Week 4: Time-Series Forecasting
ARIMA & GARCH Models

MSc Banking and Finance - FinTech Course

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1 Practical Exercises

1.1 Exercise 1: Stationarity Testing

Test the stationarity of some asset prices and returns using both ADF and KPSS tests. Interpret the results and explain why returns are preferred for modeling.

1.2 Exercise 2: Model Selection & Volatility Forecasting

Fit ARIMA models with orders (0,0,0), (1,0,0), (0,0,1), and (1,0,1) to some crypto (or whatever else you are prefer) returns. Compare AIC and BIC values to select the best model. Similarly, estimate a GARCH(1,1) and calculate the 30-day ahead volatility forecast and interpret the persistence parameter $(\alpha + \beta)$.

1.3 Exercise 3: Monte Carlo Simulation

Generate 1000 price paths for some assets over a 30-day horizon using combined ARIMA-GARCH forecasts. Calculate the 90% confidence interval and probability of positive returns.

1.4 Exercise 4: Backtesting

Implement rolling window forecasting for your chosen cryptocurrency. Compare RMSE and directional accuracy against a naive random walk benchmark.