

Evaluating the Effectiveness of Internal Risk Rating Systems

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Standard & Poor's Risk Solutions

What do we offer...

- **Services**

- Custom Modeling
- **Rating Scale ServicesSM**
- Expert Judgment or Qualitative Credit Assessment
- Validation
- Stress Testing

- **Products**

- Quantitative Models: *Probability of Default, Rating Estimation and LGD Models*
- Portfolio Risk Management
- Risk Management Platform

- **Data**

- *Corporate and Structured Finance Default and Ratings Data, Recovery Data, and Data Consortia*

Standard & Poor's Risk Solutions

Agenda

- **Rating Scale Services**
 - Mapping – developing substantive links between multiple ratings scales (internal or external)
 - Rating Scale Refinement – further defining or adding granularity to an existing ratings scale
 - Dual Scale Development – converting traditional EL systems to best practice PD & LGD systems
- **Case Study Example**
- **Question & Answers**
- **Contact Info**

Mapping

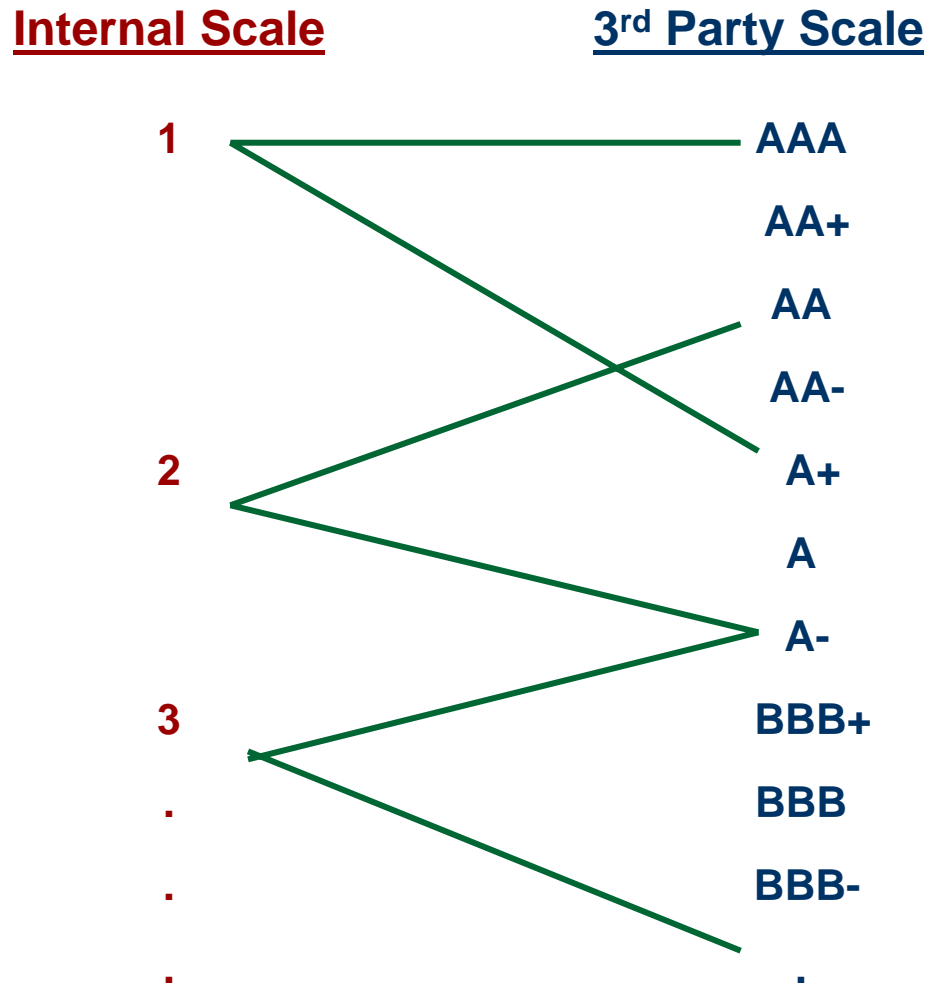
What is a Rating Scale Mapping?

- The translation of one scale of measurement to another scale of measurement.
- The relationship can be simple...

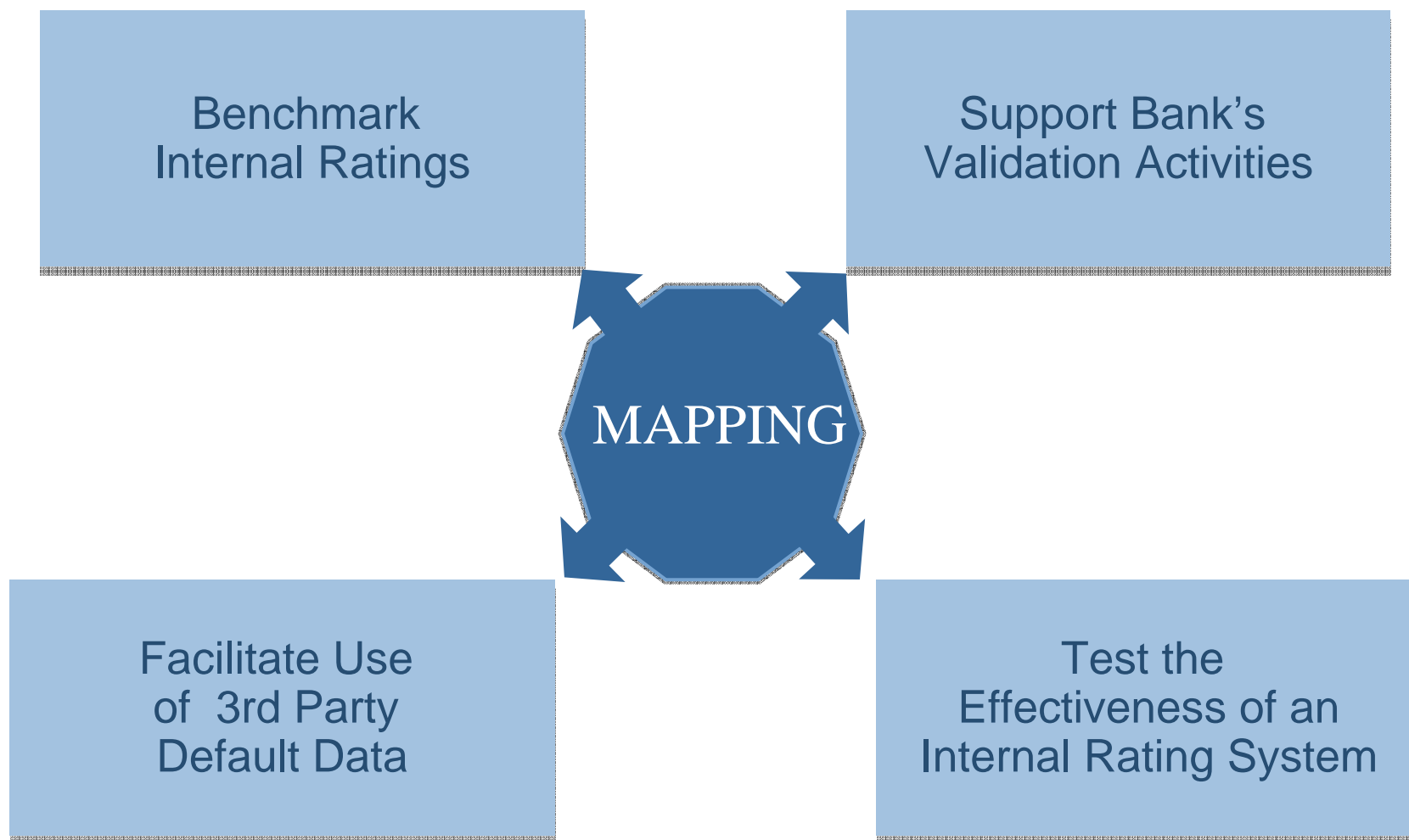
<u>Internal Scale</u>		<u>3rd Party Scale</u>
1	—————	AAA
2	—————	AA
3	—————	A
▪		▪
▪		▪
▪		▪

What is a Rating Scale Mapping?

- ...or the relationship can be more complex...



Rating Scale Services - Why Map?



Mapping Methodology

Step 1:

Qualitative Assessment of Internal Rating System

- High Level Conceptual Soundness Review to Understand Alignment of Client and S&P methodologies.

Step 2:

Determine Appropriate Benchmarks

- For example, External and/or Internal Default Rates

Step 3:

Quantitative Analysis of Rating Scale output

Compare:

- Default statistics
- Ratings' transition behavior
- Commonly-rated entities PLUS "Credit Estimates"

Step 4:

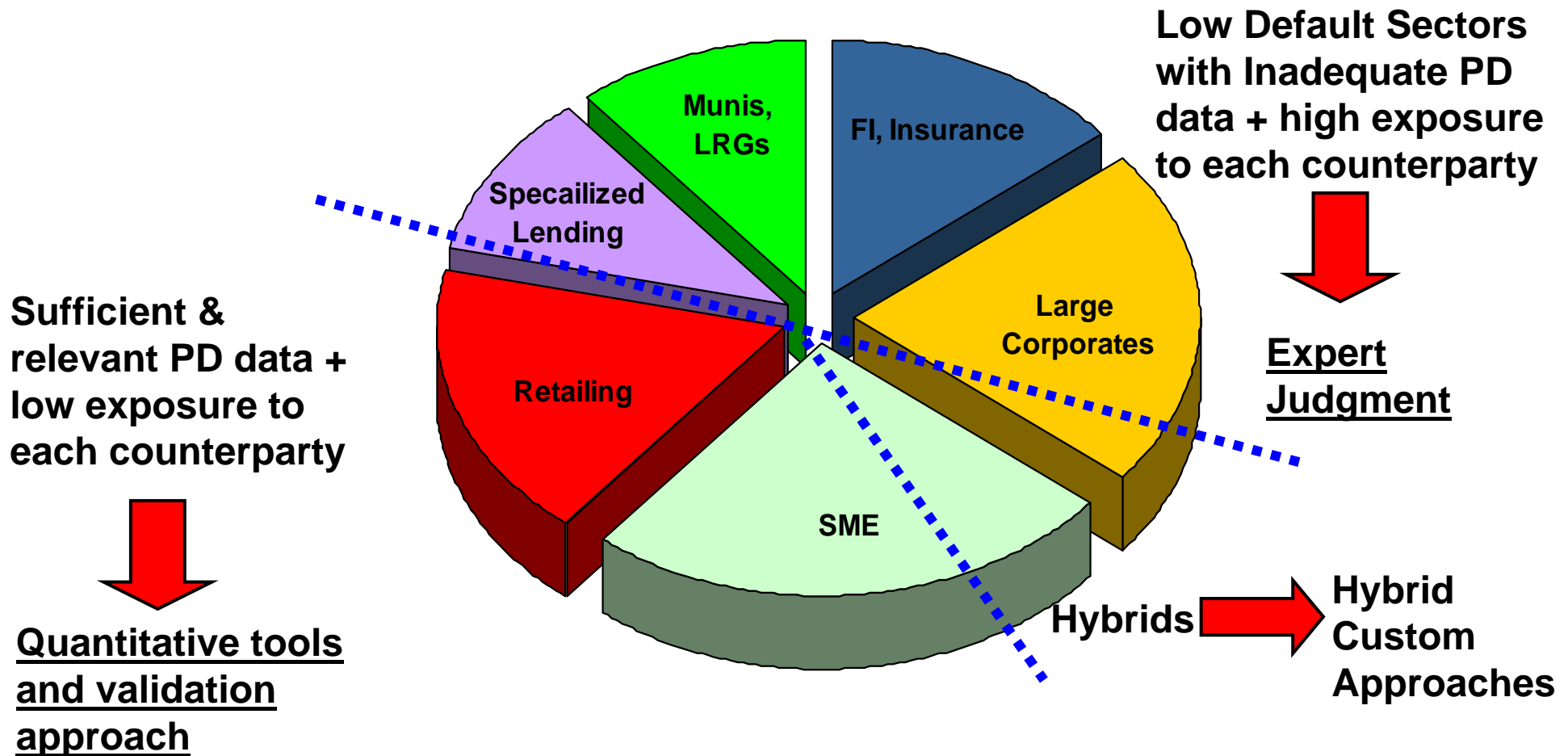
Deliverables - Final Report

- Final Report with findings, recommendation of proposed mapping.

Standard & Poor's Risk Solutions often uses a combination of these Step 3 methodologies, depending on the situation/available information

Step 2: Key's to Successful Mapping Methodology:

- a. Identify appropriate benchmarks for specific portfolio segments
- b. Develop realistic mapping between benchmark and internal rating scale.



Step 3: Sampling Technique

Goal: Select a stratified sample sufficiently large so that logical inferences can be made about the entire portfolio

- Divide the portfolio into “buckets” based on rating category, size and industry
- Pick a minimum number of observations per populated bucket depending on portfolio size
- Selection of “Credit Estimates” on the obligors in the sample if inconsistencies are apparent in a particular bucket, augment the sample with additional borrowers from that bucket

Step 3: Analysis of Mapping Results

Analyze the “fit” of the mapping

- **The Conceptual Soundness review provides a backdrop for this analysis**
 - Helps identify areas that could cause mapping inconsistencies
- **Analysis of outliers**
 - Look for patterns in outliers
 - Can uncover issues with consistency of the application of the internal rating system
 - Can help identify causes of any inconsistencies

Step 3: Mapping

Bank Rating History Data

1982	1987	1992	1997	2002
1983	1988	1993	1998	2003
1984	1989	1994	1999	2004
1985	1990	1995	2000	2005
1986	1991	1996	2001	2006

S&P Rating History Data

1982	1987	1992	1997	2002
1983	1988	1993	1998	2003
1984	1989	1994	1999	2004
1985	1990	1995	2000	2005
1986	1991	1996	2001	2006

Bank Rating	Default Rate	Map	S&P Rating	Default Rate
2	?		AAA	
3	?		AA	
4	?		A	
5	?		BBB	
6	?		BB	
7	?		B	
8	?		CCC	

Step 3: Compare Historical Default Experience

- Compare historical internal default data to 3rd party default data

<u>Internal Rating</u>	Internal 5-year Probability of <u>Default(%)</u>	3 rd Party 5-year Probability of <u>Default(%)</u>	<u>3rd Party Rating</u>
1	0.05	0.10	AAA
2	0.35	0.27	AA
3	0.52	0.62	A
4	4.40	3.20	BBB
5	18.60	12.34	BB
6	35.00	26.59	B
7	60.30	50.46	CCC

Step 3: Bank XYZ – Commonly Rated Entities

Internal scale	# of credits	Standard & Poor's rating																					
		D	SD	CC	CCC-	CCC	CCC+	B-	B	B+	BB-	BB	BB+	BBB-	BBB	BBB+	A-	A	A+	AA-	AA	AA+	AAA
1	5																						5
2	0																						
3	3																				3		
4	11																		1	4	4		2
5	10																1	1	6	2			
6	22														1	1	17	3					
7	18														3	9	6						
8	21													2	13	6							
9	39												1	30	6	1						1	
10	27											1	20	5	1								
11	13											1	6	3	2	1							
12	11										3	1	4	1			1	1					
13	5									2	2	1											
14	4										1	2	1										
15	6								1			2	2	1									
16	1							1															
17	0																						
18	2											2											
19	1											1											
20	1								1														
Totals	200	0	0	0	0	0	0	1	2	2	8	8	12	27	40	25	19	25	10	6	8	0	7

Note: The shaded diagonal reflects the mapping established with commonly-rated entities.

Step 3: Bank XYZ – Credit Estimates

Internal scale	# of credits	Standard & Poor's rating																						
		D	SD	CC	CCC-	CCC	CCC+	B-	B	B+	BB-	BB	BB+	BBB-	BBB	BBB+	A-	A	A+	AA-	AA	AA+	AAA	
1	1					1																		
2	0																							
3	4					1	1			1													1	
4	2						1			1														
5	4						1						1			1		1			1			
6	9						2	3	1	1				1		1		1						
7	9							2		2	1	1				1	2							
8	4							2							1	1								
9	18					1	3	3	1	1	1		4	1	1	1	1							
10	12						1	3	3	1	2		2											
11	9						1	2	2	1	1	1	1											
12	17			1		1	3	4	1	4	1	1				1								
13	3							3																
14	4						2		1	1														
15	8					1	3	1	3															
16	3					2			1															
17	0																							
18	2	1							1															
19	2					2																		
20	9	2	1	1	1	2	2																	
Totals	120	3	1	2	1	11	10	19	20	11	9	6	2	7	3	4	4	4	2	1	0	0	0	1

Note: The shaded diagonal reflects the mapping established with commonly-rated entities.

Mapping Challenges

- **To effectively map one rating scale against another, the scales must be intended to measure the same characteristics**
- **Some of the Key Issues ...**
 - What is the definition of default?
 - What timeframe is covered?
 - Do ratings measure PD, LGD, or some combination?
 - Is it an obligor v. facility rating?
- **Differences can make mapping results difficult to interpret**

Mapping Challenges

Data Limitations

- In many cases, existing client datasets are not large enough, or well distributed enough, to permit a mapping with an appropriate degree of confidence.
- In these cases, Standard and Poor's Risk Solutions can augment the number of commonly-rated entities by selecting a representative sample of companies in the portfolio and provide an estimate of credit quality based on the Standard and Poor's scale.
- We can also compare your historical ratings performance on default and ratings transitions.

Mapping

Benefits of Mapping

- Independent identification of the strengths and weaknesses of your internal rating scale.
- Mapping a financial institution's internal risk ratings to external ratings is a transparent methodology which can be supported by a rating agency's historical ratings data, and is consistent with industry best practices.
- Mapping can be used on a “best estimate” basis, to track the closest or best relationship between different rating scales or rating scales vs. default rates.

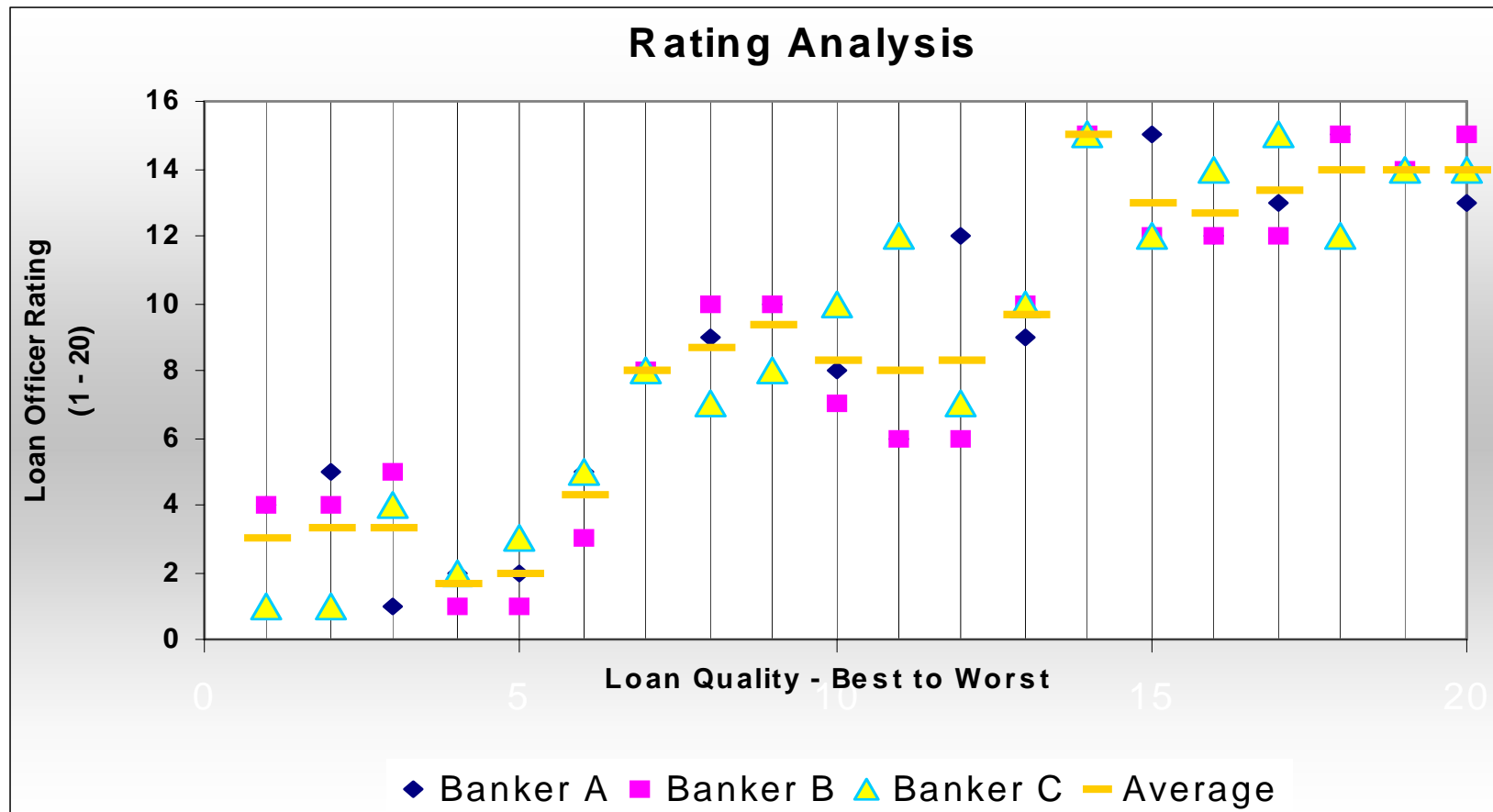
Risk Rating Refinement

Risk Rating Refinement

- A risk rating refinement should help financial institutions enhance their risk rating systems, utilizing a comprehensive approach that creates a much more robust framework for measuring credit risk.
 - Seek ratings consistency across lines of businesses
 - Get the expertise and tools to develop a master risk rating scale that reflects the total risk of your portfolio
 - Identify and determine whether there are too few risk grades which makes it difficult to differentiate risk or too many risk grades which makes assigning risk grades to subjective and time consuming
 - Design a risk rating scale that optimizes the number of grades within the portfolio to ensure that the default risk is appropriately differentiated
 - Don't try to do it all alone

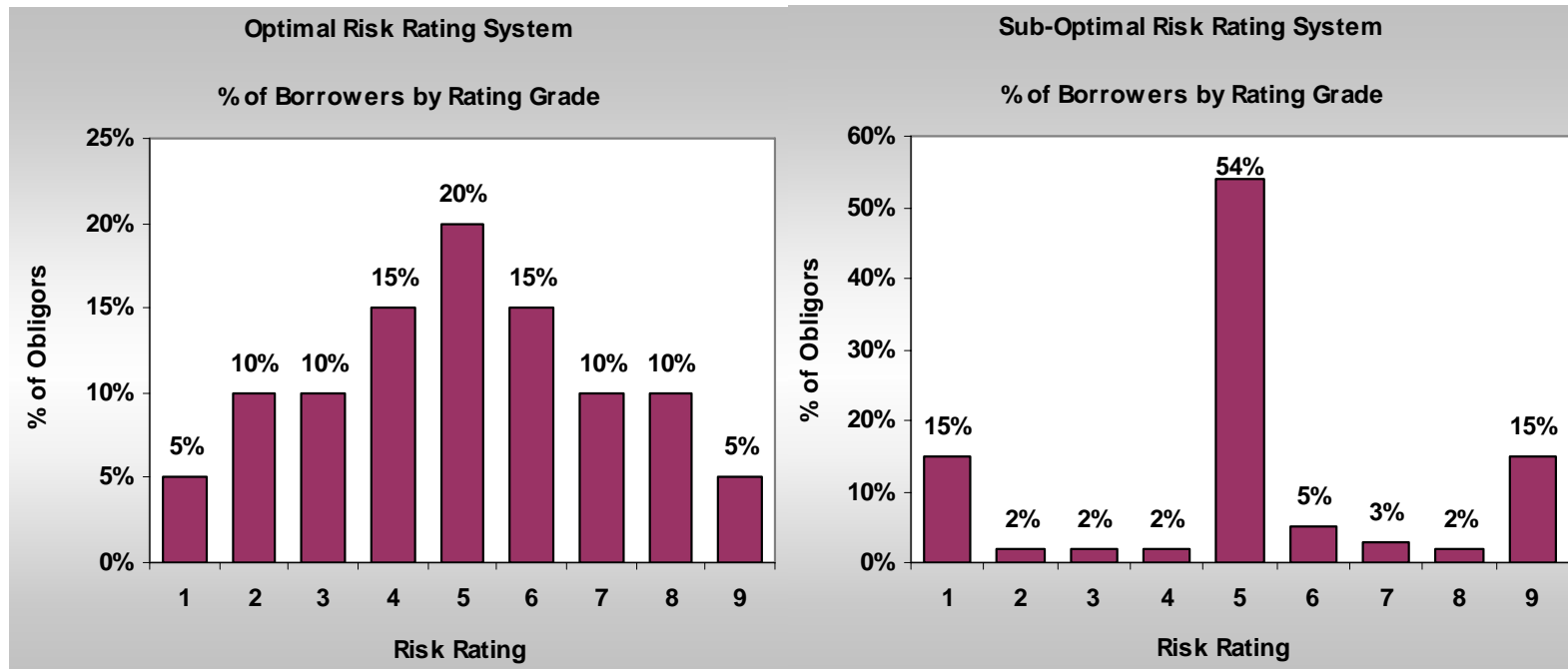
Risk Rating Refinement

Consistency: Does the rating scale produce similar results across loan officers?



Risk Rating Refinement

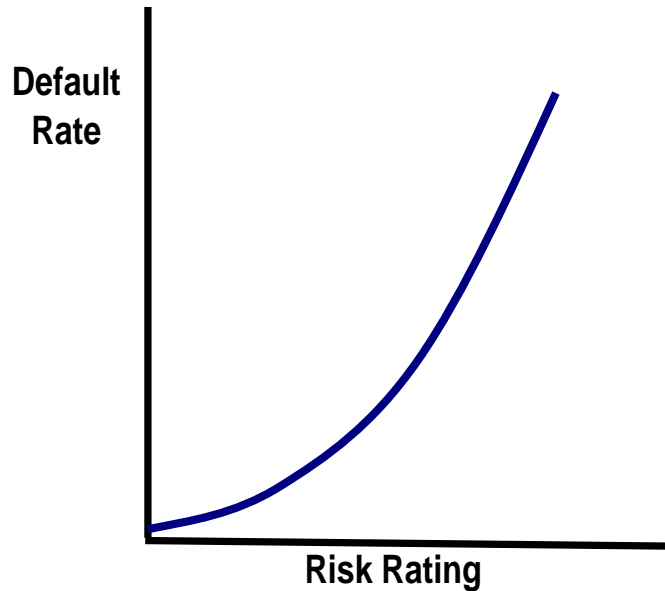
Granularity – does the rating scale provide a good distribution across customers?



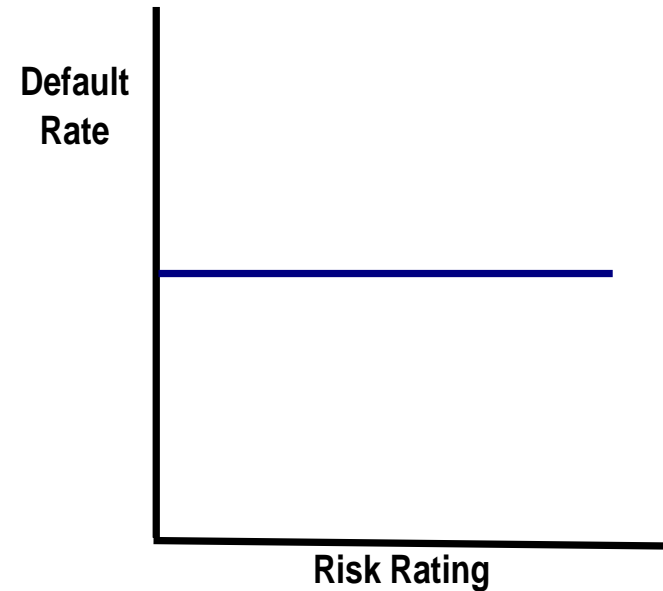
Risk Rating Refinement

Differentiation – is the rating scale able to differentiate credit quality of customers?

Effective Risk Rating System



Non-Effective Risk Rating System



Risk Rating Refinement

Use Rating Scale Services to calibrate your probabilities of default using Standard & Poor's experience...

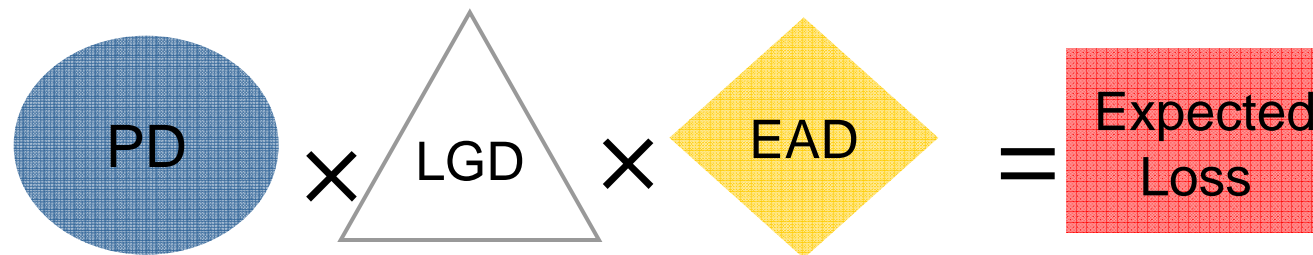
Former Master Scale			New Master Scale	
Old Rating Class	Probability of Default (PD)		Probability of Default (PD)	New Rating Class
			0.015%	1
			0.03%	2
			0.06%	3
1	0.13%	→	0.11%	4
2	0.26%	→	0.20%	5
			0.35%	6
3	0.65%	→	0.60%	7
4	1.58%	→	1.05%	8
			1.85%	9
5	4.69%	→	3.25%	10
			5.70%	11
6	11.21%	→	10.00%	12
7	26.03%	→	17.50%	13
8	42.77%	→	30.00%	14

Dual Rating Scales

Types of Rating Scales

- **Single Scale System**

- Assign a single rating to each obligor that reflects relative credit risk (EL)
- Ratings incorporate credit quality of the obligor as well as recovery prospects



Dual Rating Scales

According to Basel II NPR 9-06...

To differentiate among degrees of credit risk, a bank must be able to make meaningful and consistent distinctions among credit exposures along two dimensions—default risk and loss severity in the event of a default.

Types of Rating Scales

- **Dual Scale System**

- Obligor Rating

- Reflects the likelihood that the obligor will default on any of its obligations (PD)

- Facility Rating

- Reflects loss severity
 - For Advanced IRB, must be associated with Loss Given Default (LGD) values directly reflect LGD estimates
 - For non-Advanced IRB banks, facility rating may reflect Expected Loss (EL)

- For Advanced IRB Banks, the obligor and facility ratings must be calibrated to PD and LGD respectively

Single vs. Dual Scale System

	Strengths	Weaknesses
Single Scale System	<ul style="list-style-type: none">• Easy to implement• Matches with banks' focus on ultimate recovery rather than default	<ul style="list-style-type: none">• Doesn't make distinctions between default and recovery risk• For corporate exposures, need to have dual scale to implement IRB approach under Basel II
Dual Scale System	<ul style="list-style-type: none">• Forces separation of default and recovery risk• Provides mechanism to help track historical default and recovery experience• Complies with requirements for IRB approach	<ul style="list-style-type: none">• More difficult to implement• Implementation of a dual scale may result in downgrading ratings

Dual Rating Scales

A two-dimensional approach supersedes traditional ratings scales, which have tended to measure risk according to a single scale – albeit one that combines PD and LGD considerations in different proportion.

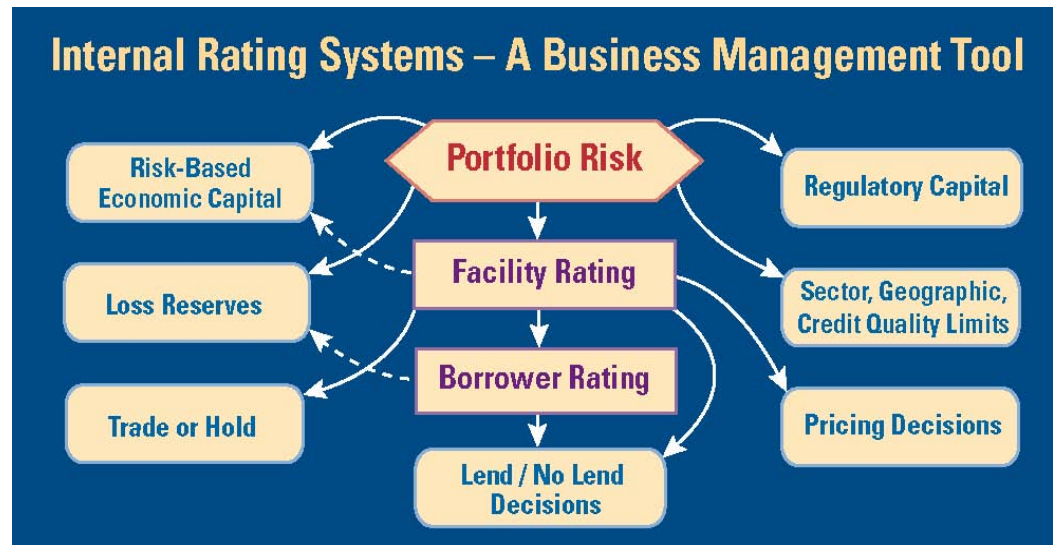
Obligor Rating

Probability of Default (PD)	Rating Class
0.015%	1
0.03%	2
0.06%	3
0.11%	4
0.20%	5
0.35%	6
0.60%	7
1.05%	8
1.85%	9
3.25%	10

Facility Rating Scale

Grade	Recovery Range
1+	100% of Principal
1	90 - 100% of Principal
2	70 - 90% of Principal
3	50 - 70% of Principal
4	30 - 50% of Principal
5	10 - 30% of Principal
6	0 - 10% of Principal

Dual Rating Scales



Benefits of a Dual Rating System

- A dual rating system improves consistency among raters that enable factors that drive PD and LGD to be evaluated more objectively and tested for relevance.
- Best practice is the ability to assess and quantify these separate risk elements and to use that knowledge to inform a whole host of risk management decisions from limit-setting and pricing decisions to portfolio management and economic capital requirements.

Commercial Bank Example

Mapping Example

Mapping a Bank's New Internal Rating System to S&P's Rating Scale

A Global Commercial Bank hired S&P Risk Solutions to map its internal ratings into comparable S&P Ratings.

The client wanted a consistent, transparent global risk rating system that can be substantiated with S&P's historical data

Mapping Example

Conceptual Review

- The Bank implemented a new internal rating system for Mid-cap and large Corporates a few years ago.
- The new rating system includes both quantitative and qualitative elements and reportedly has a higher level of performance than the previous rating system used by the bank.
- The definition of default used by the bank was in line with banking regulation.

In our view, the structure and methodology of the new internal rating system was in line with market practices. At the same time the reported performance statistics compare favorably with those of peer banks.

Mapping Example

The Bank's New Rating Scale

Bank's Master Scale includes 15 rating categories for performing companies.

New Rating	Bank Rating
0.015%	1
0.030%	2
0.060%	3
0.110%	4
0.200%	5
0.350%	6
0.600%	7
1.050%	8
1.850%	9
3.250%	10
5.700%	11
10.000%	12
17.500%	13
30.000%	14
40.000%	15

A naïve mapping based purely on the expected PD by the Bank's rating class compared to S&P's historic default rates looked like the table below:

Bank Rating	Proposed Mapping
1	AA-
2	A+
3	A-
4	BBB+
5	BBB
6	BBB-
7	BB+
8	BB
9	BB-
10	B+
11	B
12	B-
13	CCC
14	CCC
15	CCC

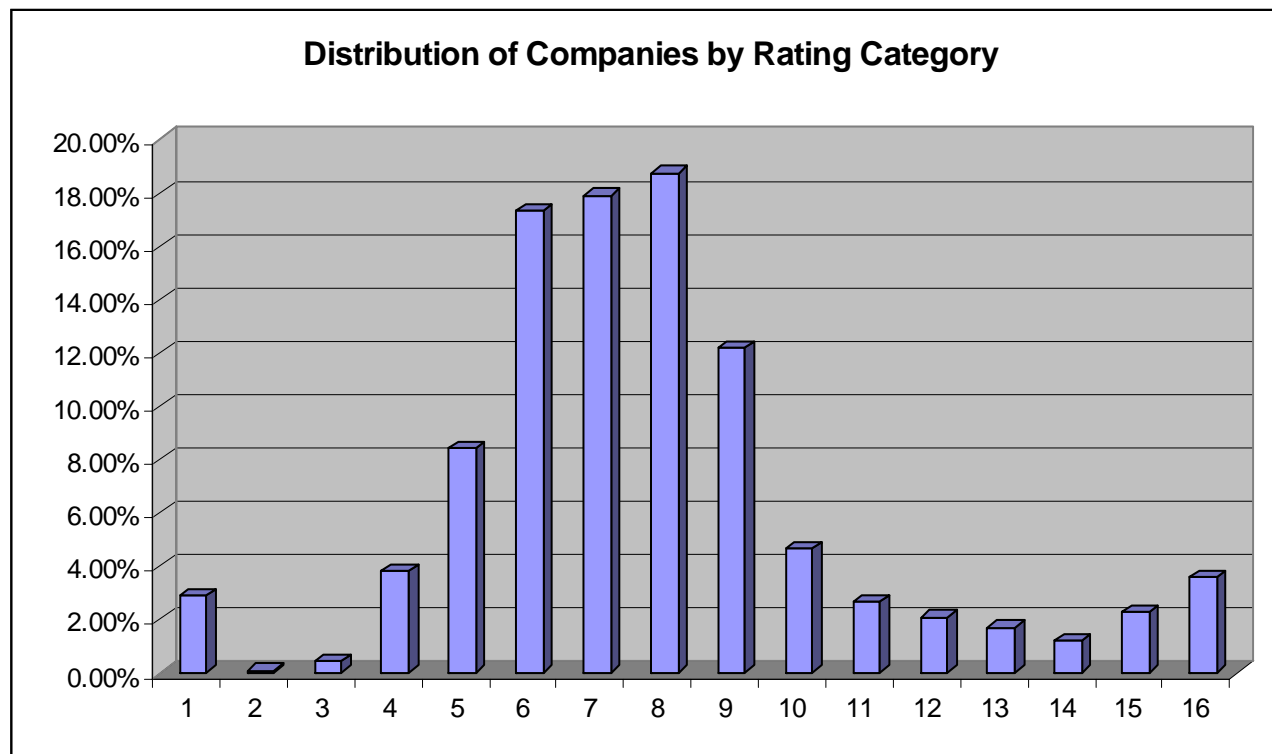
Mapping Example - Phase I

- Standard & Poor's Risk Solutions reviewed the pool of companies provided the Bank as the basis for a mapping of the bank's New Internal Rating System to Standard & Poor's Rating Scale.
- Given the size of the companies in the pool (mainly large corporates), we used Standard & Poor's CreditModel as a benchmark for the bank's internal ratings.
- CreditModel's scores were based on the limited financial data provided by the bank.

Mapping Example

Sample Provided

The Bank provided Standard & Poor's with a pool of 5,300 companies with a limited set of financial figures and the corresponding internal score assigned by the bank. The composition of this portfolio was as follows:



Mapping Example

Analysis of the companies in the pool

- Risk Solutions scored around 4,000 companies in the pool provided by the Bank using Standard & Poor's CreditModel.
- Some companies (around 20%) were not scored as the industry in which they operate was not specifically covered by CreditModel.

Mapping Example

Proposed Mapping

Based on the comparative analysis of the Bank's internal ratings using CreditModel's scores as a benchmark, Risk Solutions generated a proposed mapping for this pool of companies. This mapping was further enhanced by the analysis of the expected PDs by rating category.

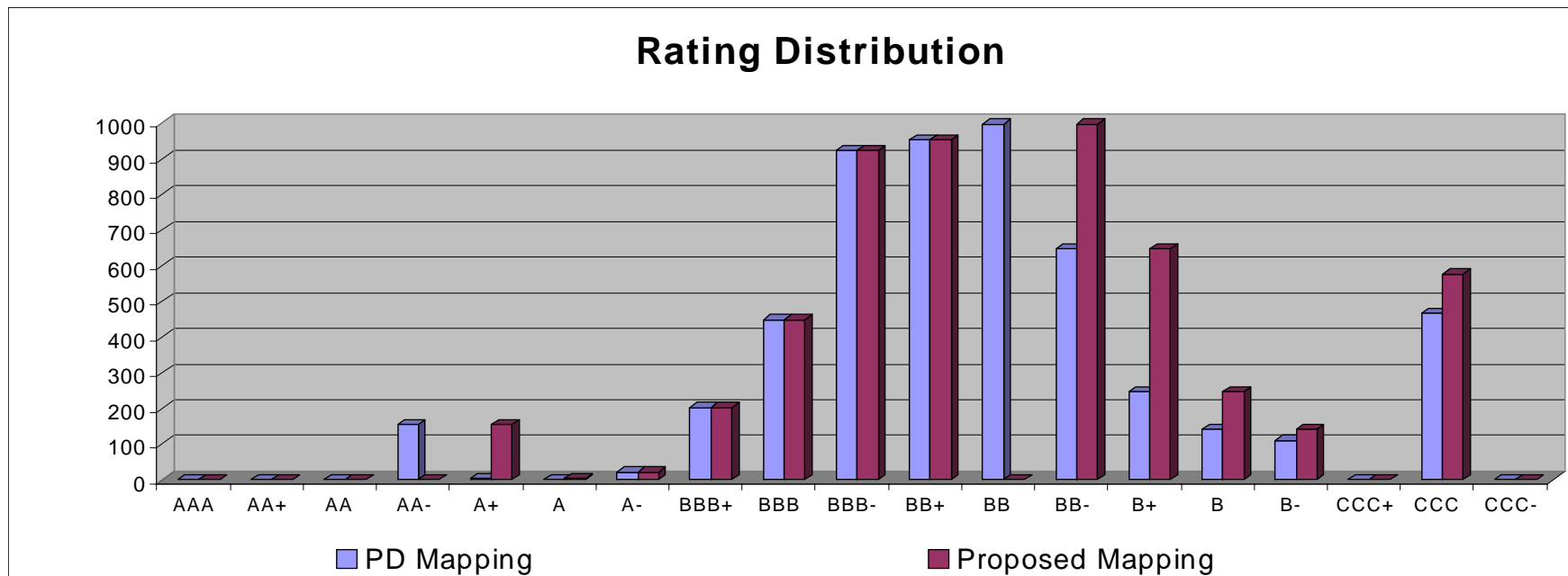
Bank Rating	Proposed Mapping	Default Rate
1	AA-	0.02%
2	A+	0.05%
3	A-	0.60%
4	BBB+	0.15%
5	BBB	0.23%
6	BBB-	0.31%
7	BB+	0.52%
8	BB	0.81%
9	BB-	1.44%
10	B+	2.53%
11	B	6.27%
12	B-	9.06%
13	CCC	15.45%
14	CCC	22.55%
15	CCC	25.59%

Mapping Example

Proposed Mapping

Based on the proposed mapping, we looked at the distribution of mapped ratings in the pool presented by the bank.

- As a benchmark, we compared this distribution with the distribution that would result from the naïve mapping presented earlier.

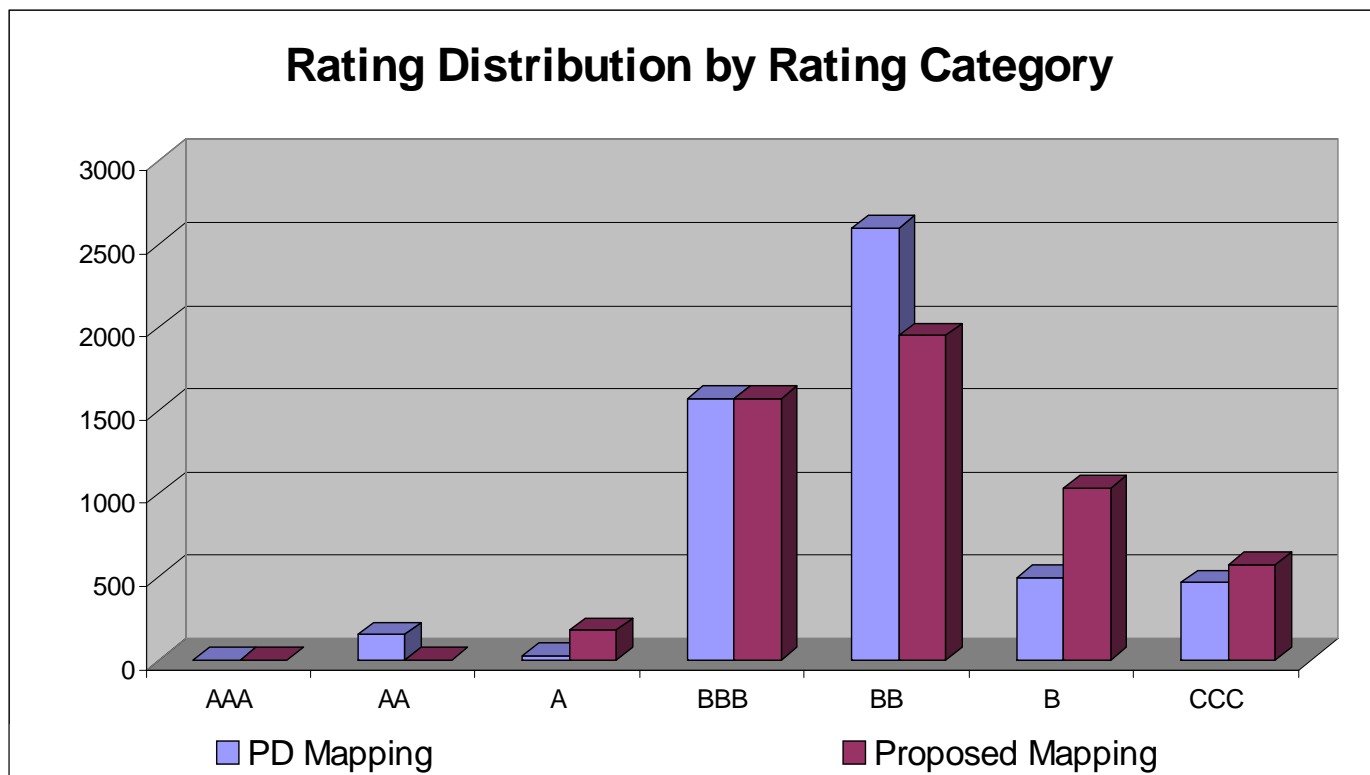


Note that the proposed mapping is more conservative.

Mapping Example

Proposed Mapping

For illustrative purposes, the graph below shows the different distribution (with the Proposed vs. Naïve mapping) by rating category.



Again, the proposed mapping is more conservative.

Mapping Example - Conclusion

- Mapping the bank's internal risk ratings to external ratings is a transparent methodology, supported by the rating agency's historical ratings data, and is consistent with industry best practices.
- The optimal mapping methodology between internal risk grades and Standard & Poor's risk grades was obtained by matching the rating definitions of the bank and Standard & Poor's and then testing the mapping with the bank's data.

Q & A

Contact & Replay Information

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For a replay of this webinar, visit:

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