



Analyzing Bond Yield Dynamics :

Rating Disparity,
Liquidity Score,
and Yield Forecasting



Name: Muhammad Zariff Wafiy

Matric No.: 17204013

Company Supervisor: En.Mohammad Izzad Halimi

Faculty Supervisor: Dr.Nor Liyana Mohd Shuib

Outline

Introduction

Background

Problem
Statements

Objectives

Methodologies

References

Introduction

Bond Pricing Agency
Malaysia, BPAM



The premier source of evaluated prices and data
for the Malaysian Ringgit Fixed Income Market.

Calculating and publishing bond prices, yield
curves and other relevant information.

Help facilitate trading, risk management, and
investment decision-making.

source: <https://www.bepam.com.my/>

Introduction

Malaysian Bond Market

Bond is a debt security (IOU).

Issued by corporations, governments, and other financial institutions to increase capital for projects.

Bought and traded by investors, in return for interest,(coupons) which are agreed upon bond issuance .

source: Hayes, The bond market (aka debt market): Everything you need to know 2023



Background

BPAM Market Implied Rating, BIR

A concept developed and promoted by BPAM which addresses rating disparity of bonds.

Source: BPAM Market Implied Rating (BIR) - Bondstream

Liquidity Score

Tracks the liquidity (tradeability) of bonds by few factors including:

- Trade recency
- Trade frequency
- Trade turnover

Source: Liquidity Tracker Document - Bondstream

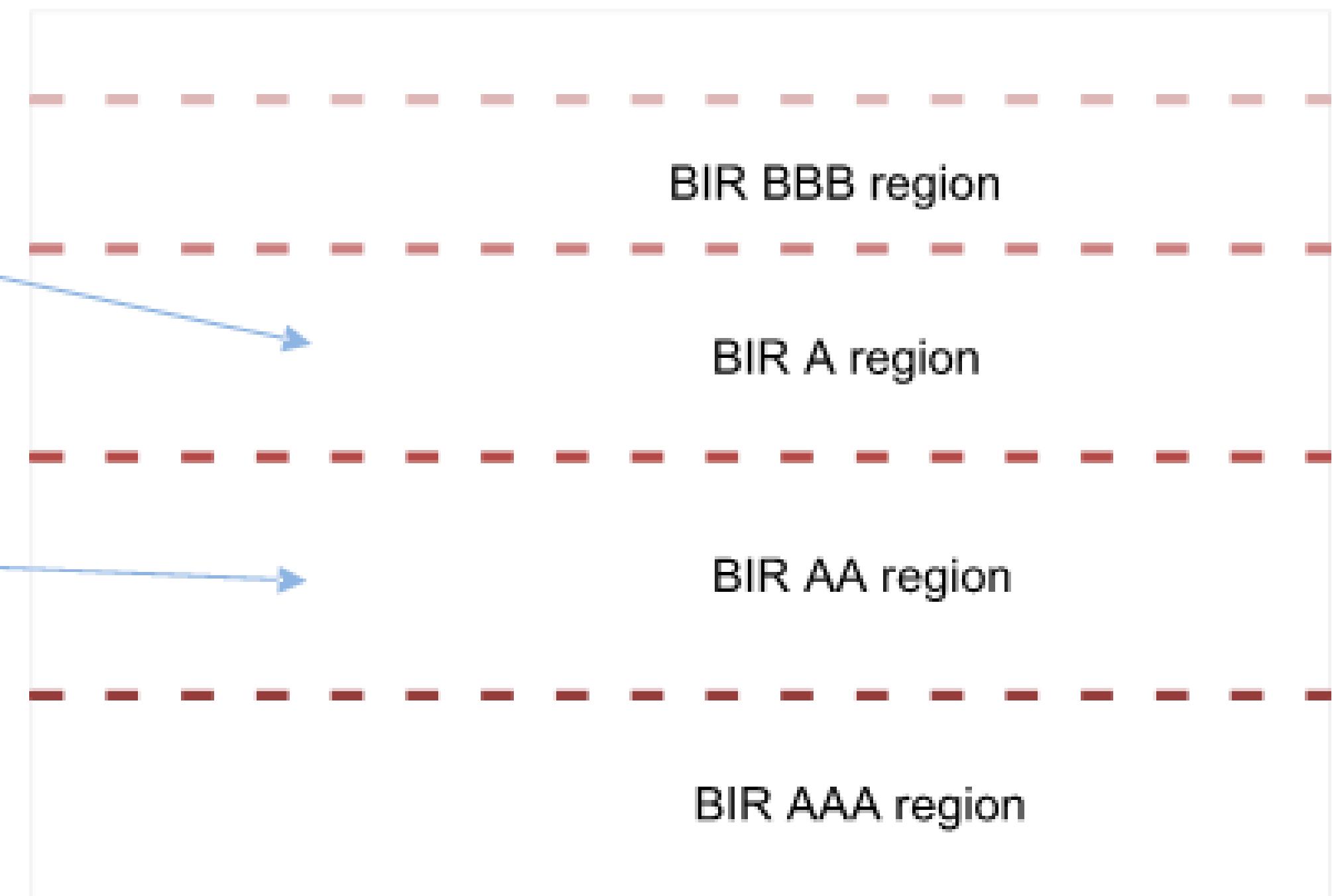
Exhibit 1: BIR Mapping Process

BIR Mapping Process

Unrated 3 Year bond

CRA's BBB-rated
3 Year bond

Market statistics



3 Yr BIR Boundaries:

— AAA — AA — A — BBB

Liquidity Score

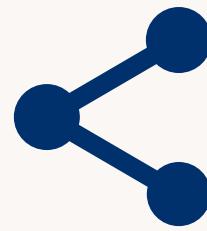
Trade Liquidity Score			Composite Liquidity Score (5.0 - Most Liquid)
Trade Recency	Trade Frequency	Trade Turnover	
5	5	5	5.0
5	5	5	5.0
5	5	5	5.0
5	5	5	5.0
5	5	5	5.0
5	5	5	5.0
5	5	5	5.0
5	5	5	5.0
5	5	5	5.0
5	5	5	5.0
5	5	5	5.0
5	5	5	5.0
5	5	5	5.0
5	5	5	5.0
5	4	5	4.7
5	4	5	4.7

Higher liquidity score means **more** tradeability.

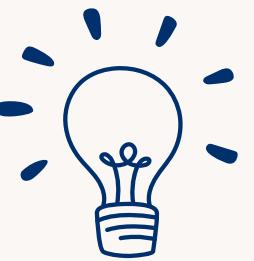
Lower liquidity score means **lower** tradeability.

Source: Liquidity Tracker Document - Bondstream

Problem Statements



There is a lack of comprehensive understanding regarding the connection between the liquidity score and the rating disparity of bonds.

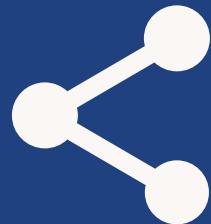


Identifying bonds to trade that offer favorable yields relative to their credit ratings can be challenging.



The need to forecast bond yields accurately is necessary for investors to assess potential returns and manage risks effectively.

Objectives



To understand the correlation between the liquidity score and the rating disparity of bonds.



To recommend best suited bonds for users by filtering underpriced and overpriced bond yields compared to credit rating yield.



To build a forecasting model that predicts the yield of bonds by user's choice using machine learning techniques and algorithms.

Background

Existing Research on Bond Yield Forecasting

Document	Author	Models
Forecasting the term structure of government bond yields	(Diebold & Li, 2006)	Nelson-Siegel curve model
Forecasting bond yields in the Brazilian fixed income market	(Vicente & Tabak, 2008)	Nelson-Siegel curve model (specified market)
Forecasting government bond yields with large Bayesian vector autoregressions	(Carriero et al., 2012)	Bayesian Vector Autoregression (BVAR)



Methodologies

DATA SCIENCE PIPELINE

Data Collection



BPAM's Bondstream

Contains data that are accessible to clients.



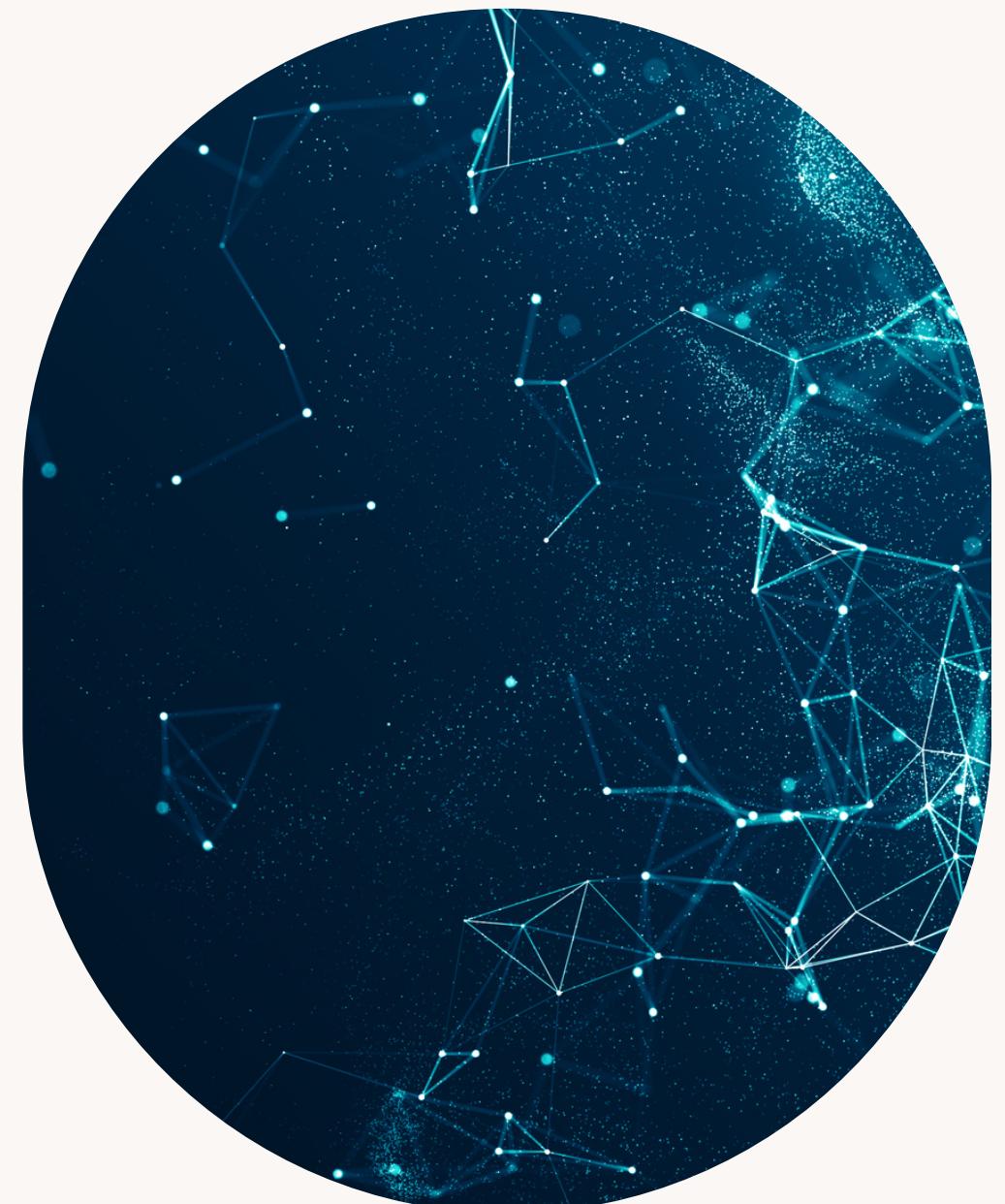
BPAM's Database

Company's main database.



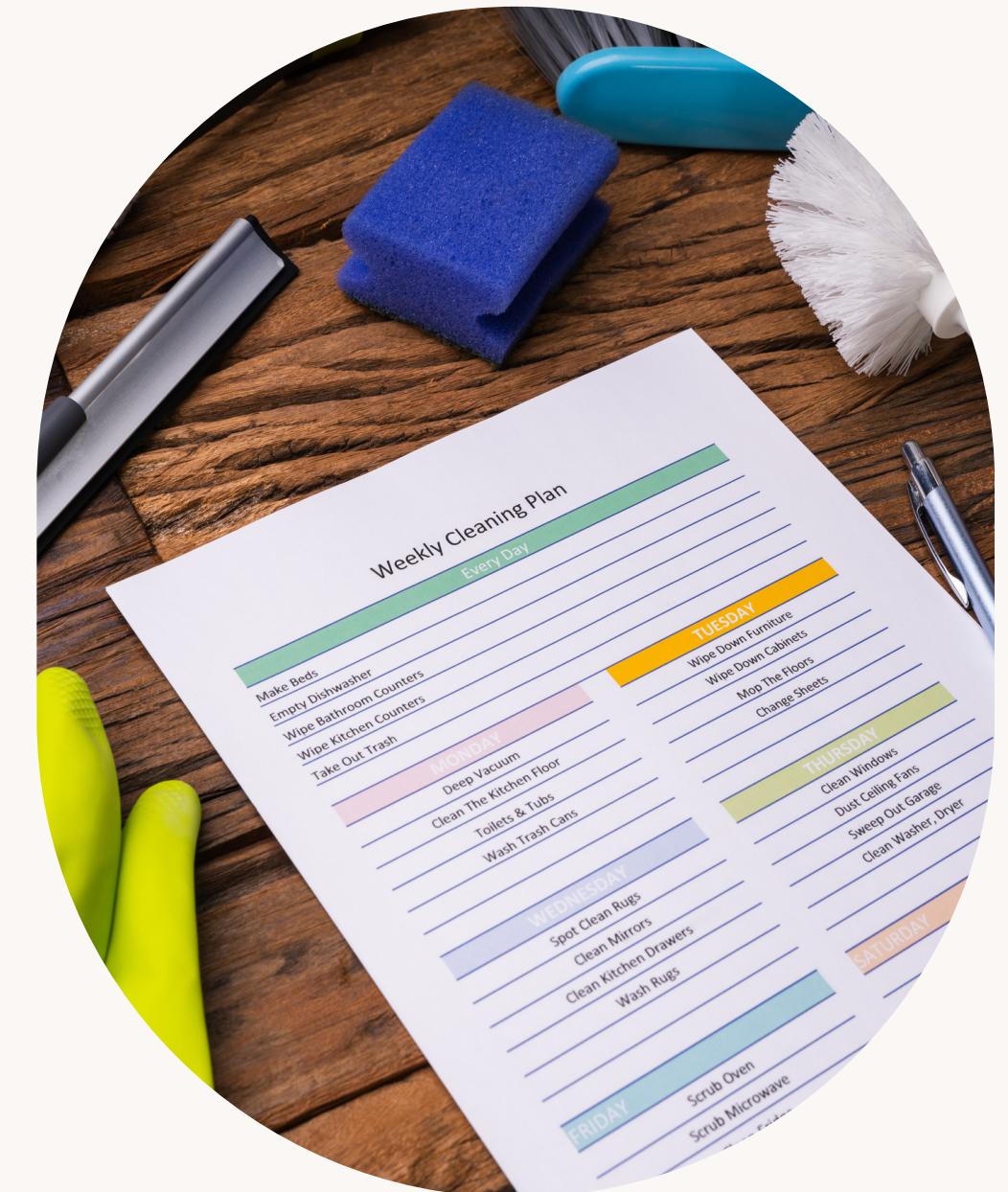
Online Data (BNM, Bursa)

Other relevant datasets and information.



Data Preprocessing

Data Cleaning, Feature Scaling,
Normalization, Train-test set split.



Exploratory Data Analysis

Understanding the correlation between the rating disparity and liquidity score.



Model Building

Time Series Forecasting Models

Autoregressive Integrated Moving Average (ARIMA).

- Univariate non-linear time series forecasting.

Vector Autoregression (VAR)

- Multivariate non-linear time series forecasting.



Model Evaluation

Hold out testing

Cross Validation

Forecast Error Decomposition



Model Deployment

Web Application / dashboard



Thank you.

References

- Bonds. Bonds | Investor.gov. (n.d.). Retrieved May 5, 2023, from <https://www.investor.gov/introduction-investing/investing-basics/investment-products/bonds-or-fixed-income-products/bonds>
- Hayes, A. (2023, April 30). The bond market (aka debt market): Everything you need to know. Investopedia. Retrieved May 5, 2023, from <https://www.investopedia.com/terms/b/bondmarket.asp#:~:text=The%20bond%20market%20refers%20broadly,to%20investment%20amount%2C%20plus%20interest>.
- Hotchkiss, E., & Jostova, G. (2017). Determinants of corporate bond trading: A comprehensive analysis. *Quarterly Journal of Finance*, 07(02), 1750003. <https://doi.org/10.1142/s2010139217500033>
- Diebold, F. X., & Li, C. (2006). Forecasting the term structure of government bond yields. *Journal of Econometrics*, 130(2), 337–364. <https://doi.org/10.1016/j.jeconom.2005.03.005>
- Vicente, J., & Tabak, B. M. (2008). Forecasting bond yields in the Brazilian fixed income market. *International Journal of Forecasting*, 24(3), 490–497. <https://doi.org/10.1016/j.ijforecast.2008.03.009>
- Carriero, A., Kapetanios, G., & Marcellino, M. (2012). Forecasting government bond yields with large Bayesian vector autoregressions. *Journal of Banking & Finance*, 36(7), 2026–2047. <https://doi.org/10.1016/j.jbankfin.2012.03.008>