University of Massachusetts Lowell
Master of Science in Business Analytics
Capstone Project

Overall Risk Profile Analysis and Indicators

By: Ashwini Agnihotri & Peter Neal

Faculty Advisor: Dr. Asil Oztekin

Project Sponsors: Ryan Morrissey, Michael Donahue & Bao Duong

Outline

- About Santander
- Project objective
- Data
- Analytical Hierarchy Process (AHP)
- Why AHP?
- AHP weights & Rank, Average and Percentiles
- Methodology
- Tableau Demo
- Recommendations and Future scope

About Santander

- Madrid-based Banco Santander
- Founded in 1857
- Globally respected Banking group

- 16^{th} largest banking institution in the world
- Has 125 million+ customers in the U.S., Europe, and Latin America

- One of the largest commercial and retail banks in the US
- Has $74.5 billion in assets, corporate offices in Boston
- Has over 600 branches and more than 2000 ATMs

- Has approximately 9600 employees
- Serves 2.1 million customers
- Principally located in MA, NH, CT, RI, NY, NJ, PA, DE

Project Objective

Under Operational Risk Management Function various risk programs are managed

KRIs

Issue Management

Material Risk

Data for these programs exists in disparate, disconnected systems

Program owners access the risk ratings by reviewing various reports created subjectively

Use mathematical approach to develop an agile, flexible & scalable methodology to analyze the risk program data with focus on KRIs and IM

Data for KRIs

Submission Month	KRI Code	Value Score	Unit	Frequency	Area Name	Risk Type	Severity Rating
Jun-2020	CI28824	Green	Percentage	Monthly	Analytics & Decision Science	Compliance	High
Jul-2020	CI28824	Green	Percentage	Monthly	Analytics & Decision Science	Compliance	High
Aug-2020	CI28824	Green	Percentage	Monthly	Analytics & Decision Science	Compliance	High
Sep-2020	CI28824	Green	Percentage	Monthly	Analytics & Decision Science	Compliance	High
Oct-2020	CI28824	Green	Percentage	Monthly	Analytics & Decision Science	Compliance	High

NO NUMERIC/QUANTIFIABLE DATA

JAN 2018-OCT 2020
SUBMISSION MONTH

253
KRI CODE

3
VALUE SCORE

13
AREA NAME

4
SEVERITY RATING

Data for Issue Management

AD Due Date by Month	Area	Department	AD ID	AD Target Due Date	AD Status	Priority Rating	Resolution Status	Current Target Date	Number of MA	Date of Creation	Products	Regulatory Hashtags	Vendor	Application	Issues opened by Month	Issues Closed/Abandoned by Month
Apr-21	Business Banking	NaN	005056A0614D1EDB85F8030A82F98364	2021-04-01	On Track	Moderate	Remediate	2021-04-01	1.0	2020-10-26	No	Yes	No	No	Oct-20	NaN
Complete	Consumer Lending	Home Loans	005056A0614D1ED8BCBBD2D9FAE5230B	2019-08-30	Complete	Moderate	Remediate	2019-08-30	4.0	2018-11-27	Yes	Yes	No	No	Created 13 Months Ago	Closed 13 Months Ago
Complete	Consumer Lending	Home Loans	005056A0614D1EDA96B3BDE076BEE563	2020-04-30	Complete	Moderate	Remediate	2020-04-30	1.0	2020-02-27	Yes	Yes	Yes	Yes	Feb-20	Apr-20
Complete	Operations	Payments	005056A0614D1EE8AEBF72AD6B4A0EED	2020-12-31	Complete	Moderate	Remediate	2020-12-31	1.0	2018-09-16	Yes	No	No	Yes	Created 13 Months Ago	Dec-20
Complete	FLOD & Bus. Controls	NaN	005056A008D11EDAA3DA9DCAF13A707E	2020-11-30	Complete	Low	Remediate	2020-11-30	3.0	2020-05-05	Yes	No	No	No	May-20	Dec-20

NO NUMERIC OR QUANTIFIABLE DATA

3187
AD ID

12
AREA NAME

5
AD STATUS

4
PRIORITY RATING

NOV 2017- JAN 2021
DATE OF CREATION

Analytical Hierarchy Process (AHP)

AHP was developed by Thomas L Saaty in 1970s

Structure technique to organize, analyze complex decisions

Based on Mathematics, Qualitative judgement and Quantitative analysis

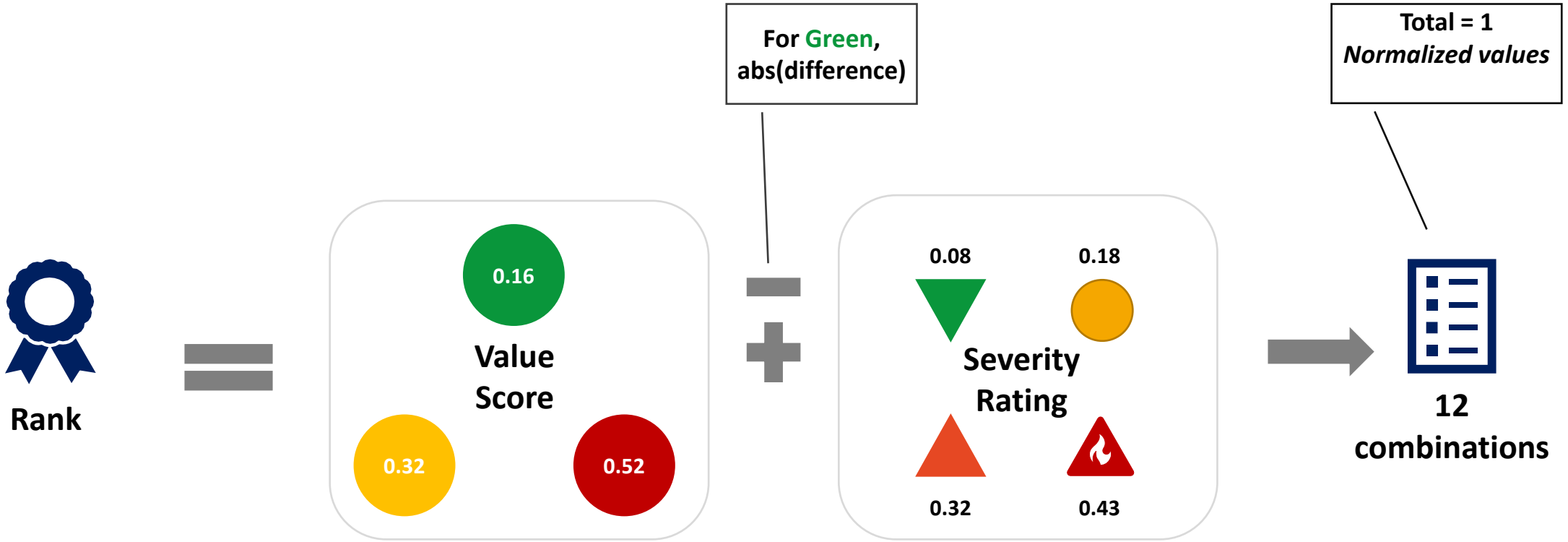
Uses a specially designed questionnaire to get the quantified weights of decision criteria

Considers the relative relevance of each parameter to compute the numeric weightage

Why AHP?

- No Numeric of Quantifiable data
- Multiple decision criteria for risk analysis in all risk programs
- Relative relevance of every parameter is maintained in numeric weights
- Adaptable to other risk verticals as well
- Structured technique that can be replicated

AHP weights & Rank for KRIs



For Issue Management, Rank = AD -/+ PR

12 combinations

Value Score

Green	0.16
Amber	0.32
Red	0.52

Severity Rating

Critical	0.43
High	0.32
Moderate	0.18
Negligible	0.08

12 Combinations

Green_Moderate	0.02	0.003384
Green_Negligible	0.08	0.013536
Green_High	0.16	0.027073
Green_Critical	0.27	0.045685
Amber_Negligible	0.40	0.067682
Amber_Moderate	0.50	0.084602
Red_Negligible	0.60	0.101523
Amber_High	0.64	0.108291
Red_Moderate	0.70	0.118443
Amber_Critical	0.75	0.126904
Red_High	0.84	0.142132
Red_Critical	0.95	0.160745

Average and Percentile

Average

Area

Submission Month

n KRIs

Avg. = Σ Ranks of all *n* KRIs / *n*

Percentile

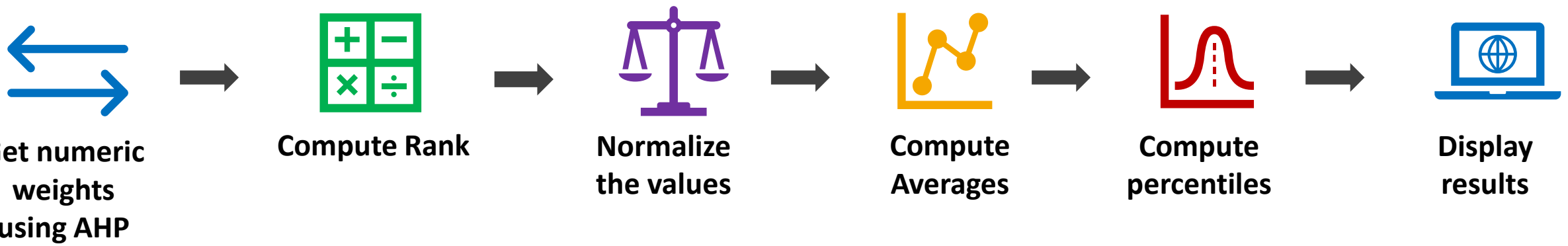
12 combinations

Avg. < 10th Percentile

10th Percentile < Avg. < 20th Percentile

Avg. > 20th Percentile

Methodology



Overall Risk Profile Analysis and Indicators - KRIs

Santander

0.01489
10th Percentile

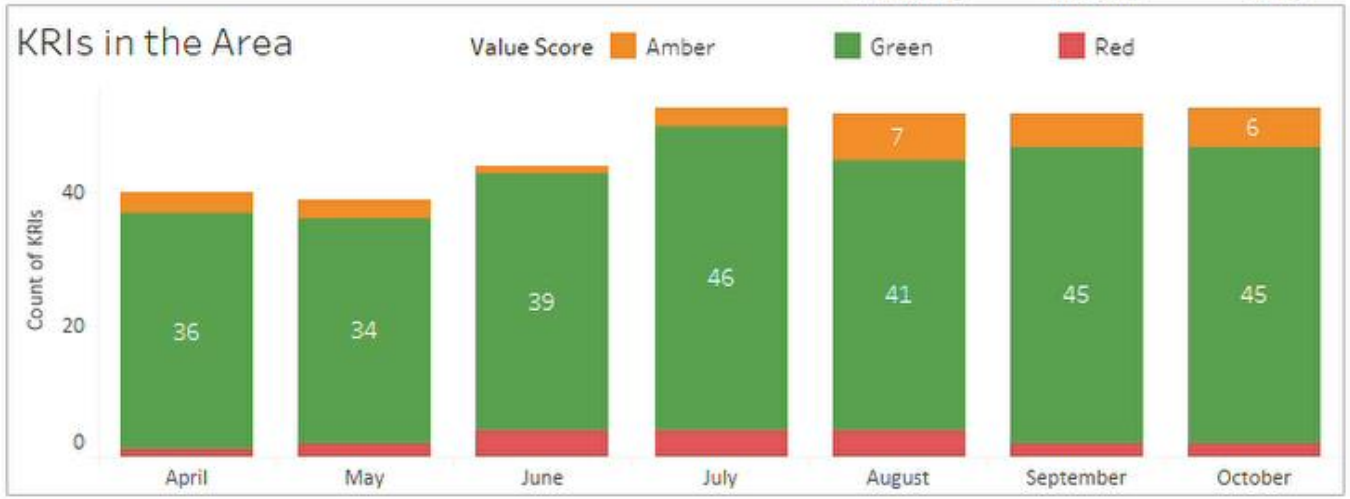
Value
Between 10th & 20th Percentile

0.03079
20th Percentile

Month: October 2020

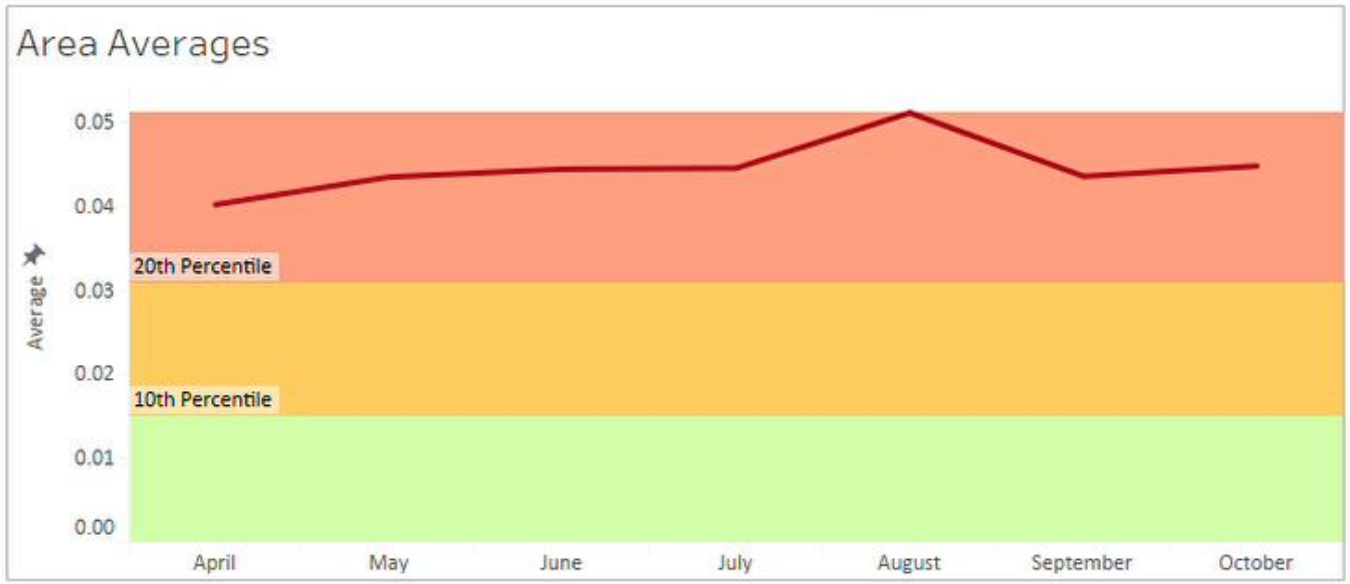
Area Name: Home Loans

0.04482	0.04360	-0.00122
Current Avg.	Prev. Avg.	Change



PROCESS FLOW

- Using AHP, get numeric weights
  for Value Score (VS) & Severity Rating (SR)
- Compute Rank
  For Value Score = Green
  Rank = VS – SR Else, Rank = VS + SR
- Normalize the values
  to maintain relative relevance
- Compute Averages
- Compute Percentiles
  to access the performance



KRI_sev_counts | KRI_counts | KRI_avg | KRIs | IM | Curr.Avg | Prev.Avg | Change | IM_Priority | IM_counts | IM_Avg | Curr. Avg. IM | Prev. Avg. IM | Change IM | Capstone_KRI_IM

Recommendations and Future scope

- Applying this methodology to other Risk programs at the Bank
- Incorporate subjectivity at Business Line level
- Quantify how each risk program affects others
- Dynamic percentiles for performance assessment

Thank You!