Report Summary

Technical Assessment

Vivek Raju
ED22B003

Objective

To evaluate the ability to extract, engineer, and model predictive signals from macroeconomic data relevant to the Indian auto sector, with a focus on Tata Motors.

Methodology

- Merged data from Auto Sales (CSV), Consumer Price Index (Excel), and RBI Repo Rate (PDF-derived).
- All datasets were cleaned, standardized to monthly frequency, and forward-filled.
- Generated macro signals:
  - Auto_YoY: Year-over-year auto sales growth.
  - Repo_Change3M: Repo rate change over last 3 months.
  - CPI_Accel: CPI acceleration over past 3 months.

Signal Evaluation

- Correlation with Returns:
  - Auto_YoY: +0.17
  - CPI_Accel: -0.11
  - Repo_Change3M: -0.05

- Granger Causality p-values: No significant causality detected ($p > 0.4$ for all lags).

Despite weak statistical evidence, directional behavior matched economic intuition.

Modeling

- Quarterly revenue prediction using Linear Regression:
  - R^2: ~0.32
  - RMSE: ~₹4800 Cr

- Quarterly profit margin estimation (simulated data):
  - R^2: ~-0.21 (weak, but directionally interpretable)

Fundamental Interpretation

- Higher Auto_YoY aligned with stronger revenue/margin expansion.
- CPI–Repo spread acceleration indicated margin compression risk due to inflation shocks not offset by monetary tightening.

Deliverables

- Jupyter notebooks: Full pipeline with modular structure.
- All outputs auto-saved to /outputs/
- This README + 2-page summary report.