

**TÜRKİYE CUMHURİYET  
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## **SOVEREIGN RISK EVALUATION MODEL**

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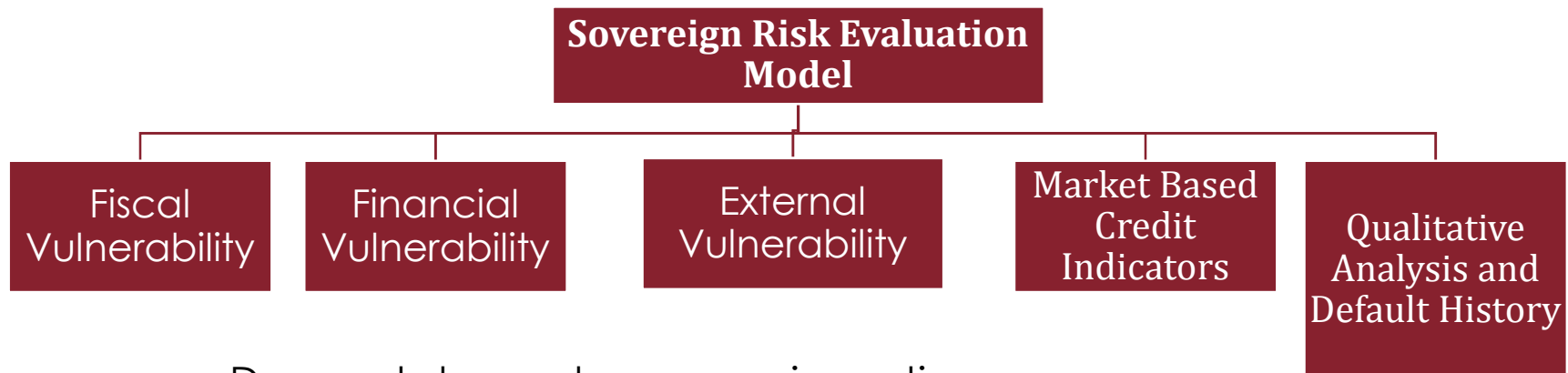
**Mumbai**

# Sovereign Risk Evaluation Model

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# Introduction

- Eliminating mechanical reliance on credit ratings
  - After 2008 financial crisis, critiques against rating agencies
- Sovereign risk evaluation model



- Does not depend on sovereign ratings
- Independent and reliable data and information sources (BIS, IMF, Euromoney etc.) and research
- Early warning indicators
- Provides recommendations to the FX Risk and Reserve management Committee

# 1. Fiscal Vulnerability

- Baldacci, McHugh and Petrova, 2011, 'Indicators of Fiscal Vulnerability and Fiscal Stress'
- Also a part of fiscal vulnerability assessment of Fiscal Monitor (IMF)
- Fiscal Vulnerability Indicator is a weighted average of the scores of the following factors:
  - Gross Financing Needs (%GDP)
  - Interest Rate Growth Differential
  - Cyclically Adjusted Primary Deficit (%GDP)
  - Gross Debt (%GDP)

# 1. Fiscal Vulnerability

- Methodology:
  - Fiscal indicators are scored according to the threshold levels determined for emerging and developed markets separately
  - Thresholds are updated periodically (IMF)

Fiscal Vulnerability Thresholds						
	Thresholds					
	Emerging Markets			Developed Markets		
	High	Medium	Moderate	High	Medium	Moderate
Gross Financing Need (% GDP)	>17,2	11,6-17,2	<11,6	>20,6	19,8-20,6	<19,8
Interest Rate-Growth Differential	>3,6	0,1-3,6	<0,1	>1,1	(-4,1)-1,1	<(-4,1)
Cyclically Adjusted Primary Balance (% GDP)	< (-4,2)	(-4,2))-(-2,0)	> (-2,0)	< (-0,5)	(-0,5) - 1,3	> 1,3
Gross Debt (% GDP)	>72,2	55,7-72,2	<55,7	>42,8	29,5-42,8	<29,5

- Fiscal score is the weighted average of these four indicator scores
- Sovereigns are grouped as high or low fiscal vulnerability according to the fiscal score

# 1. Fiscal Vulnerability

## Results for Developed Markets (As of 2016)

Developed Markets	Total Financing Needs (%GDP)	Interest Rate-Growth Differential	Cyclical Primary Surplus (%GDP)	Public Debt (%GDP)	Fiscal Vulnerability
A	Moderate	Moderate	Moderate	Moderate	Moderate
B	Moderate	Moderate	Moderate	Moderate	Moderate
C	Moderate	Moderate	Moderate	Moderate	Moderate
D	Moderate	Moderate	Moderate	Moderate	Moderate
E	Moderate	Moderate	Moderate	Moderate	Moderate
F	Moderate	Moderate	Moderate	Moderate	Moderate
G	Moderate	Moderate	Moderate	Moderate	Moderate
H	Moderate	Moderate	Moderate	Moderate	Moderate
I	Moderate	Moderate	Moderate	Medium	Moderate
J	Medium	Moderate	Moderate	Medium	Moderate
K	Moderate	Moderate	Moderate	Medium	Moderate
L	Medium	Moderate	Moderate	High	Moderate
M	Moderate	Moderate	Moderate	High	Moderate
N	High	Moderate	Moderate	High	Moderate
O	High	Moderate	Moderate	High	Moderate
Q	Medium	Moderate	Moderate	High	Moderate
P	Medium	Moderate	Moderate	High	Moderate
R	High	Moderate	Moderate	High	Moderate
S	Moderate	Moderate	High	Moderate	Medium
T	Medium	Moderate	Moderate	High	Moderate
U	High	Medium	Moderate	High	Medium
V	High	Medium	Moderate	High	Medium
W	High	Moderate	High	High	Medium
X	Medium	High	Moderate	High	High

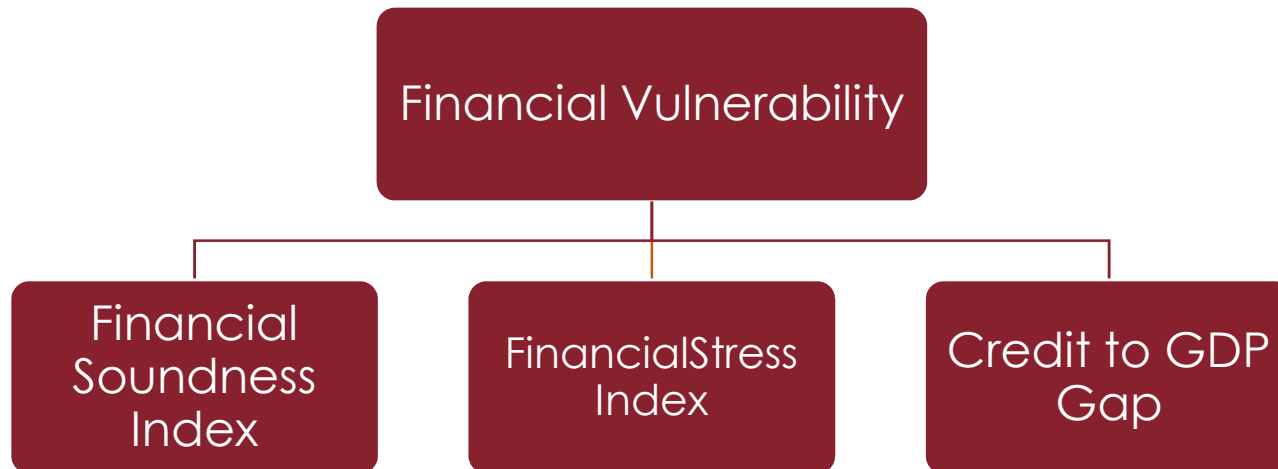
# 1. Fiscal Vulnerability

- Results for Emerging Markets (As of 2016)

<b>Emerging Markets</b>	<b>Interest Rate-Growth Differential</b>	<b>Cyclical Primary Surplus (%GDP)</b>	<b>Public Debt (%GDP)</b>	<b>Fiscal Vulnerability</b>
EA	Medium	Medium	Medium	Medium
EB	Moderate	High	High	Moderate
EC	Medium	Moderate	Medium	Moderate
ED	Moderate	High	High	Moderate
EE	Medium	High	Moderate	Medium
EF	High	High	Moderate	High
EG	Medium	High	Moderate	Medium
EH	High	High	High	High
EI	Medium	High	High	High
EJ	Medium	Medium	High	Medium
EK	Medium	High	High	High
EL	High	High	High	High
EM	High	Medium	High	High

## 2. Financial Vulnerability

- Strong correlation between sovereign and financial sector risks,
- Combination of three different measurement;
  - Sectorwise fundamental risk ratios
  - Market indicators for financial stress
  - Credit expansion and banking sector stress





## 2.1 Financial Soundness Index

- Financial Soundness Index is a weighted average of the standardized data of 10 financial ratios of the banking sector of the corresponding sovereign
- The ratios can be classified into 5 categories
  - Capital Adequacy
  - Asset Quality
  - Profitability
  - Liquidity
  - FX Position
- Index provides not only cross country comparison but also country specific evaluation

## 2.2 Financial Stress Index

- Components:
  - MSCI (Morgan Stanley Capital International) Financial Sector Stock Index Volatility (1 month historical volatility)
  - Average Borrowing Cost of Banking Sector (the difference between 1 year interbank money market interest rate and 1 year treasury bond interest rate)
  - Average Financial Sector CDS Spreads
  - Exchange Rate Volatility (1 month historical volatility)

## 2.2 Financial Stress Index

- Methodology:

- Financial Stress Index is obtained by the sum of the average of four components (in the form of percentage) mentioned above and sovereign CDS premiums, proportionately.
- Therefore, it is possible to measure how much financial sector adds CDS premium on sovereign CDS.

**Financial Stress Index** *Sovereign CDS*  $\times ((1 +$   
*(The average of four components))*

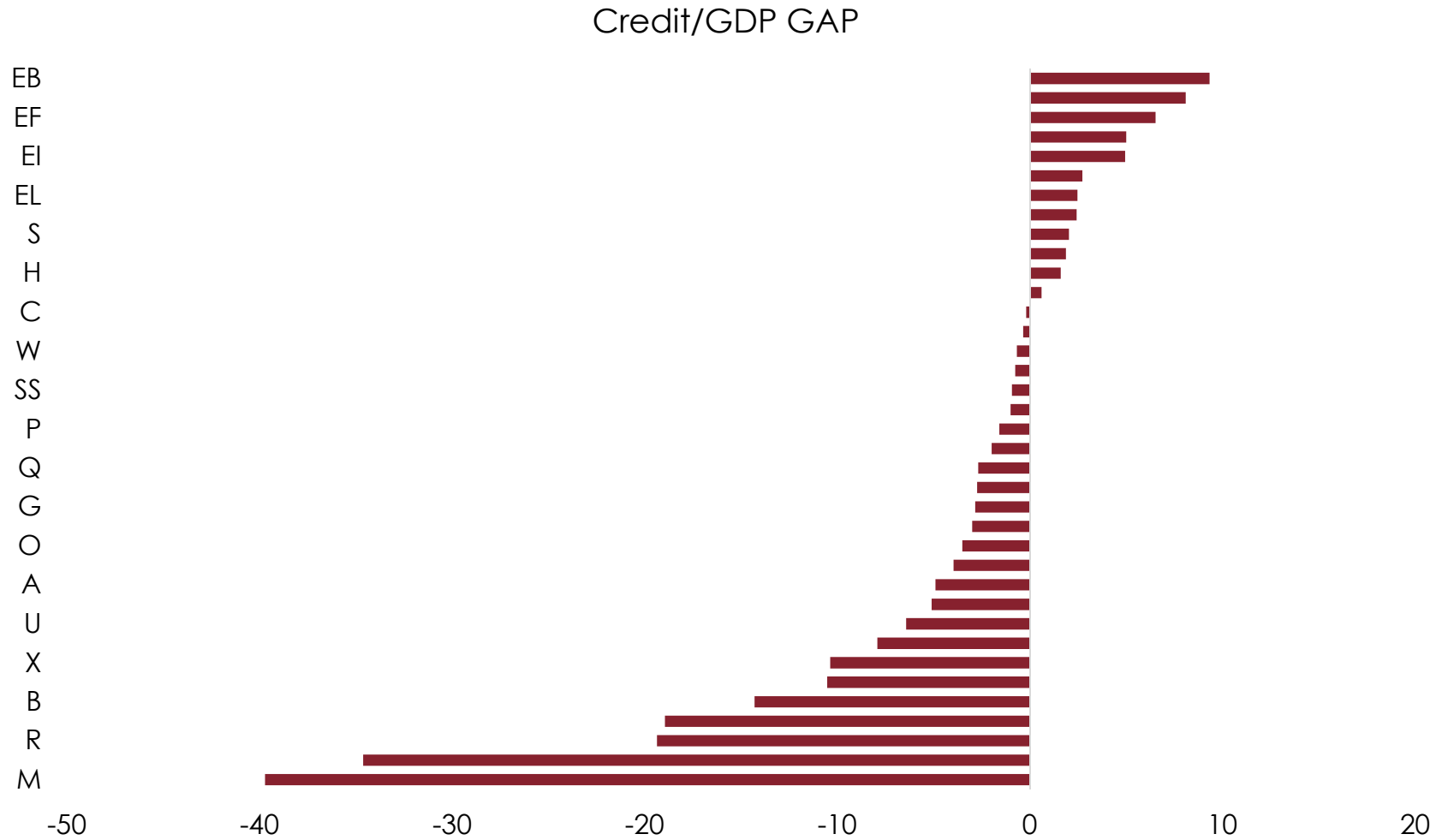
- Threshold values for stress level are determined with using of the Thomson Reuters index reflecting sector basis ratings.

## 2.3 Credit Gap

- In the Borio and Lowe (2002, 2004), Drehman and Tsatsaronis (2014) and some investment banks studies, the importance of credit gap as a early warning indicator is emphasized.
- According to Basel III criterias, credit gap could be used as a countercyclical capital buffer.
- Some central banks are using credit gap while estimating the vulnerabilities and decision-making process. For instance, England,Switzerland, Norway, and India Central Banks are following this indicator for their own countries.
- Because of all these reasons, credit gap is included in our model as an early warning indicator.

## 2.3 Credit Gap

- Results (As of 2016)



## 2. Financial Vulnerability

- Results (As of 2016)

Financial Score	
Country	Score
I	4
J	4
D	4
E	4
HN	4,5
SS	4,5
A	6
B	6
K	6
C	6
G	6
W	6
H	6
Q	7
P	7
O	7
T	7
N	8
M	8
S	8

Financial Score	
Country	Score
EE	9
L	9
EK	9
EJ	9
EA	9
EH	10
ED	10
R	10,0
EC	10,5
EG	10,5
EL	11
EI	13
V	13
F	14
EB	14
EM	14
U	14
EF	16
X	21

Baa Medyan	10,00
A Medyan	8,00

### 3. External Vulnerability

- The countries ability to generate funds from abroad to meet their obligations to nonresidents,
- Similar to S&P's external score module,
- Three factors are assumed to drive the external vulnerability
  - Status of the currency
    - % in Official Reserves
      - ✓ COFER (Currency Composition of Foreign Exchange Reserves, IMF)
      - ✓ Updated in every 3 months
      - ✓ FX Claims/Total Allocated Reserves
      - ✓ Reserve Currency (ratio  $\geq$  %3), i.e U.S, U.K, Japan, Germany etc.
    - % in total FX Trading
      - ✓ Triennial Central Bank Survey (BIS)
      - ✓ Updated in every 3 years
      - ✓ Actively Traded Currency (ratio  $\geq$  %0,8), i.e Australia, Switzerland Canada etc.

### 3. External Vulnerability

- External Liquidity Ratio
  - External Financing Need/Liquid External Assets
  - Short term vulnerability (upto 1 year)
- External Indebtedness Ratio
  - Net International Investment Position/Current Account Receipts
  - Long term vulnerability



### 3. External Vulnerability

#### Methodology;

- Countries classified according to their currency status
- Liquidity and indebtedness ratios are compared with the thresholds determined for each currency group.

➤ i.e

Assume that country A's currency is neither reserve nor actively traded currency then

**External Liquidity Ratio > %100**



**High External Vulnerability**

### 3. External Vulnerability

Results (As of 2016)

Result	Status of the Currency	External Liquidity	External Debt
P	Reserve		-64%
O	Reserve		128%
J	Reserve		-56%
Q	Reserve		-5%
S	Actively Traded	157	-384%
C	Other	70,2	-19%
W	Reserve		-779%
N	Reserve		206%
R	Reserve		633%
V	Reserve		659%

## 4. CDS Based Indicator

- Measure of relative credit risk based on CDS market prices
- Advantages
  - Incorporates all available information and investor expectations
  - Higher discriminatory power over 1-year period
  - Provides quick reaction time
- Disadvantages
  - Volatile

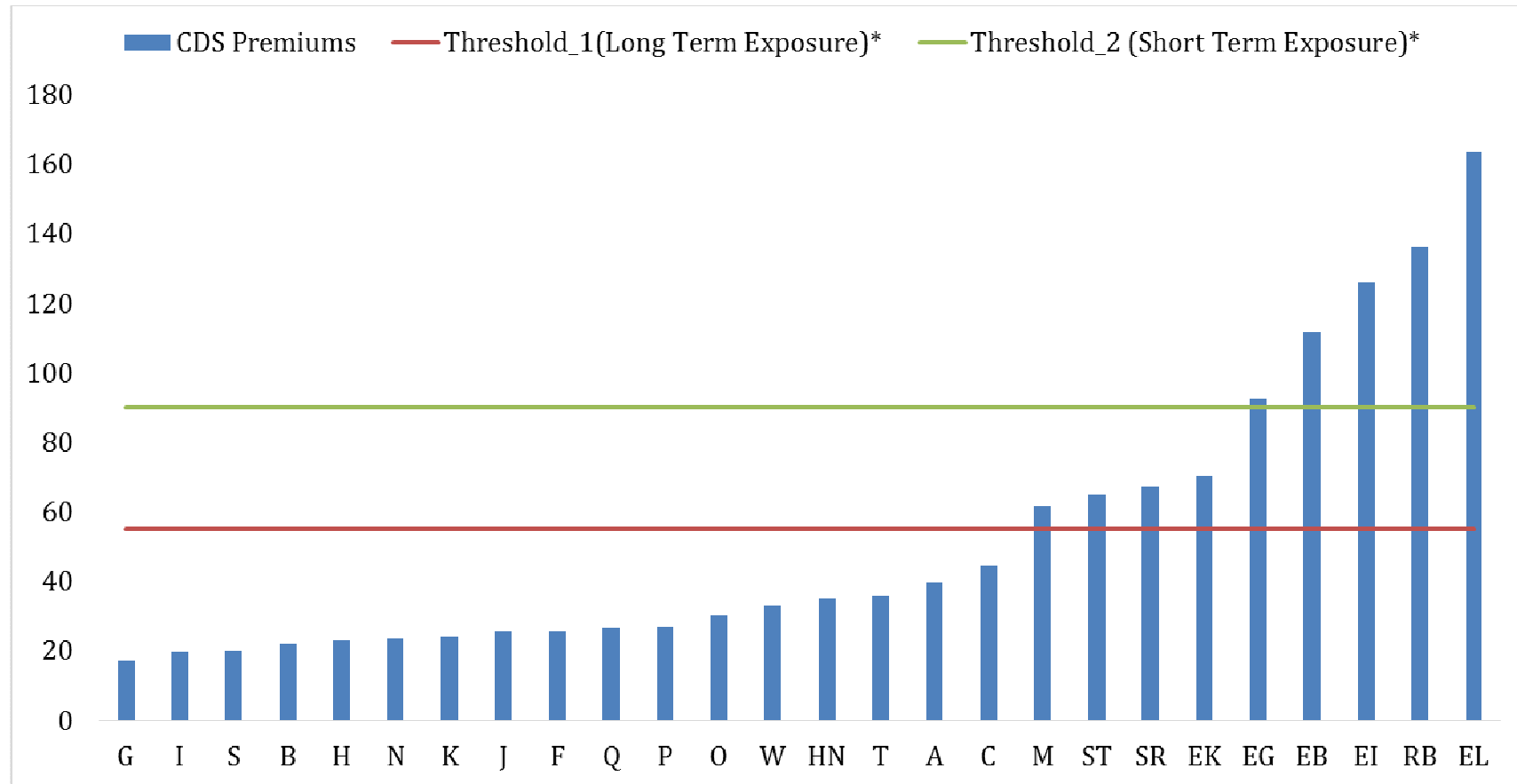
## 4. CDS Based Indicator

### Methodology;

- Sovereigns and Reference Credit Rates:
  - Select the Sovereigns with actively traded 5 year CDS spreads
  - The second best credit rating among Moody's, Fitch and S&P
- CDS Implied Ratings
  - Group the sovereigns according to their credit rating (AAA, AA, A etc.)
  - Median CDS of the rating groups
  - Assign the median CDS to mid sub-rating group (AA2, A2 etc.)
  - Exponential interpolation to estimate the median of the other sub-rating categories (AA1, AA3, A1 etc.)
- Early Warning Thresholds,
  - Determine the early warding CDS tresholds according to the CDS Implied Ratings

## 4. CDS Based Indicator

### Results (As of 2016)



(\*) These are not the threshold levels used by the Central Bank of Turkey

## 4. CDS Based Indicator

- Relative risk based on analyst expectations and default history adjustments
- Based on 4 different analysis
  - Risk Matrix
    - ✓ Economic and Political Risk Scenarios
    - ✓ Upto 5 scenarios per country with likelihood and impact
    - ✓ IMF Article IV, FSSA Reports and CBRT Analyst Expectations
  - Political Assessment (Euromoney)
  - Structural Assessment (Euromoney)
  - Default History Adjustment,
    - ✓ 15 years of default history
    - ✓ Recent defaults have higher negative adjustments

## 5. Qualitative Analysis and Default History

### Results (As of 2016)

Country	Score
H	89,52
S	87,89
G	85,70
SS	85,02
B	84,88
K	83,08
D	82,26
L	81,62
J	75,79
F	73,35
HN	71,78
T	70,47
Q	70,13
I	67,91
E	67,89
N	67,40
W	65,84
O	59,43
M	54,85
P	54,56
EG	50,08
C	47,73
A	45,25

Country	Score
EI	44,76
EK	42,51
R	37,28
V	35,61
U	31,39
EM	30,71
EL	21,74
EB	21,28
EH	20,98
ED	20,66
EJ	19,80
EA	18,00
EC	16,19
X	15,11
EE	15,04
EF	10,08
RG	9,97

<b>Baa Median</b>	<b>20,66</b>
<b>A Median</b>	<b>45,25</b>

# Model Results

## Sovereign Risk Evaluation Model Results (As of June 2016)

I  
Q  
P  
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J  
HN  
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SS

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