



Yield Curve Regime Clustering & Interest Rate Forecasting

P2 Preliminary Presentation

Team: Sajan Arora & Karan
Badlani

Project Goal

1

Identify yield
curve regimes
using clustering

2

Forecast future
yield movements
and/or regime
transitions

3

Analyze
macroeconomic
interpretation of
curve shapes

Proposed Plan

Collect

- multi-maturity weekly Treasury yields

Apply

- clustering to detect yield curve regimes

Develop

- forecasting models to predict rates/regime changes

Data Collection

- Federal Reserve Economic Data (FRED) <https://fred.stlouisfed.org/>
- We use weekly U.S. Treasury Constant Maturity yield rates to represent the yield curve.
- Maturities Included:
 - 3-Month Treasury Bill (TB3MS)
<https://fred.stlouisfed.org/series/TB3MS>
 - 2-Year Treasury Note (DGS2)
<https://fred.stlouisfed.org/series/DGS2>
 - 10-Year Treasury Note (DGS10)
<https://fred.stlouisfed.org/series/DGS10>
 - 30-Year Treasury Bond (DGS30)
<https://fred.stlouisfed.org/series/DGS30>
- Frequency: Weekly observations
- Time Span Used: ~25+ Years (covers multiple economic cycles)

Pre-processing Steps



Retrieved weekly yield data via FRED API



Standardized date indexing



Forward-filled missing values where necessary



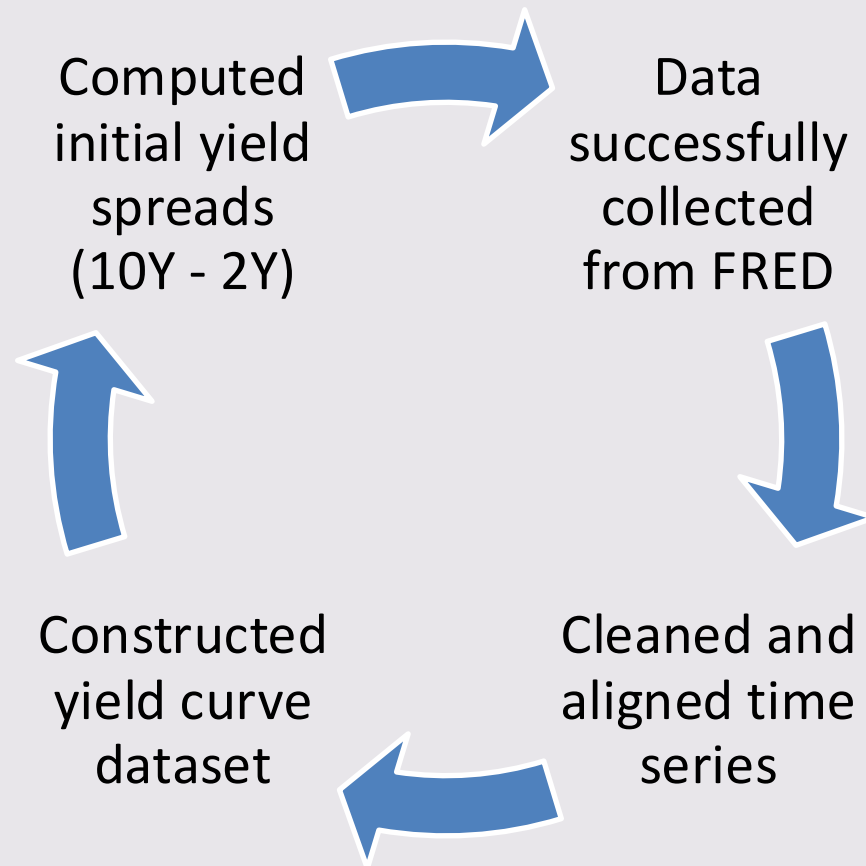
Constructed numerical matrix representation of yield curves

Data Overview

- Final dataset: Weekly U.S. Treasury yields (3M, 1Y, 2Y, 5Y, 10Y, 30Y)
- Time span: 1980–2025 (~1,300 weekly observations)
- Each row = weekly observation (indexed by date)
- Each column = yield at a specific maturity or spread metric
- Data is fully cleaned and merged

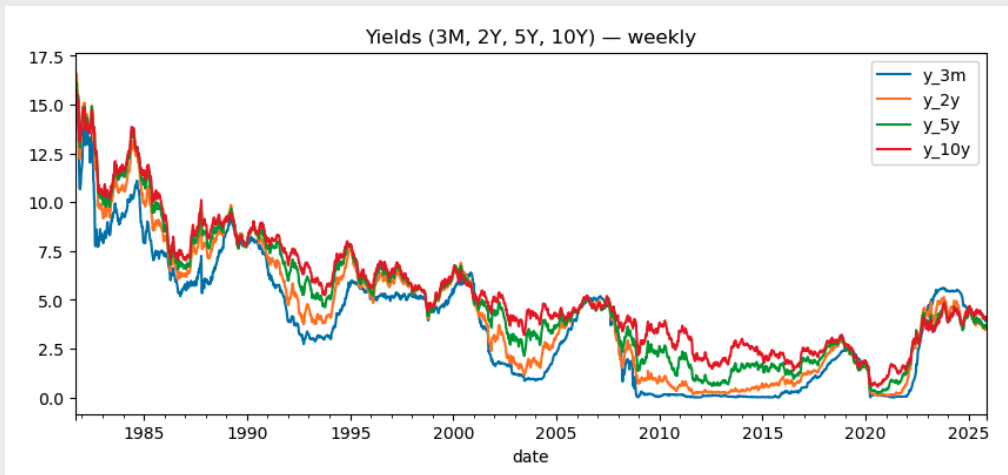
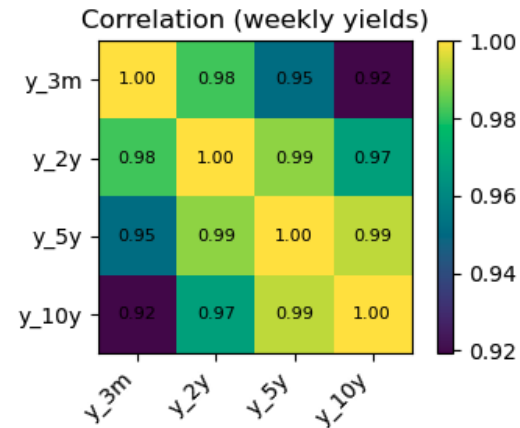
	y_3m	y_1y	y_2y	y_5y	y_10y	y_30y	spr_10y_3m	spr_10y_2y
date								
2025-10-24	3.95	3.57	3.46	3.58	4.00	4.57	0.05	0.54
2025-10-31	3.90	3.66	3.55	3.67	4.06	4.61	0.16	0.51
2025-11-07	3.95	3.67	3.59	3.71	4.12	4.70	0.17	0.53

What We Have Done (Week 1)

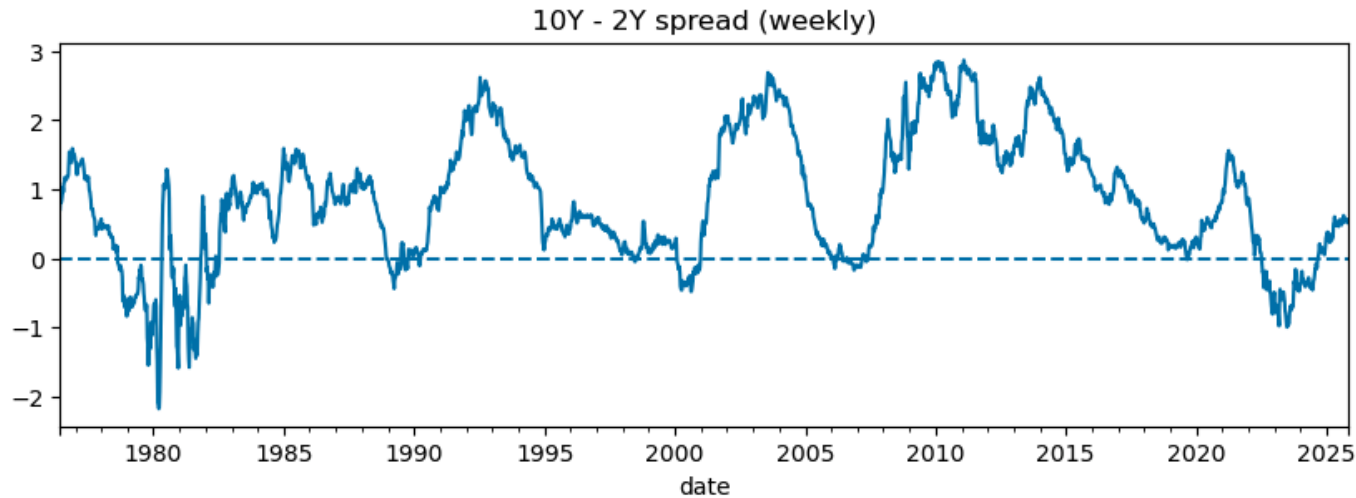


Exploratory Data Analysis

High correlation among maturities confirms smooth yield curve structure and suitability for dimensionality reduction.



Yields across maturities follow similar long-term downward trends, reflecting multiple rate cycles since the 1980s



Exploratory Data Analysis

- The 10Y–2Y spread turns negative before major recessions, highlighting yield curve inversion as a predictive feature.

Next Steps

- Week 2 – Apply PCA to reduce dimensions & perform K-Means clustering.
- Week 3 – Train forecasting models (ARIMA / VAR).
- Week 4 – Evaluate models & prepare final presentation.

