-5.3	-5.3	-5.3	-5.3
+	Constraint Component	0.0	0.0	0.0	0.0	0.0
=	**Projected Annual Default Cost Vector**	29.2	23.7	18.3	12.9	12.9

- The Net Spread if Bought on Val Date calculations are:

	Current Option Adjusted Spread (OAS) in bps	180
-	Investment Expenses used for Net Spread calculation	10
-	Projected Annual Default Cost Vector	
=	**Net Spread if Bought Asset at OAS on Val Date**	

29.2	23.7	18.3	12.9	12.9
140.8	146.3	151.7	157.1	157.1

- Net Spreads are lower than Benchmark by 21 – 5.3 = 15.7 bps

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Our 3rd Example: Baa3 Low Risk Asset with OAS > Benchmark Current Index

- Assumed OAS: 250 bps (vs. 201 Benchmark)
- For an asset with Rating $\geq$ T (i.e. A3 or worse), the Benchmark is T (i.e. A3)
- Generic Component is the same as the 1st Example

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Our 3rd Example (page 2 of 3)

- Specific Component = Specific XS Spread x Y% where
  - Y% is a lookup from a prescribed table, since OAS > Benchmark Current Index. Below is an illustrative table.

Y varies by Risk & Rating	Aaa	Aa1	Aa2	Aa3	A1	A2	A3	Baa1	Baa2	Baa3	Ba1 & worse
Low	25.0%	25.0%	25.0%	25.0%	25.0%	50.0%	75.0%	100.0%	100.0%	100.0%	100.0%
Medium	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	75.0%	100.0%	100.0%	100.0%	100.0%
High	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	100.0%	100.0%	100.0%	100.0%

- Specific Component = Specific XS Spread x Y%

			1	2	3	4	5
	Specific XS Spread=Asset OAS - Benchmark Current Index Spread	49.0					
x	Y% = if(Specific XS Spread <0, X%, lookup from a prescribed table)	100%					
=	**Specific Component**		49.0	49.0	49.0	49.0	49.0

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Our 3rd Example (page 3 of 3)

- Projected Annual Default Cost Vector calculations are:

		1	2	3	4	5
	Generic Component (i.e. 70 CTE Default Cost + Index XS Spread Adjustment)	34.5	29.0	23.6	18.2	18.2
+	Specific Component	49.0	49.0	49.0	49.0	49.0
+	Constraint Component	0.0	0.0	0.0	0.0	0.0
=	**Projected Annual Default Cost Vector**	83.5	78.0	72.6	67.2	67.2

- The Net Spread if Bought on Val Date calculations are:

	Current Option Adjusted Spread (OAS) in bps	250
-	Investment Expenses used for Net Spread calculation	10
-	Projected Annual Default Cost Vector	
=	**Net Spread if Bought Asset at OAS on Val Date**	

83.5	78.0	72.6	67.2	67.2
156.5	162.0	167.4	172.8	172.8

- The Net Spreads equal those for the Benchmark

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Our 4th Example: A3 Low Risk Asset with OAS much < Benchmark Current Index

- Assumed OAS: 150 bps (vs. 201 Benchmark)
- For an asset with Rating = T, the Benchmark is T (A3)
- Generic Component is the same as the 1st Example
- Specific Component = Specific XS Spread x Y% where
  - Specific XS Spread = OAS – Benchmark Current Index
  - Y% is set = to X%, since OAS < Benchmark Current Index

			1	2	3	4	5
	Specific XS Spread=Asset OAS - Benchmark Current Index Spread	-51.0					
x	Y% = if(Specific XS Spread <0, X%, lookup from a prescribed table)	25%					
=	**Specific Component**		-12.8	-12.8	-12.8	-12.8	-12.8

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Our 4th Example (page 2 of 3)

- Constraint Component = larger of two calculations:
  - Adjustments to Satisfy the Minimum Default Cost Constraint, which requires that the asset's Net Spread if Bought on the Val Date is not greater than

    the asset's Gross Spread

    less a prescribed parameter Z% (assume 50%) x Baseline Default Cost for the asset's Rating

    less Investment Expenses
  - Adjustments to Satisfy the Maximum Net Spread Constraint , which requires that the asset's Net Spread if Bought on the Val Date is not greater than that for the Threshold

	Vector of Annual Default Cost Adjustments to Satisfy the Minimum Default Cost Constraint	0.0	0.0	0.0	3.7	3.7
	Vector of Annual Default Cost Adjustments to Satisfy the Maximum Net Spread Constraint	0.0	0.0	0.0	0.0	0.0
	Constraint Component	0.0	0.0	0.0	3.7	3.7

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Our 4th Example (page 3 of 3)

- Projected Annual Default Cost Vector calculations are:

		1	2	3	4	5
	Generic Component (i.e. 70 CTE Default Cost + Index XS Spread Adjustment)	34.5	29.0	23.6	18.2	18.2
+	Specific Component	-12.8	-12.8	-12.8	-12.8	-12.8
+	Constraint Component	0.0	0.0	0.0	3.7	3.7
=	**Projected Annual Default Cost Vector**	21.7	16.2	10.8	9.1	9.1

- The Net Spread if Bought on Val Date calculations are:

	Current Option Adjusted Spread (OAS) in bps	150
-	Investment Expenses used for Net Spread calculation	10
-	Projected Annual Default Cost Vector	
=	**Net Spread if Bought Asset at OAS on Val Date**	

21.7	16.2	10.8	9.1	9.1
118.3	123.8	129.2	130.9	130.9

- vs. Asset's Maximum Net Spread at Min Def Cost Constraint

Asset's Maximum Net Spread (to satisfy Z% Minimum Default Cost) if Bought on Val Date	130.9

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LRWG's Methodology Satisfies Life PBR Subgroup's Principles

- Perhaps of greatest importance to the Life PBR Subgroup is that for any asset, the "Net Spread if Bought at OAS on Val Date" is never higher than for the bond index asset rated at the Threshold. Below is a summary of the examples with a 11/30/2007 Val Date.

#	Moody's	OAS	Risk	Net Spread if Bought Asset at OAS on Val Date				
				1	2	3	4	5
1	A3	201	Low	156.5	162.0	167.4	172.8	172.8
2	A3	180	Low	140.8	146.3	151.7	157.1	157.1
3	Baa3	250	Low	156.5	162.0	167.4	172.8	172.8
4	A3	150	Low	118.3	123.8	129.2	130.9	130.9

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Default Costs Address Historical, Current Market, and Structural Factors

- Below is a summary of the Projected Annual Default Costs for the examples with a 11/30/2007 Val Date.

#	Moody's	OAS	Risk	Projected Annual Default Costs by Projection Year				
1	A3	201	Low	34.5	29.0	23.6	18.2	18.2
2	A3	180	Low	29.2	23.7	18.3	12.9	12.9
3	Baa3	250	Low	83.5	78.0	72.6	67.2	67.2
4	A3	150	Low	21.7	16.2	10.8	9.1	9.1

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Some Further AAA Research is Needed to Implement the Methodology

- Confirm that the Methodology works as intended for other Ratings/Risk/Spread permutations
- Optimal data sources for
  - Default data
  - Spread data
- Optimal interpolation/smoothing algorithms to calculate
  - Baseline Annual Default Costs
  - Current Index Spreads
  - 7y Mean Index Spreads

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Some LHATF Decisions are Needed to Implement the Methodology

- Prescribed values: for T, N, X%, Y% Table and Z%
- For Rating:
  - a formula for how to translate two or three Moody's/S&P/Fitch ratings, which sometimes differ by 1 or more notches, into one Rating
- Asset Class Structural Risk (Risk):
  - how to define Low Risk, Medium Risk and High Risk (or possible 4+ categories)
- Investment Expenses (Expenses):
  - Should the NAIC provide guidance or perhaps prescribe Expenses for different asset classes?

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Appendix

- Graphs of Baseline Annual Default Costs as of 2/2008
  - A3/A- and Stronger
  - Baa/BBB and Ba/BB
- Graph of Mean Index Gross Spreads as of 11/30/2007
- Graph of Current Index Gross Spreads as of 11/30/2007

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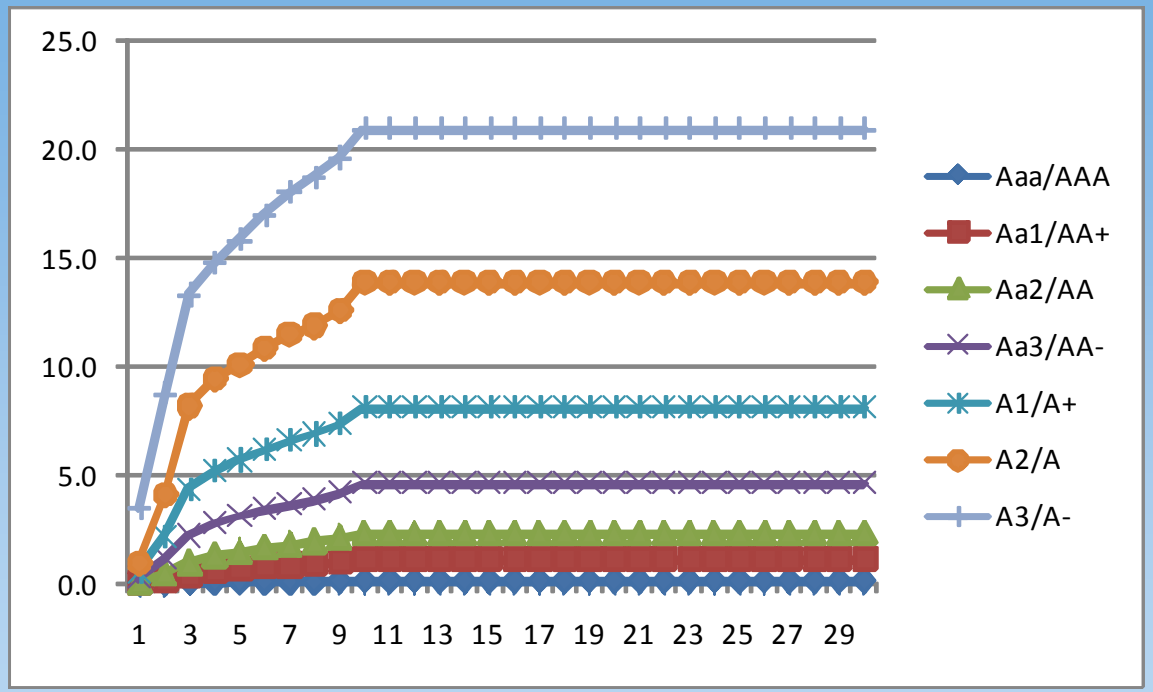
Baseline Annual Default Costs for Ratings of A3/A- or Stronger

- Baseline annual default costs shown below were estimated using estimates for 70 CTE recover rates and 70 CTE cumulative default rates based on Moody's data



- The above calculation results assume that every insurer owns every bond in the market and do not reflect the variability of results if it were assumed that every insurer owns S statistically independent bonds.

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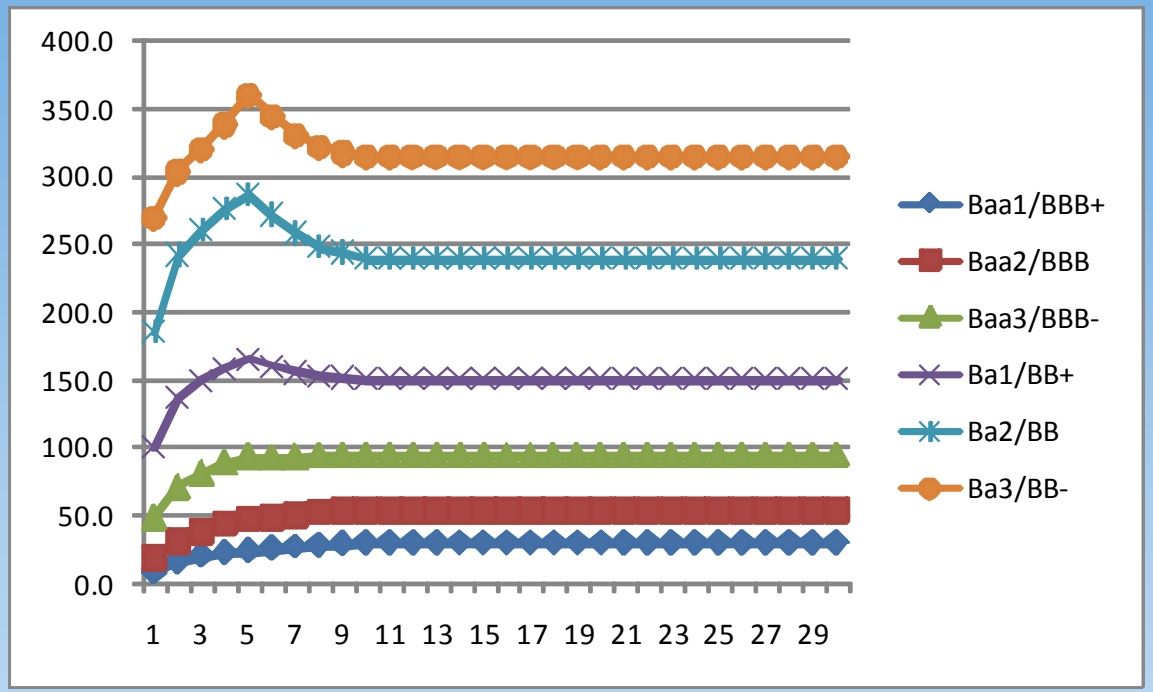
Baseline Annual Default Costs for Ratings between Baa1/BBB+ and Ba3/BB-

- Baseline annual default costs shown below were estimated using estimates for 70 CTE recover rates and 70 CTE cumulative default rates based on Moody's data



- The above calculation results assume that every insurer owns every bond in the market and do not reflect the variability of results if it were assumed that every insurer owns S statistically independent bonds.

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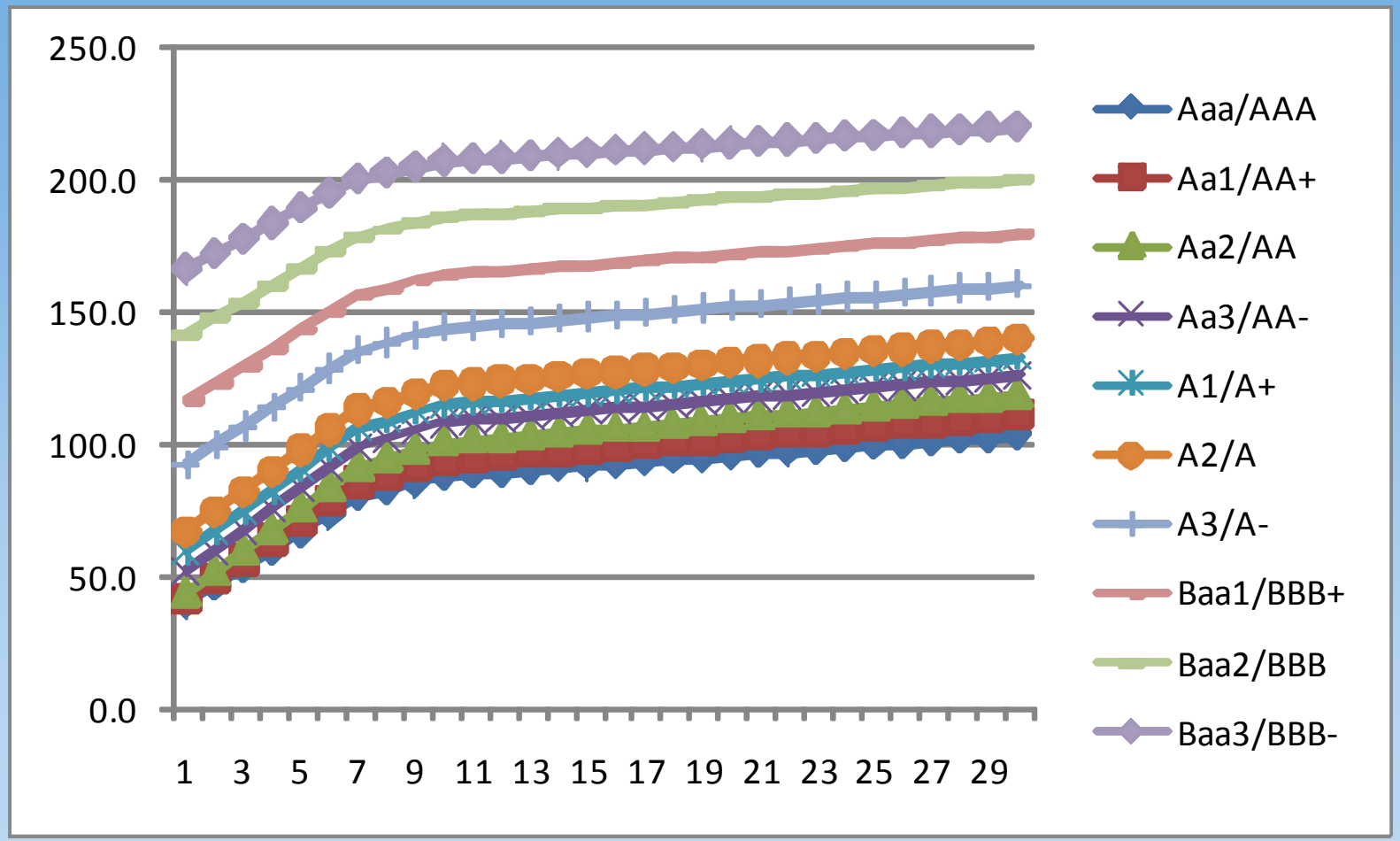
This Graphs shows 7y Mean Index Gross Spreads as of 11/30/2007



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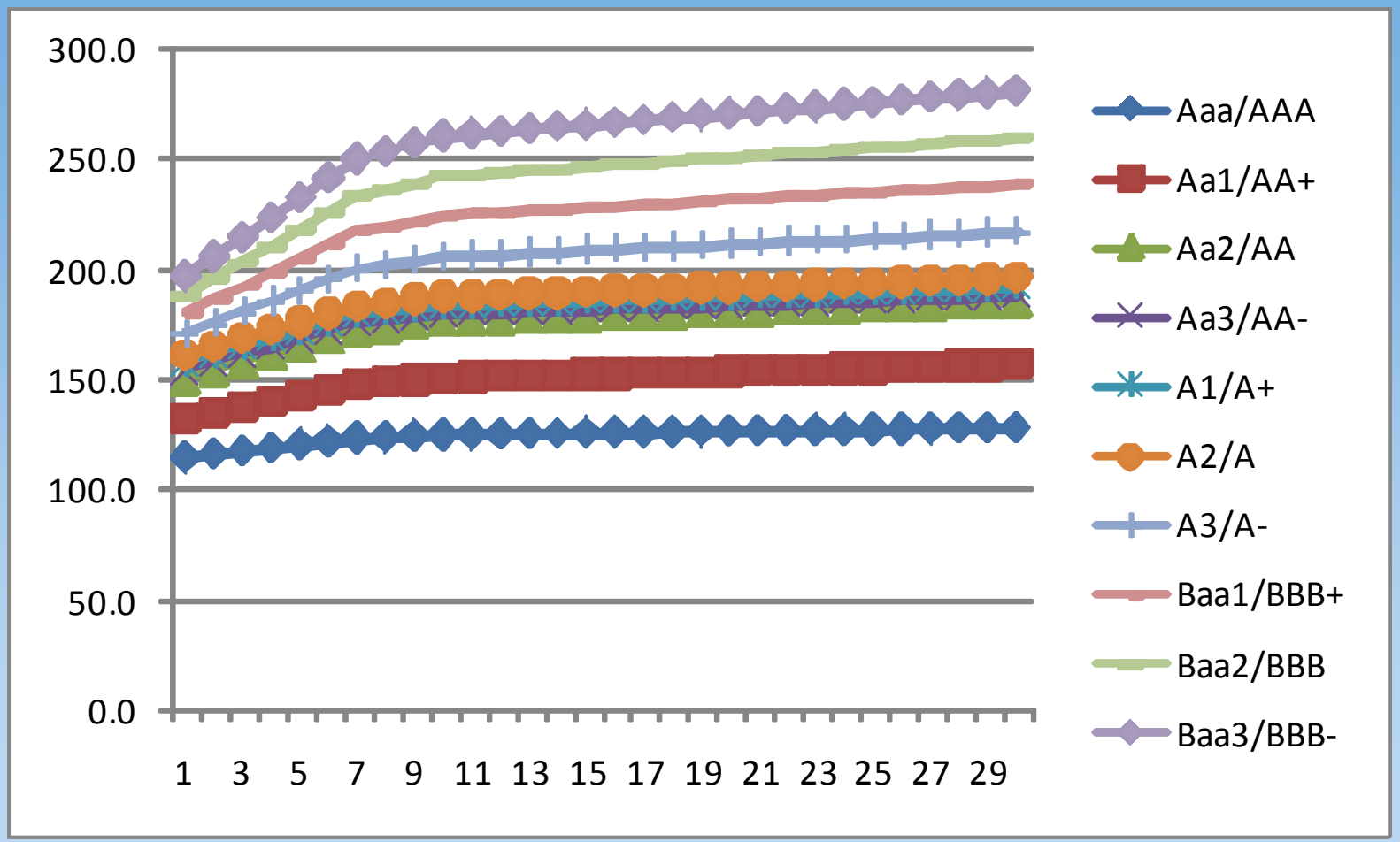
This Graph shows Current Index Gross Spreads as of 11/30/2007



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