

Assignment 2 : EIE3006/EII3005 – Financial Econometrics

Semester 1, Session 2024/2025

Date of Submission : 3rd January 2025 (3 Weeks)

Save your assignment as “Assignment2_[Yourname]” in .doc or .pdf format, and submit to aminhaniff@um.edu.my

Title : Investigating Influences on Microsoft Stock Price

Objective:

The goal of this assignment is to identify the key variables that significantly influence Microsoft Stock Price. Using econometric techniques, you will analyze the dynamic relationships between Microsoft Stock Price and selected macroeconomic and financial variables. The aim is to determine which variables play a critical role in influencing Microsoft Stock Price and to interpret their economic and financial significance.

Datasets : 04-macro-assets_Price.xls

Label	Meaning
microsoft	Microsoft Stock Price
ccredit	Consumer Credit or Commercial Credit
snp	S&P Common Stock Price Index : Composite
m1supply	M1 Money Supply
bminusa	US Corporate Index
cpi	Consumer Price Index
indpro	Industrial Production Index
ustb3m	3-Month U.S. Treasury Bill Yield
ustb10y	10-Year U.S. Treasury Bond Yield
gs5	5-Year Treasury Rate
gs10	10-Year Treasury Rate

Data Preparation and Exploration

The variables are grouped into three different sets, and each sets of variables corresponds to unique theoretical relationships towards Microsoft Stock Price. The groups of the variables assigned to you are shown below :

Group 1:

- Microsoft Stock Price
- S&P Common Stock Price Index : Composite (market sentiment and equity trends)
- 10-Year U.S. Treasury Bond Yield (long-term interest rates)
- Consumer Price Index (inflation and purchasing power)

Group 2:

- Microsoft Stock Price
- Industrial Production Index (economic output and demand for technology)
- 5-Year Treasury Rate (medium-term interest rates)
- M1 Money Supply (liquidity in the economy)

Group 3:

- Microsoft Stock Price
- Bank of America Merrill Lynch US Corporate Bond Index (corporate credit market conditions)
- Consumer Credit or Commercial Credit (consumer debt and spending trends)
- 3-Month U.S. Treasury Bill Yield (short-term interest rates)

Theoretical Relationships Between Variables

Group 1:

- **S&P Common Stock Price Index : Composite**

The S&P Composite Index reflects overall market performance and investor sentiment. As a major component of the stock market, Microsoft's stock price is expected to have a strong correlation with the S&P index. A rise in the index typically signals positive market conditions, which can boost Microsoft's stock price.

- **10-Year U.S. Treasury Bond Yield**

The 10-year yield is a key indicator of long-term interest rates and reflects expectations of future economic conditions and monetary policy. Higher yields increase the discount rate used to value future cash flows, negatively impacting stock prices, including Microsoft's. Conversely, lower yields can support higher stock valuations.

- **Consumer Price Index (CPI)**

The CPI serves as a measure of inflation, which can affect consumer spending, purchasing power, and corporate profitability. Rising inflation could lead to higher interest rates and increased costs, potentially reducing Microsoft's profit margins and stock price.

Group 2:

- **Industrial Production Index**

The Industrial Production Index measures the output of the manufacturing, mining, and utilities sectors, providing insight into overall economic activity. A strong industrial production environment may indicate robust economic growth, which can benefit companies like Microsoft through increased demand for their technology products and services.

- **5-Year Treasury Rate**

The 5-year Treasury rate reflects medium-term interest rate expectations. It impacts borrowing costs and corporate investment decisions. Rising rates may increase financing costs for Microsoft, reducing profitability, while declining rates can have the opposite effect.

- **M1 Money Supply**

M1 Money Supply represents the liquidity available in the economy. Higher liquidity, often driven by expansionary monetary policies, tends to encourage investment in equities, including Microsoft stock. Conversely, tighter monetary policies and reduced liquidity can negatively impact stock prices.

Group 3:

- **Bank of America Merrill Lynch US Corporate Bond Index**

This index reflects credit market conditions for corporations. A strong performance in the corporate bond market indicates favourable financing conditions for companies like Microsoft, potentially lowering their cost of capital and boosting stock prices.

- **Consumer Credit or Commercial Credit**

Consumer and commercial credit levels reflect the ability of businesses and individuals to borrow and spend. High credit growth may indicate strong economic activity and increased demand for Microsoft's products and services, positively impacting its stock price.

- **3-Month U.S. Treasury Bill Yield**

The 3-month yield represents short-term interest rate expectations and is influenced by central bank policies. Rising short-term rates can lead to higher borrowing costs and reduced corporate profitability, potentially lowering stock prices. Conversely, falling short-term rates may have a stimulative effect on equities, including Microsoft stock.

INSTRUCTION FOR EACH GROUP OF DATA

Step 1: Data Transformation and Stationarity Testing

1. Transform all variables into natural logarithm format
2. Conduct the **Augmented Dickey-Fuller (ADF)** test to assess stationarity for each variable. (*Note: Ensure to check “Trend and Intercept” for data at Level, and “intercept” for data at first difference*)
3. Present the results of your stationarity test, including the order of integration $I(0)$ or $I(1)$ for each variable.

Step 2: Cointegration Testing

1. Use the **Johansen cointegration test** to determine if there is a long-run equilibrium relationship between the variables in your group.
2. Report the results of the test, including the **trace statistic** and **maximum eigenvalue statistic**, and explain their significance.
3. Based on the cointegration results, decide whether to proceed with a **Vector Autoregressive (VAR)** model or a **Vector Error Correction Model (VECM)**

Step 3: Diagnostic Testing

1. Perform the following diagnostic tests to evaluate your model:
 - **Serial Autocorrelation Test:** Use the LM test and interpret the results.
 - **Heteroskedasticity Test:** Use the White test to assess heteroskedasticity.
2. Discuss the diagnostic results and their implications for model reliability.

Step 4: Model Estimation and Interpretation

1. Estimate the appropriate model (VAR or VECM) for your group:
 - If using **VAR**, specify the lag length based on information criteria (AIC, BIC, etc.).
 - If using **VECM**, include the error correction term and interpret its significance.
2. Present the estimated equations for Microsoft Stock Price and interpret the coefficients.

Step 5: Causality and Dynamic Analysis

1. Conduct a **Granger-causality test** to identify directional relationships among the variables.
2. Generate and interpret **Impulse Response Functions (IRFs)** to analyze how Microsoft Stock Price reacts to shocks in the other variables.
3. Perform **Variance Decomposition** to determine the contribution of each variable to the forecast error variance of Microsoft Stock Price.
4. Summarize the dynamic interactions and explain which variables have the largest influence on Microsoft Stock Price.

Step 6: Insights and Recommendations

1. Identify the key variables that play a significant role in determining Microsoft Stock Price and explain their theoretical and practical relevance.
2. Discuss the economic implications of the results. Are the signs and magnitudes of the coefficients consistent with theory?
3. Provide actionable recommendations for financial analysts or investors monitoring Microsoft Stock Price.