FORECASTING CENTRAL BANK INTEREST RATES USING MACROECONOMIC VAR IN EVIEWS

1. Overview

Client:

A financial consultancy supporting central bank analysts and institutional fixed-income strategy teams in the U.S. and Europe

Objective:

To construct a macroeconomic forecasting model using VAR in EViews that predicts movements in short-term policy interest rates based on inflation, output growth, and unemployment trends.

2. Background

Forecasting central bank policy actions requires understanding how macroeconomic variables interact. Relying on single-variable forecasts limits reliability. The client needed a multivariate time series model to simulate how inflation and output gaps drive policy rate decisions. EViews VAR modeling provided a transparent, academically accepted framework.

3. Data Summary

Time Period:

Q1 1995 – Q4 2022 (112 quarterly observations)

Variables Used:

Variable	Description	Source
Policy_Rate	Effective federal funds rate (%)	Federal Reserve (FRED)
CPI_Inflation	Year-over-year CPI inflation (%)	U.S. Bureau of Labor Statistics
Real_GDP_Growth	Quarterly % change in real GDP (SAAR)	U.S. Bureau of Economic Analysis
Unemployment_Rate	Civilian unemployment rate (%)	U.S. Bureau of Labor Statistics

All data series were seasonally adjusted.

4. Methodology

Software Used:

EViews 13

Model Type:

VAR (Vector AutoRegression)

Steps in EViews:

1. **Data Import and Visualization:**
    - Time series structured in panel format
    - Checked all variables for trends and volatility patterns
2. **Stationarity Testing:**
    - ADF and PP tests confirmed variables to be stationary at level (I(0))
    - No differencing required
3. **Lag Selection:**
    - Used AIC and SC to determine optimal lag: VAR(2)
4. **Model Estimation:**
    - *Estimate VAR* command with 2 lags
    - Included deterministic constant
    - Performed residual diagnostics: autocorrelation, normality, heteroskedasticity
5. **Forecasting and Scenario Simulation:**
    - Out-of-sample dynamic forecast for 8 quarters (2023–2024)
    - Generated IRFs for policy rate shocks
    - Forecast error variance decomposition calculated

5. Key Results

Forecast Output	Observation
Rate Sensitivity	Interest rate increases follow CPI inflation increases with 1Q lag

Output Gap Effect	Lower GDP growth → softening of policy rate within 2Q
Inflation Shock Impact	1% CPI shock → ~0.75% policy rate increase over 3 quarters
Unemployment Channel	Higher unemployment dampens rate increases (counter-cyclicality)
Model Accuracy (RMSE)	0.32 percentage points (12-mo forecast horizon)

Variance Decomposition (at horizon = 4Q):

- 46% of policy rate forecast error variance explained by inflation
- 31% by GDP growth
- 23% by unemployment shocks

6. Visual Outputs (EViews)

- Forecast plots with upper/lower bands
- Impulse response graphs (e.g., inflation → rate path)
- Variance decomposition charts
- Residual ACF and Q-statistic plots

7. Deliverables

- EViews .wf1 file with all variables, model setup, and forecasts
- Technical report (18 pages) including:
    - VAR theory and model building
    - Forecast interpretation and IRF analysis
    - Diagnostic test results and graphical outputs
- Executive policy brief (2 pages):
    - Summary of projected rate path under baseline and shock scenarios
    - Application of model to Fed policy planning and fixed-income strategy

8. Application & Outcome

- Used by the client to simulate interest rate reactions under inflation spike scenarios

- Cited in macro strategy newsletters sent to fixed-income clients
- Validated by comparing projected vs. actual Fed rate actions in 2023

9. Strategic Value Delivered

- Enabled the client to **integrate macroeconomic feedback loops into rate forecasting**
- Provided a **transparent, validated VAR model** useful for both policymakers and investors
- Improved **scenario testing** for interest-sensitive instruments and hedging strategies