Moody's Analytics

Kenya Bankers Association

Better Faster Decisions

East Africa Webinar Series: Risk Based Loan Pricing

July, 2020

Moody's ANALYTICS

KENYA BANKERS ASSOCIATION

Better Faster Decisions

East Africa Webinar Series

Episode 1
Thursday, 2 July

12:00 BST | 14:00 EAT

Navigating Credit Risk & Expected Losses: COVID-19

Episode 2
Thursday, 9 July

12:00 BST | 14:00 EAT

Classification and Stage Allocation of Financial Instruments Under IFRS 9

Episode 3
Thursday, 16 July

12:00 BST | 14:00 EAT

Risk Based Loan Pricing

Speakers

Jared Osoro – Director, Research and Policy **Kenya Bankers Association**

Waseem Nisar – Solution Specialist, **Moody’s Analytics**

Nash Subedar – Relationship Management, **Moody’s Analytics**

Metin Epozdemir, CFA – Risk and Finance, **Moody’s Analytics**

Agenda

1) The current pricing framework adopted by Financial Institutions in Kenya
2) Best practices in Risk Based Loan Pricing
3) IFRS 9 impact on the loan pricing methods
4) Example of a loan pricing model practical application
5) Q&A

KENYA BANKERS ASSOCIATION

COVID-19

Insights for the Banking Industry

WEBINAR

The Essence of Risk Based Pricing

- It is at the core of the broad market-based economic policy thrust in place from the early 1990s.
  - Markets determine prices based on demand and supply dynamics;
  - Regulatory framework ensures that price determination is underpinned by competition dynamics that do not disadvantage consumers:
- Prices reveal market conduct.
  - The setting up of agencies such as Competition Authority of Kenya (CAK) in 2010 is informed by the need to promote and protect "effective competition in markets and preventing misleading market conduct".
  - The subject of market power and competition generally, and market dominance and competition in particular is at the core of price setting behavior – this was the motivation of a two-phased study by CAK in 2014 on the Kenyan banking industry (see report: https://www.cak.go.ke/sites/default/files/Banking%20Sector%20Phase%20I%20Market%20Inquiry-min.pdf)
  - Findings:

    (a) Kenyan banking industry is generally competitive

    (b) The widely held concern that high lending rates and high interest spread are as a result of the market power of dominant banks has not been substantiated by this study and is probably misplaced.

    (c) The regulation of lending rates, or interest rate spread is thus not justified by competitive concerns or the market structure.

Credit Pricing – The Popular Implicit Assumption

- The interest rate capping law of August 2016 that lasted until November 2019:
  - Implicitly assumed that cost is the more binding constraint than access; indeed assumed that the two aspects can be disentangled – ‘*manage the cost and access will take care of itself*’,
  - Implicitly embeds as assumption of uniformity of the risks of borrowers,
  - Implicitly assumed away the linkages between the various financial markets:
    - The link between the money market (whose price is regulated through the capping) and the foreign exchange market (freely floating), and the two markets to the equities market.
  - Implicitly ignored the adverse implications on the CBK’s monetary policy conduct, oblivious of the fact that the monetary policy framework is price-based (not quantity based).

The Banking Industry Charter

- Effective from 1st September 2018.
- Risk-based pricing is one of the pillars.
- The others are:
  - Adoption of customer-centric business models by banks;
  - Enhanced transparency and information disclosure; (e.g. the APR);
  - Entrenching an ethical culture in banks – doing the right thing.
- The intention of the charter:
  - Promote fairness in lending;
  - Embed transparency in business practices;
  - Promote financial access (enhanced usage);
  - Promote financial literacy.

Perspectives on Risks – Returns Pricing Mechanism in the Kenya

- Conventionally, a positive risk-return relationship is to be expected. However, in Kenya the relationship between bank returns and risk indicate mixed results (based on a KBA study published in 2017 (working Paper No 21):- https://www.kba.co.ke/downloads/Working%20Paper%2021.pdf).
  - When risk is measured as the volatility of returns, it has a positive and significant effect on commercial banks' returns.
  - When risk is measured as the moving average probability of default, risk has a negative though insignificant effect on bank returns.
- It would be expected that sectors that exhibit relatively higher risk profiles attract premiums on the respective lending rates but this doesn't seem to be the case.
- Past returns have a significant and positive effect on the returns that a bank will receive in the current period.
  - This suggests that banks may be relying on previous returns to determine the price of their loans.
- Sectoral credit expansion affected by returns and risk. But, while the pricing effect is not as sensitive to the risk profile of the respective sectors, credit allocation to the sectors is highly risk sensitive.
- If risk assessment leans more to credit allocation than to risk pricing, and credit information sharing (CIS) mechanism leans more to credit decision than credit pricing, then the market needs to start developing systems of transiting to where pricing meaningfully reveals business conduct.

Traditional Credit Pricing Methodology

Cost + Profit Approach

Borrower

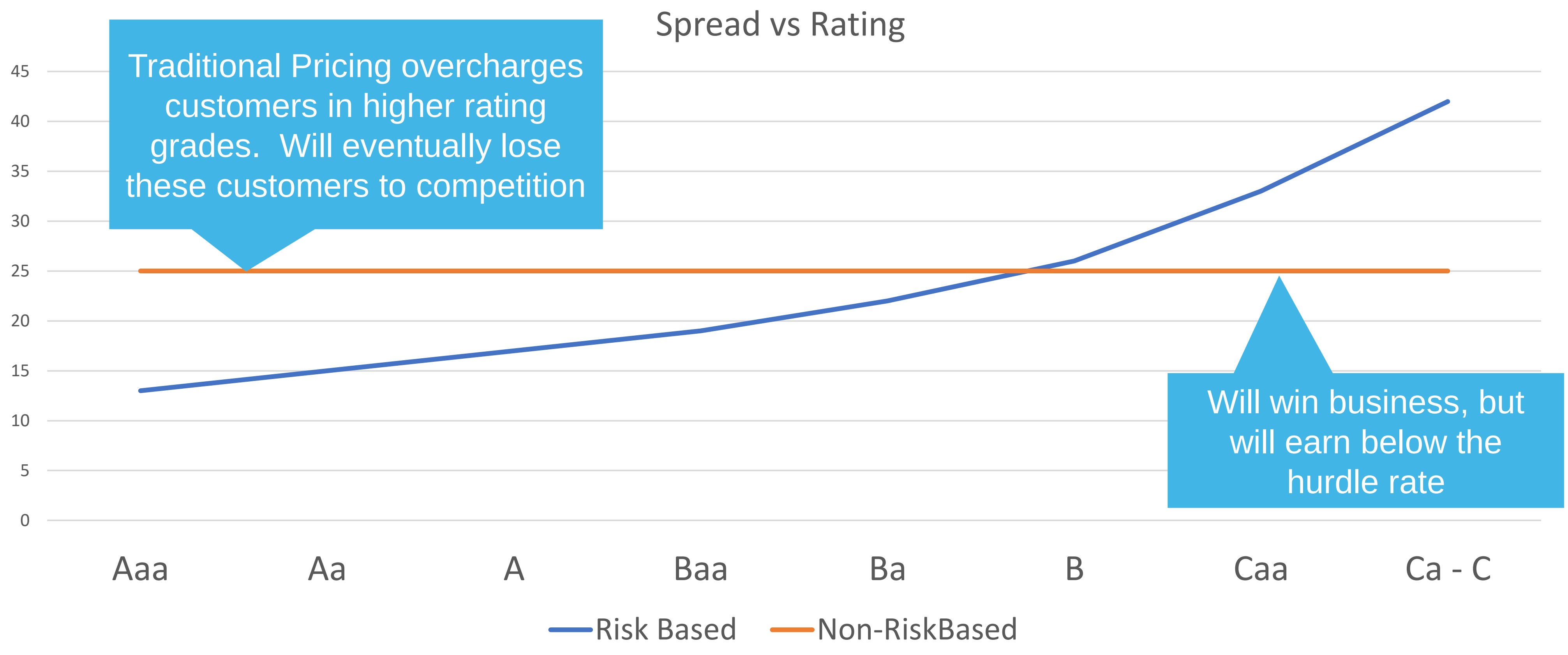
- Financials
- Business Plans
- Management
- Industry trends
- …

Facility

- Base + Spread:
  - Tenor
  - Security
  - Funding / Capital Costs
  - Overhead
  - Fees
  - Competition
  - …

Final Price

Traditional vs Risk Based Credit Pricing



Risk-Based Pricing Accounts for Volatility

Additional Margin: Represents the target return on equity, i.e. the new rate of return expected by shareholders. Guided by economic fundamentals and the long term sustainability of the institution.

Capital Cost: The product of hurdle rate and capital. Capital is **<u>the unexpected loss</u>** that an institution may suffer

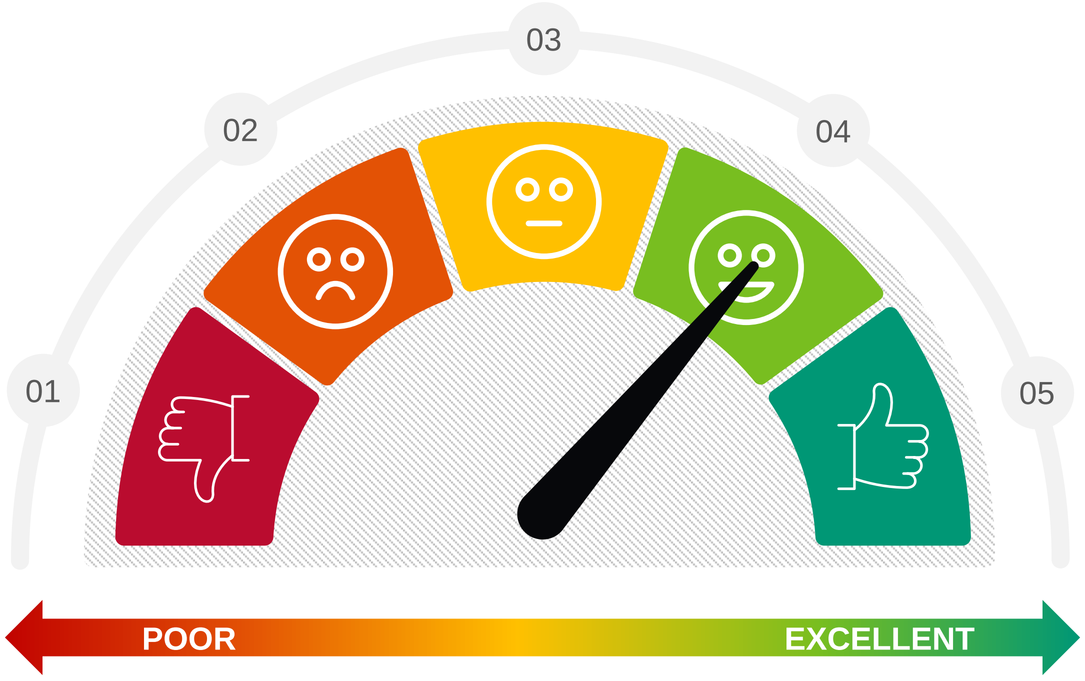
Expected Loss: The expected loss that institution will suffer. The product of Probability of Default, Loss Given Default, and Exposure of Default

Operating Costs: Includes indirect cost/overheads and statutory costs such as deposit insurance premium, case reserve requirements, opportunity cost of holding liquid assets in excess of minimum requirements, and the cost of holding non-earning assets (Cost ratio * Income)

Funding Costs: Represents the interest expense related to the monthly average volume of deposits and other funds reported to the regulator on a monthly basis

Metrics for Performance and Value

Accounting for Risk in Loan Pricing



ROA **Return on Assets**

Net Income (after LL provision) / Book Value of Asset
Used historically to measure investment performance, does not account for risk.

ROE **Return on Equity**

Net Income (after LL provision) / Equity Capital
Hard to determine it for each loan / business line, does not account for risk.

EVA **Economic Value Added**

Expected Return – Cost of Capital
Only excess return over cost of capital is considered; risk is not considered

RORAC **Return on Risk Adjusted Capital**

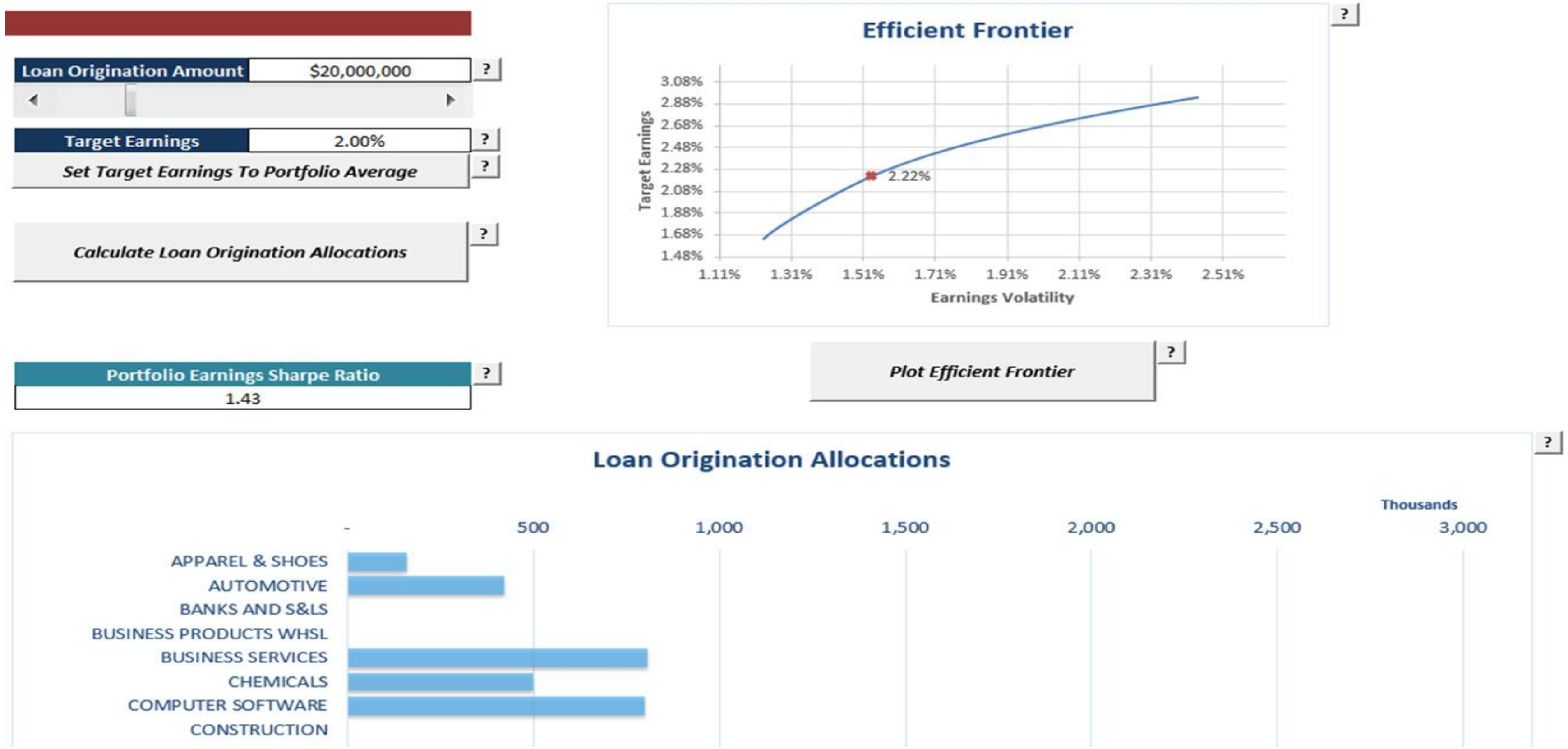
Total Return / Allocated Capital
Compares Gross Return to Risk Capital. Can be used to choose between investments with similar return / cost allocation, but different risk profile.

RAROC **Risk Adjusted Return on Capital**

Total Return – EL – FTP – Op. Cost / Allocated Capital
Most widely used measure, supports risk-return trade-off and bank-level portfolio optimization. Used to choose between alternative investments as it considers both risk and return

Impact of IFRS 9 on Loan Pricing

Risk-Reward Trade off



- » Expected Losses/Returns only tell half the story
- » Risk in terms of variance or volatility of returns is a key parameter in asset allocation and pricing decisions
- » Introduction of IFRS9 brings returns volatility in center stage
- » Stage allocation criteria, the state of the credit cycle and the macroeconomic outlook are all expected to impact on the losses volatility

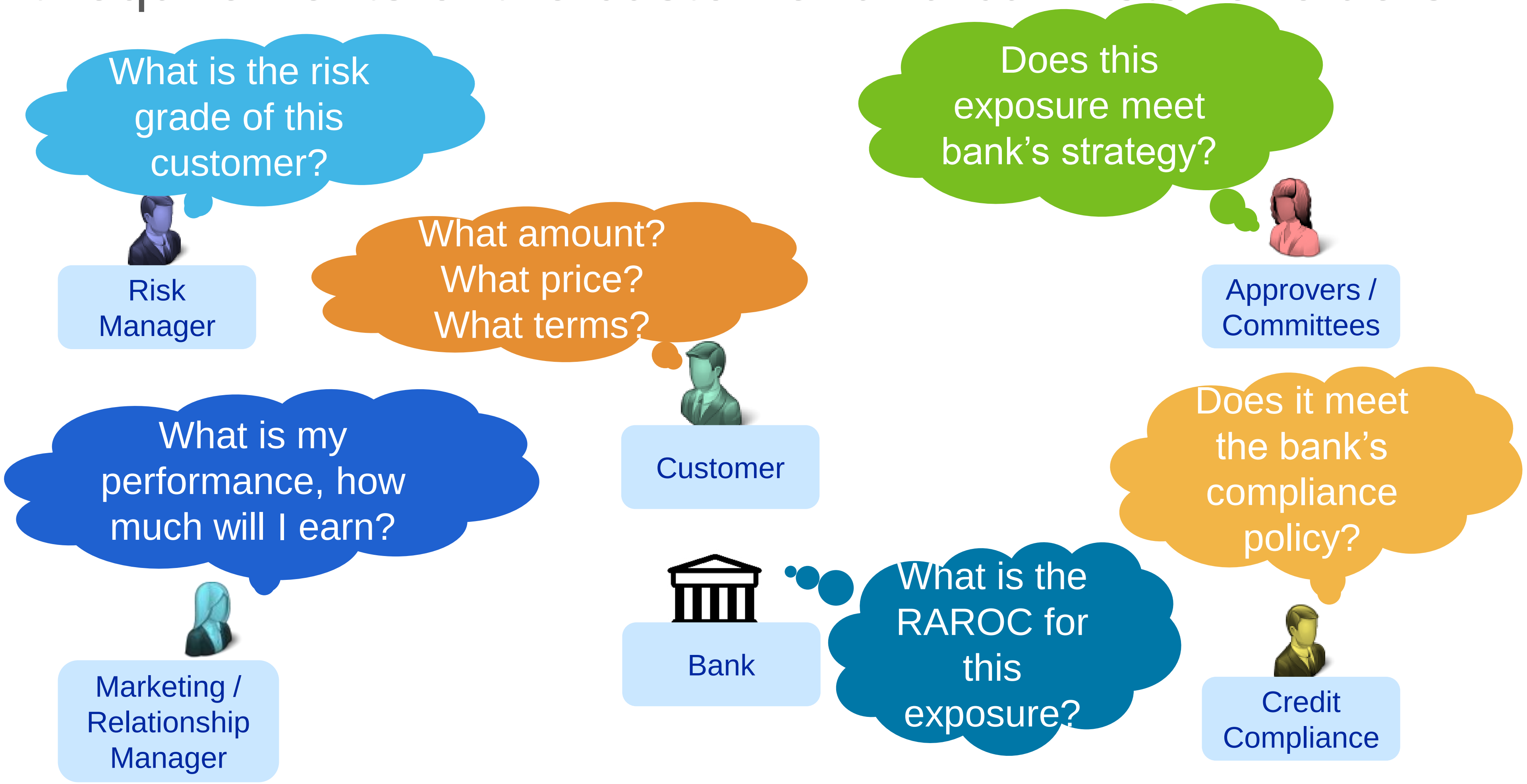
Best Practice Requires Consistent Measurements

Essential to Manage Strategy, Performance and Risk

- Common measurement standard leading to common language
- Common risk ‘currency’, interpretation as capital

Pieces of the Puzzle

Different requirements of the customer and bank stakeholders



Risk Based Pricing Framework

Inform all the stakeholders well in time

This customer's in a high risk grade

Risk Manager

I know upfront the amount, price and terms I can get!!

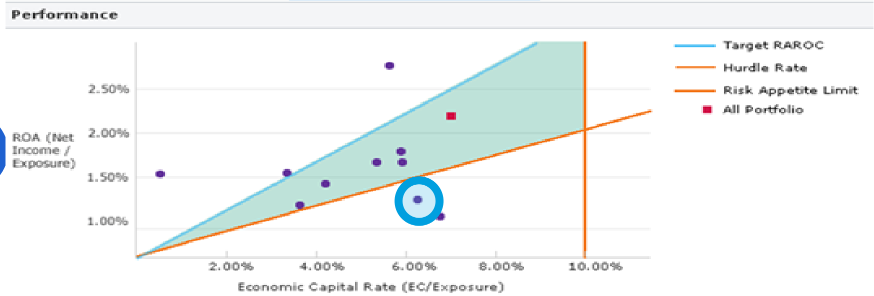
Customer

Exposure meets bank's risk appetite, but not the hurdle rate

Approvers / Committees

My portfolio return is just above 2%. Portfolio risk is 7%. Need to increase return / reduce risk

Marketing / Relationship Manager



Bank

RAROC is 15%

Exposure meets the risk appetite policy

Credit Compliance

Key metrics Needed for Pricing

Rating and Probability of Default

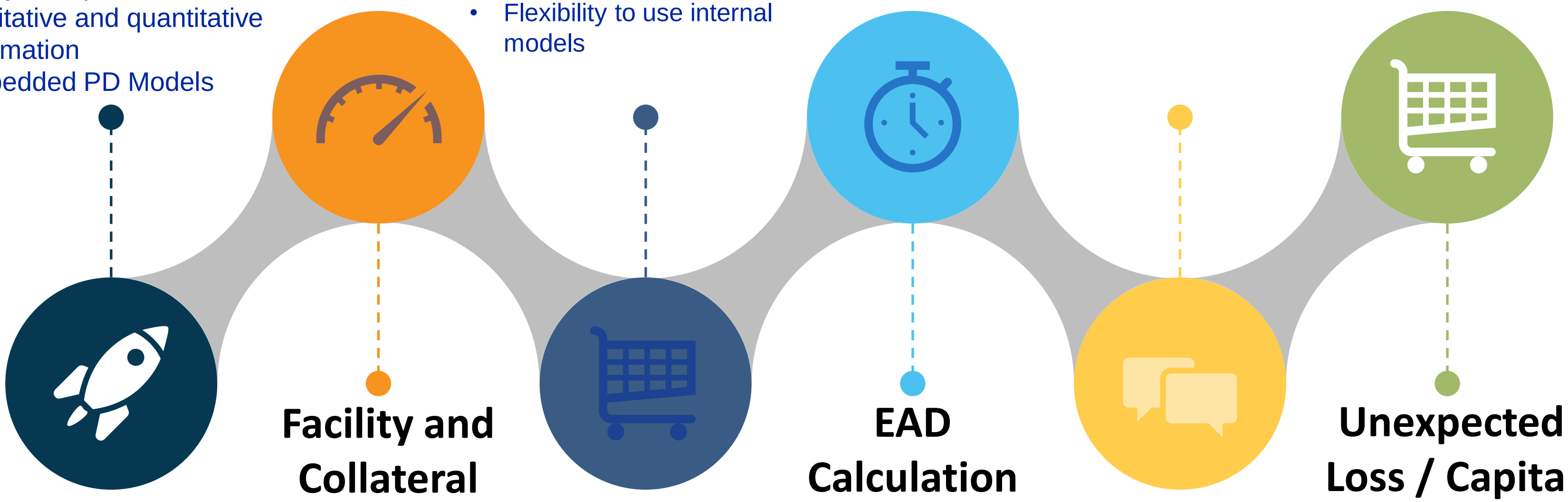
- Centralized repository of credit risk rating information
- Ability to capture both qualitative and quantitative information
- Embedded PD Models

Loss Given Default (LGD)

- Calculate Basel LGD using Collateral eligibility and regulatory haircuts
- Flexibility to use internal models

Expected Loss

- Calculate Expected Loss as a function of PD, LGD and EAD



Facility and Collateral Structuring

- Structure facilities with complex limit trees
- Add and assign collaterals to facilities
- Allocate collaterals optimally

EAD Calculation

- Import exposures from core systems periodically
- Apply Basel CCFs for to undrawn and off balance sheet facilities
- Calculate EAD

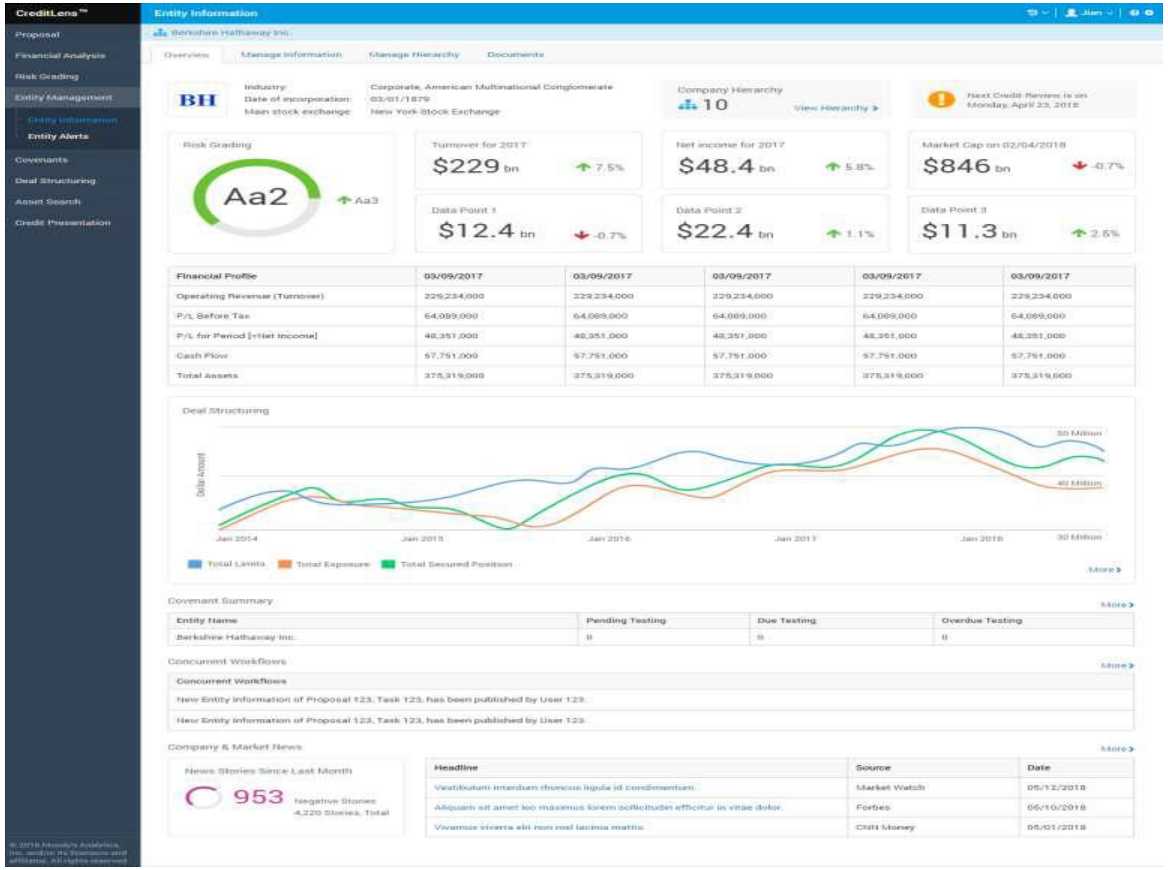
Unexpected Loss / Capital

- Calculate Basel IRB Capital Charge using the ASRF formula OR
- Economic Capital

Risk Grading

In-depth Assessment of Borrower Health

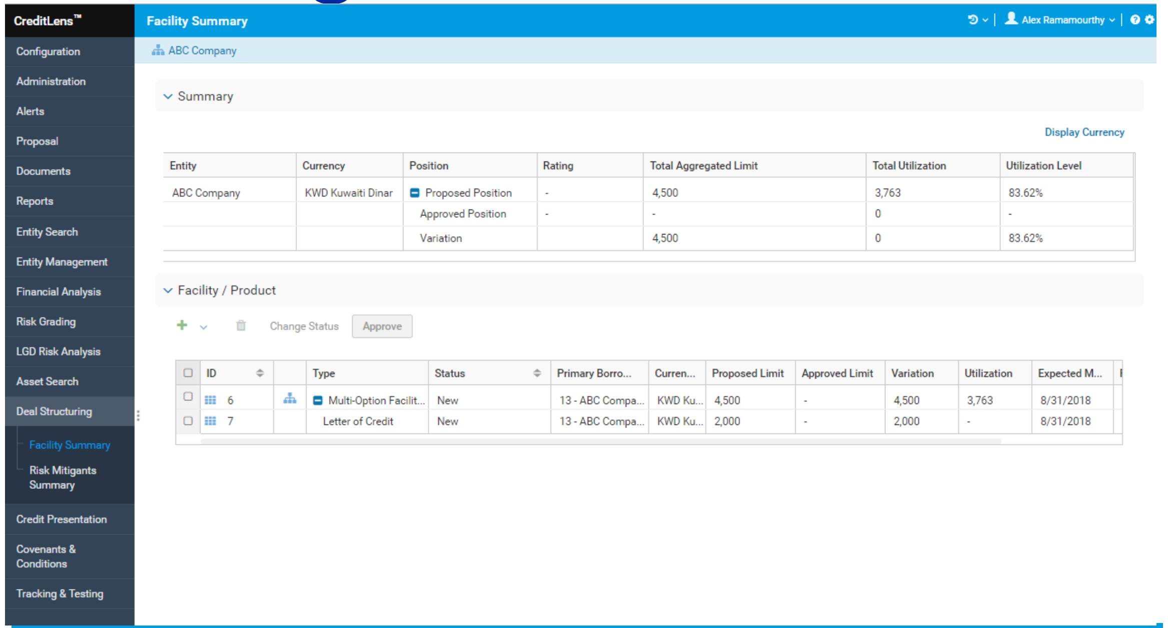
- Hierarchical grade distribution
- Configurable automated model selection
- Support for multiple scenario’s including what-if for stress assessment
- Extended override classifications
- Optional business process management control
- Platform for rapid deployment
- Pre-built Scorecards or Bank-Specific Internal Rating Models
- RiskCalc based Scorecard
- Expert Judgement Scorecards
- Bank designed or 3rd Party scorecards

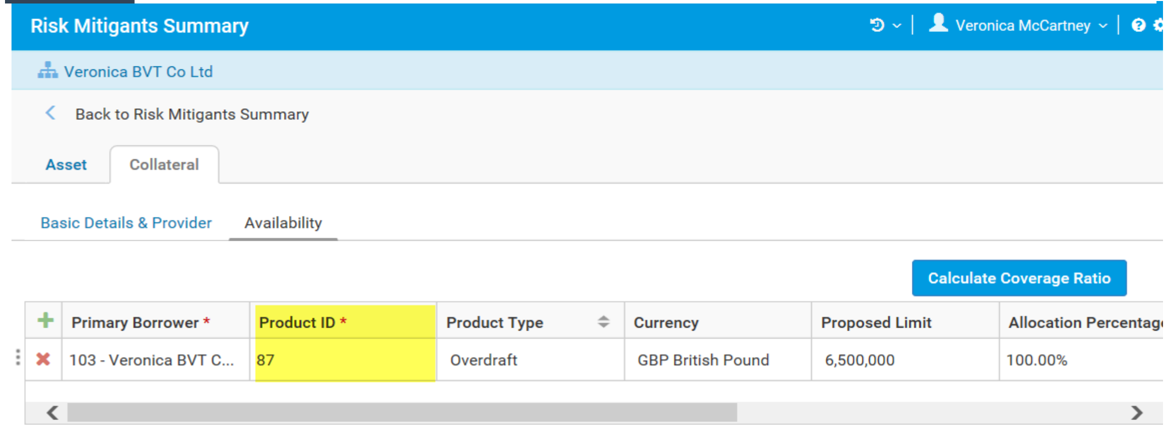


Facility and Collateral Structuring

» Facility Structuring
  - Create Facilities and Facility Trees
  - Import Facilities from Core Banking or other systems
  - Import exposures from core banking and booking systems

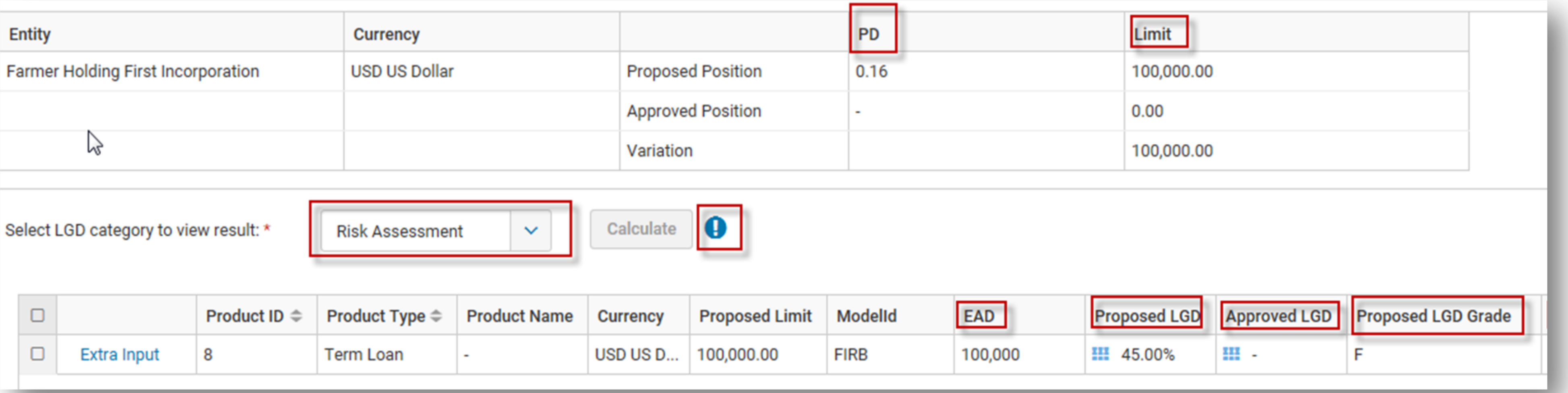
» Collateral Management
  - Create or import collaterals
  - N to N Allocation of collaterals using pro-rata allocation or an optimized algorithm





Loss Given Default Analysis

- » LGD analysis natively integrated with deal structuring functionality
- » Provides a configurable framework to create products, collateral and guarantees
- » Leverages Model Authoring Platform to enable easier configuration of client LGD models
- » Incorporates calculation logic for system run calculations
- » Builds business rules for field validations



Entity	Currency		PD	Limit
Farmer Holding First Incorporation	USD US Dollar	Proposed Position	0.16	100,000.00
		Approved Position	-	0.00
		Variation		100,000.00

Select LGD category to view result: * Risk Assessment Calculate

		Product ID	Product Type	Product Name	Currency	Proposed Limit	ModelId	EAD	Proposed LGD	Approved LGD	Proposed LGD Grade
☐	Extra Input	8	Term Loan	-	USD US D...	100,000.00	FIRB	100,000	45.00%	-	F

EAD Calculation

Based on the imported utilization of existing limits and the expected utilization level of proposed facilities

Product Summary admin

Mullinix Automotive LLC

Display Currency

Entity	Currency		Rating	Total Aggregated Limit	Total Utilization	Utilization Level
Mullinix Automotive L...	USD US Dollar	Proposed Position	A3	1,500,000.00	1,000,000.00	66.67%
		Approved Position	-	1,500,000.00	1,000,000.00	66.67%
		Variation		0.00	0.00	0.00%

Facility / Product

Approve

Product ID	Product Type	Transaction Type	Primary Borro...	Curren...	Proposed Limit	Approved Limit	Variation	Utilization	Expected M...
4	FiveYearTermL...	New	62 - Mullinix Aut...	USD US ...	1,500,000.00	1,500,000.00	0.00	1,000,000.00	11/22/2022

Expected Loss and Capital Calculation

- Expected Loss is a function of PD, LGD and EAD
- For capital computation, the Basel Capital Formula can be applied

Top 10 Capital Names (Expected Loss) Options

Name	Capital Amount
GENERAL_MOTORS_CORP	7,853,444,323
CHARTER_COMMUNICATIONS_INC	4,474,085,497
FORD_MOTOR_CO	2,514,272,715
TENET_HEALTHCARE_CORP	880,771,367
INTELSAT	723,362,057
ABITIBI_CONSOLIDATED_INC	568,009,064
EL_PASO_CORP	547,190,365
STANDARD_PACIFIC_CORP	425,259,639
HOVNANIAN_ENTRPRS_INC__-CL_A	421,485,737
BEAZER_HOMES_USA_INC	381,208,089

Credit Risk

Show Formula

Correlation:

```
R=Rconst if Rconst not null
or
R=R_PARAM1*(1-exp(R_EXP*PD))/(1-exp(R_EXP))
    + R_PARAM2*[1-(1-exp(R_EXP*PD))/(1-exp(R_EXP))]
    - R_FIRM_SIZE_ADJ_PARAM*(1-(S- MinAnnualSales))/(MaxAnnualSales-MinAnnualSales)
```

R Formula:

```
R=0.03*(1-exp(-35*PD))/(1-exp(-35))
+0.16*[1-(1-exp(-35*PD))/(1-exp(-35))]
```

Maturity Adjustment:

```
B=0 if not use Maturity adjustment
  or
B=(B_PARAM1 - B_PARAM2*ln(PD))^2
```

B Formula:

Capital Requirement:

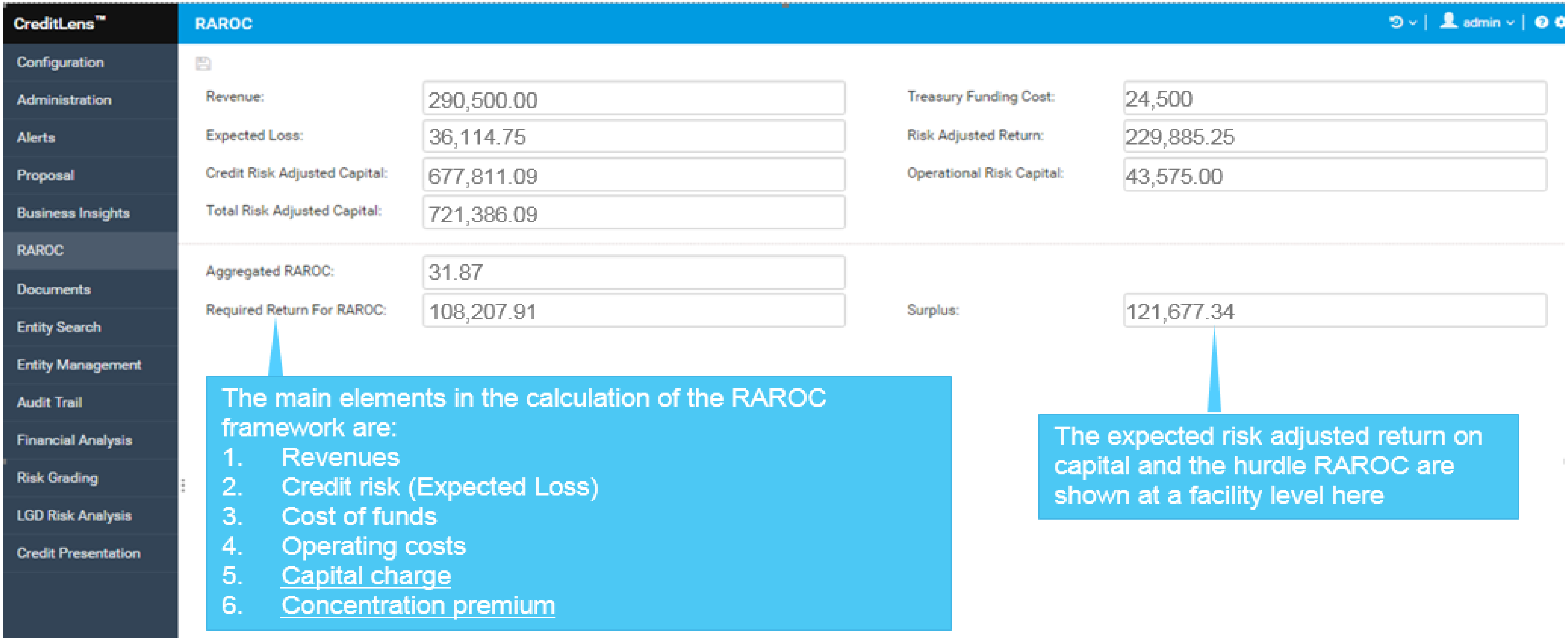
```
K={LGD*N[(G(PD)+R^0.5*G(INV_CUMUL_PARAM))/(1-R)^0.5]-PD*LGD} *(1+(M-
AVG_MATURITY_ADJ)*B)/ (1-B_PARAM3*B)
```

K Formula:

```
K=LGD*N[(G(PD)+R^0.5*G(0.99900))/(1-R)^0.5]-PD*LGD
```

Risk Adjusted Performance Management

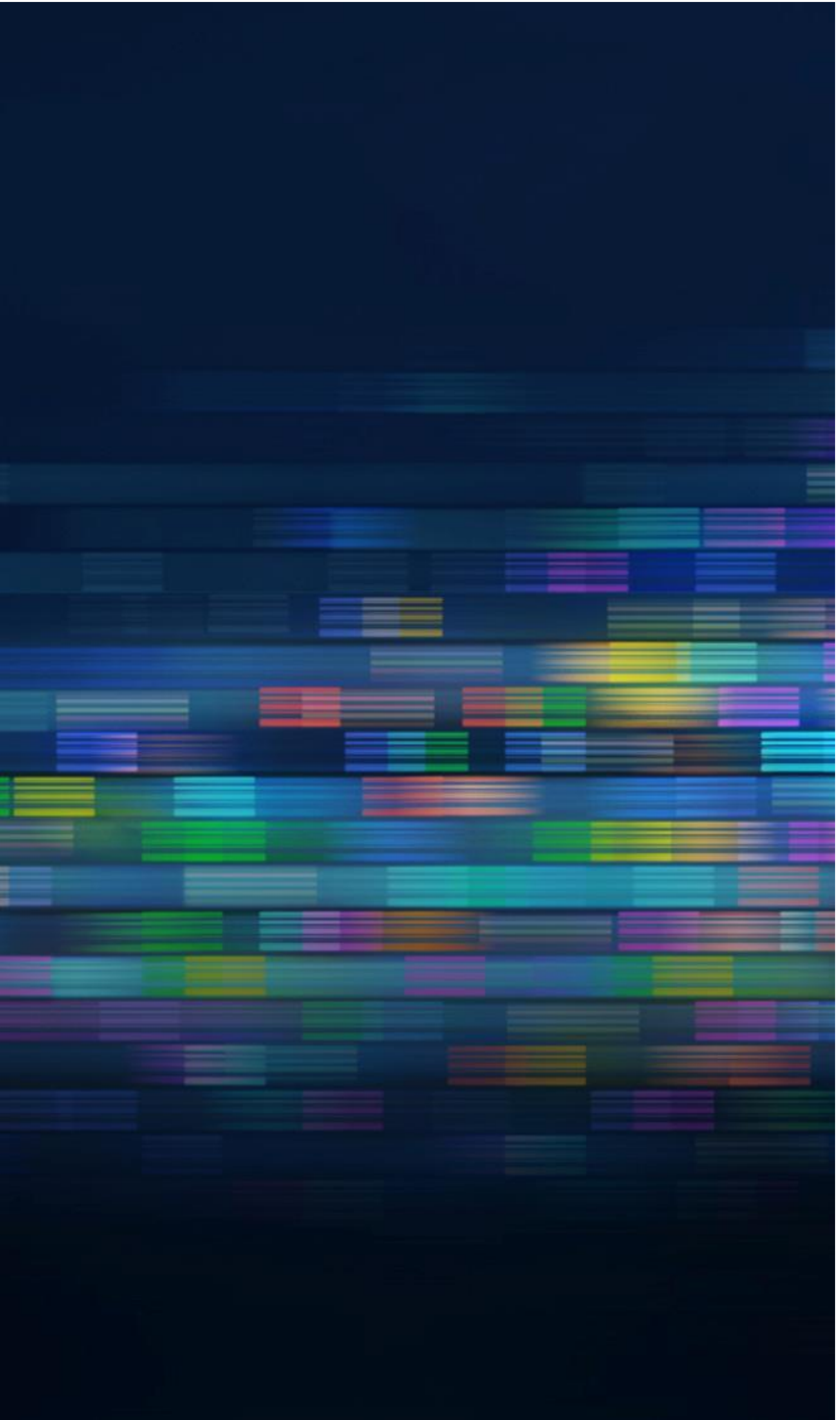
Achievable at Origination



The main elements in the calculation of the RAROC framework are:

1. Revenues
2. Credit risk (Expected Loss)
3. Cost of funds
4. Operating costs
5. Capital charge
6. Concentration premium

The expected risk adjusted return on capital and the hurdle RAROC are shown at a facility level here



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Questions and Answers

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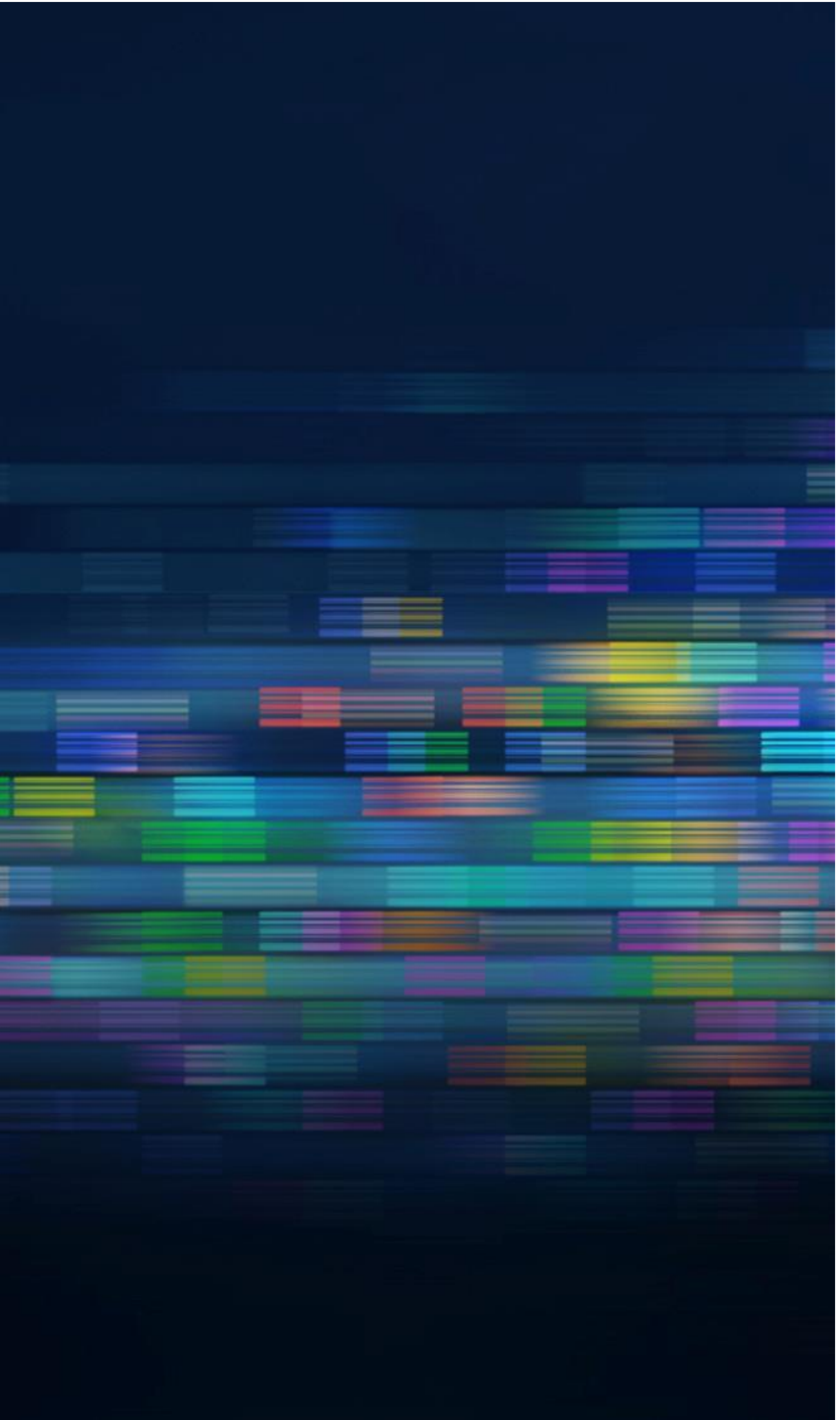

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Thank You

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