

## A Proposed Methodology for Setting Prescribed Net Spreads on New Investments in VM-20

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LRWG Asset Subgroup Presentation  
December 2, 2008

## Purposes of Presentation

- Review general characteristics of asset spreads and the general uses of asset spreads in cash flow models
- Provide some cautions regarding prescription of spreads
- Summarize key current VM-20 provisions related to prescribed net spreads on new investments
- Present LRWG-proposed methodology for setting prescribed net spreads on new investments in VM-20, with illustrative results from historical data
- Present and discuss issues LHATF should consider in incorporating the methodology into VM-20



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## Asset Spread Basics

- Asset spreads are a measure to quantify the difference between the promised return of one fixed income asset and that of a benchmark fixed income asset of the same maturity.
  - New issuance--the spread is typically built into the coupon
  - Secondary market—the spread is built into the price
- For fixed rate assets, the benchmark often used is U.S. Treasuries, but the swap curve is also commonly used
- For floating rate assets, the benchmark is typically short-term LIBOR
- Level of spreads reflects, for non-callable corporate bonds
  - Future default expectations
  - Risk premium reflecting combination of relative liquidity, price volatility, and the market's relative risk preference between the actual asset and the benchmark asset (i.e. supply and demand)



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## Typical Uses of Asset Spreads in Generic Cash Flow Models

- Projection of yields on investment of cash flows (typically gross of provisions for defaults, expenses, embedded options, etc.)
- Projection of future LIBOR rates and swap rates used to
  - Reset coupon on floating rate assets and liabilities
  - Determine future cash flows or cash settlements related to derivatives
  - Determine company's cost of short-term borrowing
- Establishment of benchmark inside the model for determining market prices of assets sold to meet modeled cash demands
- Influence competitor rate actions in the model



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## Economic Effect of Spread Levels in Modeling

- High spreads increase projected yields on investments but depress market prices when assets need to be sold (and raise borrowing costs)
- When assets are shorter than liabilities (or future deposits are expected), low spreads are generally conservative
- When assets are longer than liabilities, high spreads are generally conservative

## Cautions regarding prescribed approaches to asset spreads

- Prescribed spreads will not capture all risks across product types, particularly if they are biased to address the risks of any particular product type or investment strategy.
- The methodology proposed herein to implement the regulator decision to prescribe spreads has been developed to apply to life insurance, particularly those products with long-term guarantees. The Academy has not studied the appropriateness of such an approach for other products such as fixed annuities and health insurance.
- Prescribed spreads should be viewed as a temporary step. As stochastic approaches to spreads become more widely available, they should be considered as a replacement or alternative. Required spread calibration points might help regulator comfort.

## Key Current VM-20 Provisions Related to Reinvestment Spreads—Some Terminology

- Clarifications of terminology used in VM-20
- “Reinvestment assets” refers to new investments purchased in the model with either new inflows or with cash flows from existing assets
- “Reinvestment spreads” refers to either gross or net asset spreads on reinvestment assets
- “Gross spread” refers to the spread before consideration of default costs and investment expenses
- “Net spread” refers to the spread remaining after consideration of default costs and investment expenses
- “Option-adjusted spread” is found in VM-20 and in general use and refers to the gross spread after deducting the market’s expectation of the cost of embedded options. How option costs are handled in “net spreads” for VM-20 is still an open question.

## Key Current VM-20 Provisions Related to Reinvestment Spreads (cont.)

- Paragraph C.6.6.1
  - *Model any purchase of general account reinvestment assets with available net asset and liability cash flows in a manner that is representative of and consistent with the company’s investment policy for each model segment.*
- Paragraph C.6.6.2.a
  - *For fixed income investments including derivative asset programs associated with these assets, at purchase of each asset, determine an appropriate combination of market price and future contractual cash flow provisions for which the resulting purchase yield appropriately reflects the then-current Treasury interest rate curve plus the prescribed net spread requirements in E.5.3.*

## Key Current VM-20 Provisions Related to Reinvestment Spreads (cont.)

- Paragraph E.5.3.1
  - *The prescribed net spread on reinvestment assets shall be 4% of the appropriate Treasury spot path plus 0.25%.*
  - *Drafting note: Further research and analysis is in process to determine these prescribed net spreads.*
- Based on current treasury rates, this implies about a 40 basis point spread, net of defaults and expenses, for a 10-year asset.
- The LRWG indicated to the Life PBR Subgroup that it was working on a more principle-based approach to setting this requirement (leading to this presentation)



## Proposed Methodology for Setting Prescribed Net Reinvestment Spreads for Publicly-Traded Corporate Bonds



## Topics Covered

- Overview of Proposed Approach
- Gross Spreads
- Default Rates and Recovery Rates
- Annual Default Costs
- Net Spreads
- Observations



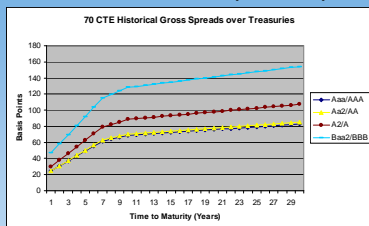
## Overview of Proposed Approach

- The original purposes of this research were to
  - Develop a relatively principle-based methodology based on actual historical market data to implement the Life PBR Subgroup's decision to prescribe net reinvestment spreads
  - Show how the choice of "4% of Treasuries + 25 bp" compares to even a very conservative measurement of net spreads based on actual historical data
  - Consider how the calculations can be updated regularly to ensure that prescribed assumptions continue to reflect recent data
- The general methodology shown here can be adapted to various levels of conservatism. However, in order to achieve the second purpose noted above, we chose for this presentation to apply a 70 CTE metric (or equivalent) to each key component of the net spread calculation. This 70 CTE metric is normally the level of conservatism to be applied in aggregate over the joint distribution of risk factors in VM-20. In the summary slide, we also show the mean results.
- Components of the "70 CTE Net Spreads"
  - A) Calculate 70 CTE gross spreads (uses 30% lowest daily spreads)
  - B) Calculate 70 CTE default costs using 70 CTE default rates and 70 CTE recovery rates (uses equivalent of 30% highest annual default costs)
  - C) Define 70 CTE net spreads as A - B - prescribed investment expense



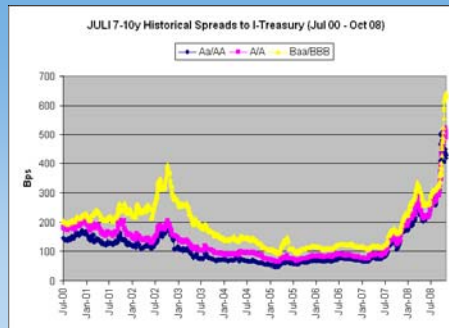
### Gross Spreads can be Calculated from Data Obtained from an Investment Bank

- 70 CTE gross spreads over Treasuries at different maturities and credit ratings can be calculated based on several years of daily historical data



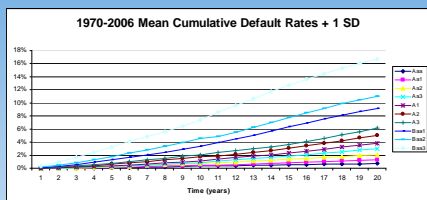
- For the above illustrative graph the underlying data used is from the JPMorgan US Liquid Index (JULI). The underlying data has been interpolated and smoothed. Averaging period: 12/1/2000 – 11/30/2007.

### Range of Spreads in JULI Index



### Default Rates and Recovery Rates can be Calculated based on Rating Agency Data

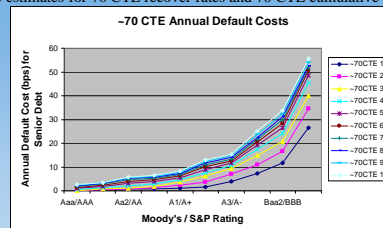
- 70 CTE cumulative default rates by rating and maturity as shown in the graph below were estimated using 1970-2006 Moody's data that was interpolated and smoothed



- 70 CTE recovery rates can be estimated using Moody's Ultimate Recovery Database. Using data from 1987-2006, the mean recovery rate less one standard deviation was 27%

### Annual Default Costs can be found using Recovery Rates and Cumulative Default Rates

- 70 CTE annual default costs shown below by rating and maturity were estimated using the prior slide estimates for 70 CTE recover rates and 70 CTE cumulative default rates



- 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 N statistically independent bonds.

## Slide 13

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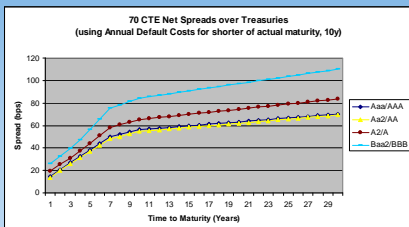
**G7** Is this a publicly available index?

Alan got permission from JPM to use this data, including for the current Academy purposes. There would need to be discussions with any investment bank about recurring use of data like this. They might see it as good publicity however.

Gary.Falde, 11/25/2008

## Net Spreads can be set equal to Gross Spreads – Annual Default Costs – Investment Expenses

- 70 CTE net spreads below assume that investment expenses are 10 bps and that 10-year maturity annual default costs are also applicable for bonds with maturities > 10 years



## Summary of mean and 70 CTE net spreads and implied margin for 10-year bonds

11/30/2000-11/30/2007		Aaa/AAA	Aa2/AA	A2/A	Baa2/BBB
Maturity					
<b>Mean</b>					
Gross Spread	10	88.4	101.1	122.6	185.8
Default Cost		0.2	3.7	9.9	26.1
Inv Expense		10.0	10.0	10.0	10.0
Net Spread		78.2	87.4	102.7	149.7
<b>70 CTE</b>					
Gross Spread	10	68.9	70.3	88.4	128.2
Default Cost		2.7	5.6	13.0	33.8
Inv Expense		10.0	10.0	10.0	10.0
Net Spread		56.2	54.7	65.4	84.4
<b>Margin</b>					
Gross Spread	10	19.5	30.8	34.2	57.6
Default Cost		2.5	1.9	3.2	7.7
Inv Expense		0.0	0.0	0.0	0.0
Net Spread		22.0	32.7	37.4	65.3
Data Sources	See Appendix				

## Observations

- Net spreads at the 70 CTE level for 10-year corporates ranged from 55-85 basis points, with all rating classes exceeding 40 bp
- A and BBB 10-year corporates had 70 CTE net spreads of approximately 65 bp and 85 bp respectively
- Maturities of 5 years and greater were at or above 40 bp for all rating classes
- Net spreads vary significantly by rating
- Net spreads vary even more significantly by maturity, with long bonds exhibiting the highest amounts
- Implied margin at 70 CTE ranged from 22-65 basis points for 10-year bonds
- Current very high spread environment was ignored

## Discussion Items to Consider and LRWG Recommendations

## Technical Decisions on Data Sources and Calculation Methodology

- Data sources
  - Gross spreads: JPMorgan or another investment bank
  - Cumulative default rates: Moody's or another rating agency
  - Recovery rates: Moody's or another rating agency
- Time horizon
  - The illustrative example used 7 years for gross spreads, 28 years for cumulative default rates and 20 years for recovery rates
  - For gross spreads, would choose between rolling n-years or look back to database inception
  - For default data, might need to stay with time periods used in rating agency publications
- Algorithms for interpolation and smoothing
  - Gross spreads: should be monotonic by maturity and rating
  - Cumulative default rates: should be monotonic by maturity and rating
- Other calculation methodology decisions would include
  - How to estimate 70 CTE using mean and standard deviation statistics if the raw data is not available for explicit 70 CTE calculations
  - Process for performing calculations and disseminating results.



## How often should prescribed net spreads be updated? What averaging periods to use?

- Update frequency--LRWG Recommendation
  - Keep fixed net spreads initially, but require review by NAIC or Academy every 3-5 years according to similar methodology
  - Other alternatives considered:
    - Update annually based on the defined methodology (subject to availability of new underlying data)
    - Keep fixed net spreads indefinitely
- Update of averaging period (LRWG still considering preferred approach)—some options
  - Moving average of a set number of prior years, e.g. 7.
  - Fixed starting point, increasing averaging period up to a max of n years
  - Can (and should) gross spread and default costs use same period?



## Should spreads vary by quality rating and maturity?

- Vary by quality rating—LRWG Recommendation
  - Yes, consistent with company's modeled mix of new investments. Need to consider what "investment grade" spread to use if company would normally model some allocation to below investment grade bonds.
  - Other alternatives considered:
    - Use a single quality rating that represents the industry average for corporate bond holdings. May require notching, e.g., A- or BBB+.
    - Whether "yes" or "no," a prescribed approach to determining LIBOR and swap rates should be developed in order to appropriately model floating rate assets and derivatives.
- Vary by maturity—LRWG Recommendation
  - Yes, the graphs show significant differences by maturity. Certain maturities could be grouped if desirable.



## Level of implied margin in prescribed net spreads?

- What level of implied margin is appropriate?
  - Setting each component separately at 70 CTE may result in duplicative margins
  - Setting gross spreads skewed toward the low end and default costs toward the high end, while conservative, is inconsistent with the normal positive correlation between the two variables
  - Products with more frequent future premiums should statistically achieve an average spread closer to the mean
  - LRWG recommends consideration be given to setting the assumption somewhere between the mean and the 70 CTE, or perhaps to developing an empirical "net spread" distribution from which 70 CTE would be calculated.



## Should there be adjustments for other asset types in company's investment strategy?

- Prescribed adjustments to spreads for other assets, such as private placements and commercial mortgages—LRWG Recommendation
  - Yes. However, any adjustments should be modest and take into account the relative expenses and risks vs. public corporate bonds.
  - Other alternatives considered—companies just assume for modeling purposes that they invest in all public corporate bonds
- Prescribed adjustments to spreads for securities with optionality?
  - Yes. If such securities are modeled, e.g., callable bonds or residential MBS, an option premium should be added to the spread to pay for the added interest rate risk. This would only make sense if the added interest rate risk is actually modeled along the scenarios.

## Should net spreads reflect starting conditions for a temporary period?

- LRWG Recommendation
  - Net spreads should reflect starting gross spreads at the valuation date and grade in to ultimate prescribed spreads over a short grading period. May be difficult to prescribe default cost piece of net spread during initial grading period. May need to allow some judgment for the first n years of the projection.
  - Other alternatives considered:
    - Level prescribed net spreads at all durations

## Should the gross spread, default cost, and expense components be broken out?

- LRWG Recommendation-- Yes
  - The separate components will be available anyway
  - This will enable appropriate market value calculations based on gross spreads rather than net spreads
  - Provides improved transparency and structural consistency with existing assets

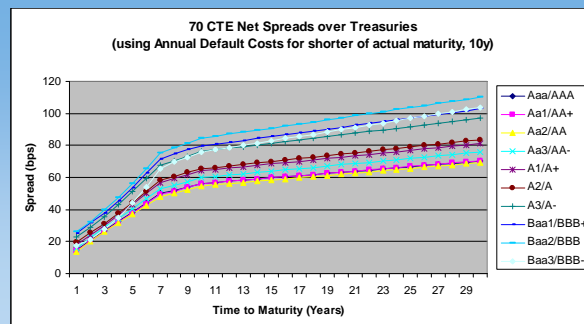
## Appendix—Additional Information



## Data Sources

- **Gross Spreads:**
  - The underlying data used was 11/30/2000-11/30/2007 daily observations from the JPMorgan US Liquid Index (JULI).
  - The underlying data has been interpolated and smoothed.
- **Default Costs (Default Rates):**
  - 70 CTE cumulative default rates by rating and maturity were estimated using 1970-2006 Moody's mean and standard deviation data from a 2007-04-04 Moody's Special Comment on Confidence Intervals for Corporate Default Rates
  - The underlying data has been interpolated and smoothed.
- **Default Costs (Recovery Rates):**
  - 70 CTE recovery rates were estimated using 1987-2006 Moody's mean and standard deviation data from a 2007-04-12 Moody's Special Comment on Moody's Ultimate Recovery Database.

## 70 CTE Net Spreads with +/- Notches



## Mean Net Spreads with +/- Notches

