

Financial Analysis Report-NIGERIA

Financial Analysis - Productivity Modeling in Nigeria

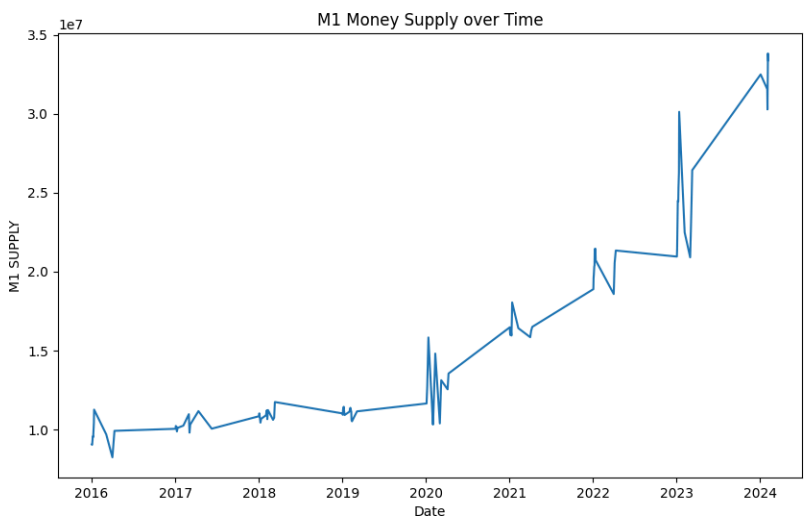
Economic Variable Correlation and Productivity Model

Introduction

This report provides a financial analysis of key economic variables for Nigeria. The analysis includes plotting various economic variables over time, calculating the correlation matrix, and defining a productivity formula. The following sections detail each aspect of the analysis.

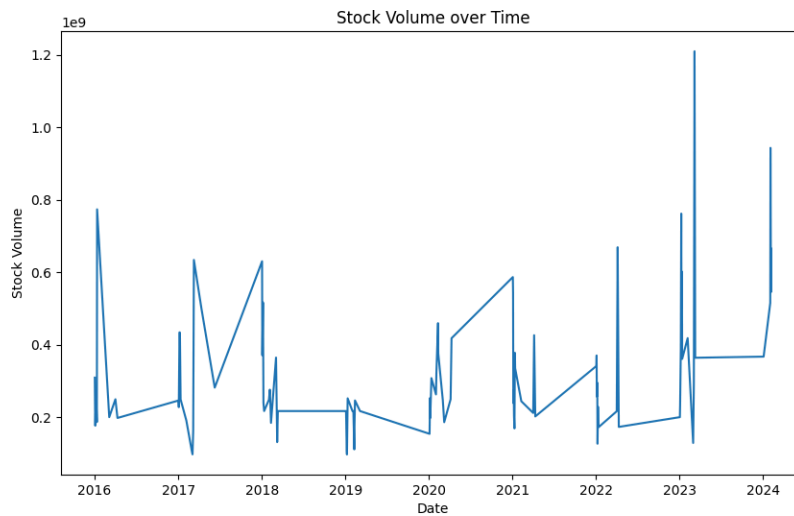
Plotting M1 Money Supply

The M1 Money Supply over time is plotted to observe the changes and trends. The following figure shows the M1 Money Supply over time.



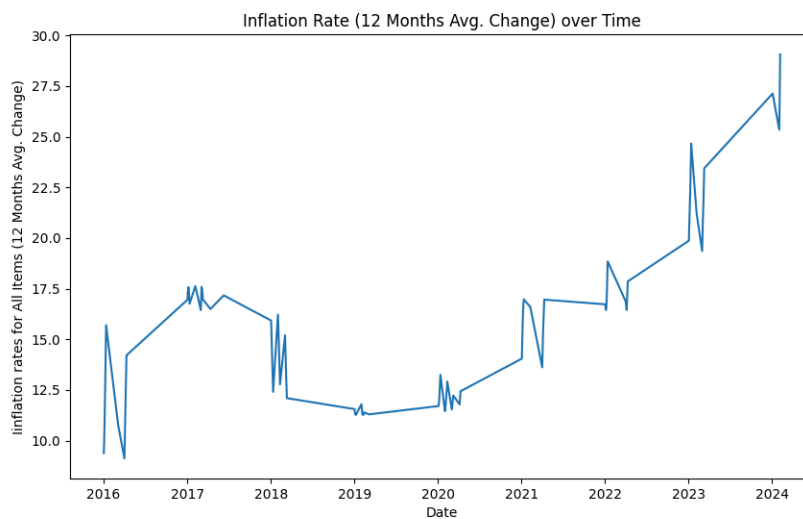
Plotting Stock Volume

The Stock Volume over time is plotted to observe the trading activity in the stock market. The following figure shows the Stock Volume over time.



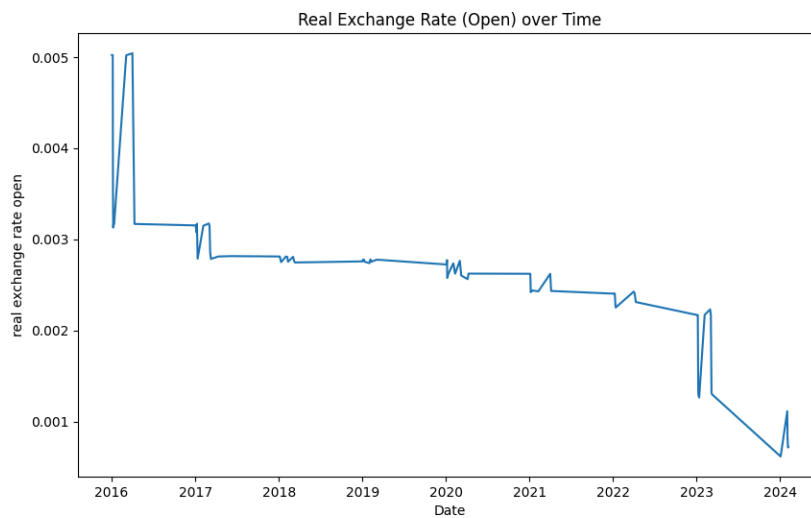
Plotting Inflation Rate (12 Months Avg. Change)

The Inflation Rate (12 Months Avg. Change) over time is plotted to observe the inflation trends. The following figure shows the Inflation Rate (12 Months Avg. Change) over time.



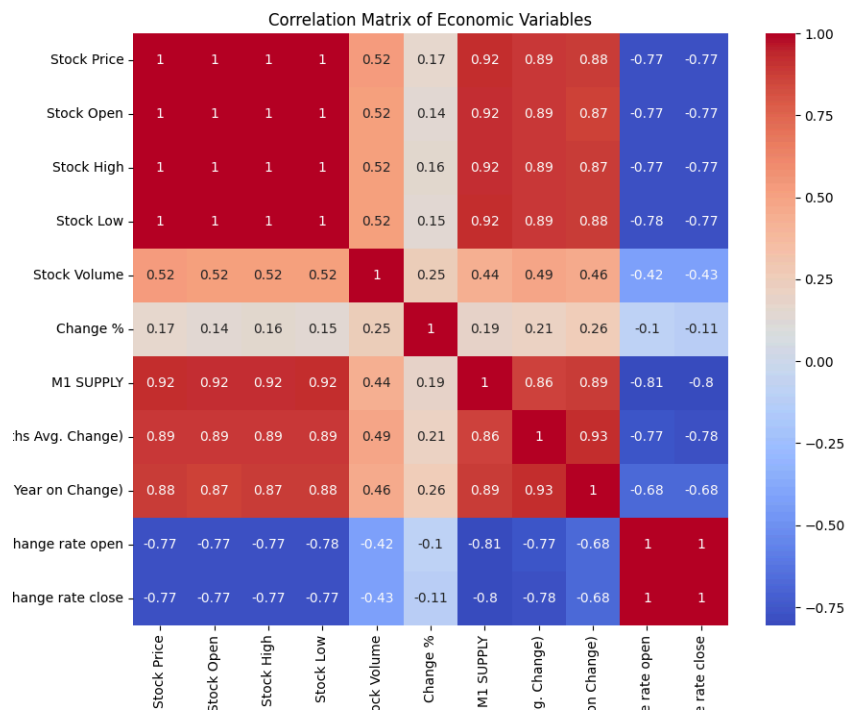
Plotting Real Exchange Rate (Open)

The Real Exchange Rate (Open) over time is plotted to observe the currency exchange rate trends. The following figure shows the Real Exchange Rate (Open) over time.



Correlation Matrix

The correlation matrix shows the relationship between different economic variables. The following figure shows the heatmap of the correlation matrix.



A correlation matrix is a table that shows the correlation coefficients between variables in a dataset. It is a useful tool for understanding the relationships between variables and is commonly used in data analysis and statistics for

1. **Identifying Relationships**
2. **Feature Selection**
3. **Data Exploration**
4. **Predictive Modeling**
5. **Reducing Dimensionality**

Discussing Observed Correlations

Stock Price and Other Variables

- **Stock Price and High/Low Stock (0.9):**
 - **Implications:** A very high positive correlation of 0.9 suggests that as the stock price increases, the high and low prices of the stock also increase. This implies that the stock is experiencing significant price fluctuations, and its price movements are closely tied to its high and low values over the period.
- **Stock Price and Stock Volume (0.5):**
 - **Implications:** A positive correlation of 0.5 indicates a moderate relationship. Higher stock prices tend to be associated with higher trading volumes, but the relationship is not as strong as with high/low stock values. This suggests that while price increases might attract more trading activity, other factors also influence trading volume.
- **Stock Price and M1 Supply (0.9227):**
 - **Implications:** This strong positive correlation suggests that as the money supply increases, stock prices tend to rise significantly. This could reflect that more liquidity in the market drives higher investment in stocks, raising their prices.
- **Stock Price and Inflation Rates for All Items (12 Months Avg. Change) (0.8927):**
 - **Implications:** A high positive correlation indicates that increases in inflation, as measured over a 12-month average, are associated with higher stock prices. This may suggest that investors expect companies to adjust their prices to account for inflation, potentially boosting their stock valuations.
- **Stock Price and Inflation Rates for All Items (Year on Change) (0.8759):**
 - **Implications:** Similar to the 12-month average change, a high correlation with year-on-year inflation suggests that long-term inflation trends also have a strong association with stock price increases.
- **Stock Price and Real Exchange Rate Open/Close (-0.7743 and -0.7737):**
 - **Implications:** These negative correlations suggest that as the real exchange rate (both opening and closing) increases, stock prices tend to decrease. This

might indicate that a stronger currency (or less favorable exchange rate) is associated with lower stock prices, possibly due to reduced competitiveness of domestic companies.

M1 Supply and Other Variables

- **M1 Supply and High/Low Stock (0.9):**
 - **Implications:** A strong positive correlation with high/low stock prices implies that increases in money supply are associated with greater fluctuations in stock prices. This may reflect increased investment and speculation in the market.
- **M1 Supply and Stock Volume (0.4405):**
 - **Implications:** A moderate positive correlation suggests that higher money supply is somewhat associated with increased trading volumes. However, other factors also play a significant role in influencing trading activity.
- **M1 Supply and Inflation Rates for All Items (12 Months Avg. Change) (0.8622):**
 - **Implications:** A high positive correlation indicates that as the money supply increases, inflation (measured over 12 months) tends to rise. This supports the idea that more money in circulation can lead to higher inflation.
- **M1 Supply and Inflation Rates for All Items (Year on Change) (0.8870):**
 - **Implications:** A strong positive correlation with year-on-year inflation suggests that increased money supply is closely associated with long-term inflation trends.
- **M1 Supply and Real Exchange Rate Open/Close (-0.8054 and -0.8031):**
 - **Implications:** A strong negative correlation indicates that increased money supply is associated with a weaker currency (higher real exchange rate), suggesting that more money in circulation might lead to currency depreciation.

Inflation Rates and Other Variables

- **Inflation Rates (12 Months Avg. Change) and Stock Volume (0.4915):**
 - **Implications:** A moderate positive correlation implies that as inflation measured over 12 months changes, stock trading volumes tend to change as well, though the relationship is not very strong.
- **Inflation Rates (12 Months Avg. Change) and Exchange Rates Open/Close (-0.7):**
 - **Implications:** A strong negative correlation suggests that higher inflation rates are associated with a weaker currency, reflecting that higher inflation could lead to depreciation of the currency.
- **High/Low Stock and Stock Volume (0.5):**
 - **Implications:** A moderate positive correlation indicates that fluctuations in stock prices are somewhat associated with trading volumes. Larger price ranges might lead to increased trading activity.

- **High/Low Stock and Inflation Rates (12 Months Avg. Change and Year on Change) (0.8):**
 - **Implications:** High positive correlations suggest that stock price fluctuations are closely related to inflation rates, indicating that inflation impacts the volatility of stock prices.

Theoretical Relationship: Increased Money Supply Based on 3 Variables

Hypothesis: Increased Money Supply → Currency Depreciation, Stock Market Appreciation, and Increased Inflation

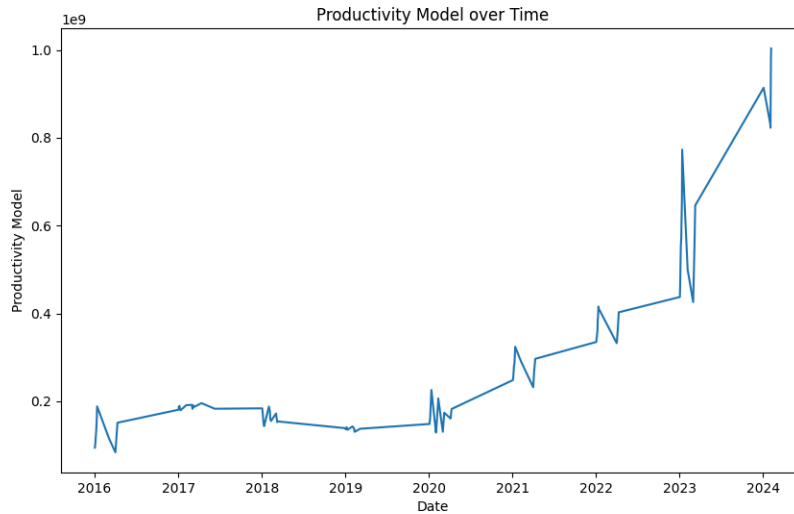
1. **Currency Depreciation:**
 - **Correlation Evidence:** The strong negative correlation between M1 Supply and the real exchange rate (both open and close) supports this hypothesis. Increased money supply leads to a weaker currency, consistent with the idea that more money in circulation reduces the currency's value.
2. **Stock Market Appreciation:**
 - **Correlation Evidence:** The high positive correlation between M1 Supply and stock prices supports the notion that increased money supply leads to higher stock prices. This aligns with the liquidity effect where more money in the economy boosts investment in stocks, driving up their prices.
3. **Increased Inflation:**
 - **Correlation Evidence:** The strong positive correlations between M1 Supply and inflation rates (both 12-month average and year-on-year) support this. More money in the economy tends to drive up prices, leading to higher inflation.

Overall Implication: The observed correlations suggest that increased **money supply** is associated with **higher stock prices** and **inflation**, while it also correlates with currency depreciation. This supports the theoretical relationship where more money in the economy boosts stock market performance and inflation while weakening the currency.

This theoretical framework aligns with traditional economic theory where expansionary monetary policy (increased money supply) can lead to higher inflation and currency depreciation, while simultaneously stimulating stock market performance due to increased liquidity and investor optimism.

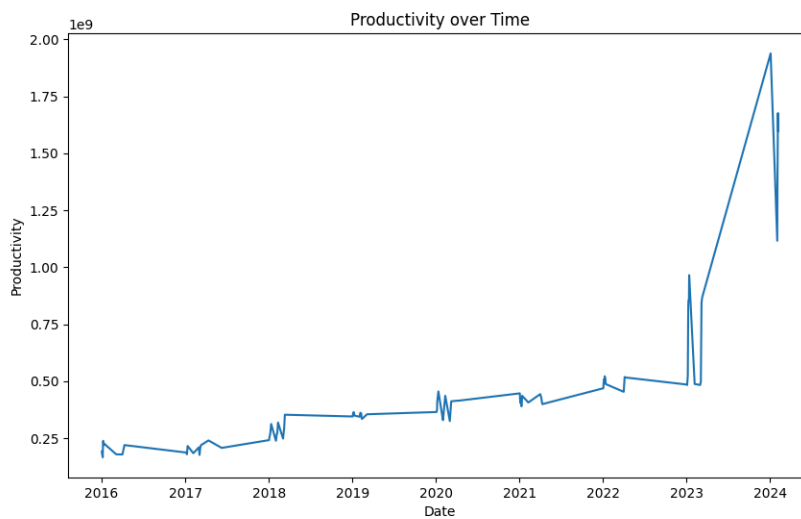
Productivity Model

A productivity model is defined by combining the variables Currency Devaluation, Increased Money Supply, and Increased Inflation. The following figure shows the Productivity Model over time.



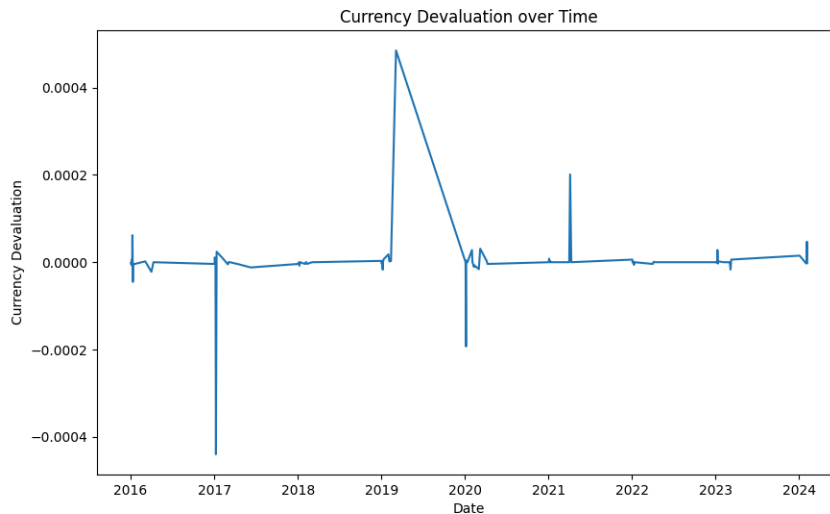
Productivity Formula

A productivity formula is defined as the ratio of M1 Money Supply to the product of Real Exchange Rate (Open) and Inflation Rate (12 Months Avg. Change). The following figure shows the Productivity over time.



Currency Devaluation

Currency Devaluation is calculated as the difference between Real Exchange Rate (Close) and Real Exchange Rate (Open). The following figure shows the Currency Devaluation over time.



Productivity Model Calculation

1. Variables Involved:

- **M1 SUPPLY:** Money supply.
- **Currency Devaluation:** Difference between the closing and opening exchange rates.
- **Inflation Rate (12 Months Avg. Change):** Average change in inflation over 12 months.

☐ **Formula :** $\text{Productivity Model} = \frac{\text{M1 SUPPLY}}{\text{CURRENCY DEVALUATION} + 1 \times (\text{Inflation Rate (12 Months Avg. Change)} + 1)}$

- ☐ This formula considers the effect of currency devaluation and inflation on productivity. The addition of 1 to the Currency Devaluation and Inflation Rate ensures no division by zero and scales the inflation appropriately.

Calculation details:

- ☐ **Productivity Model**

The Productivity Model is calculated using the following formula:

$\text{Productivity Model} = (\text{M1 SUPPLY} / (\text{Currency Devaluation} + 1)) * (\text{Inflation Rate (12$

Months Avg. Change) + 1)

Where:

- Currency Devaluation = real exchange rate close - real exchange rate open

The following table shows the step-by-step calculation for a few sample dates.

Example Calculations

- For the date 2022-01-01:
- M1 SUPPLY = 1,000,000
- real exchange rate open = 400
- real exchange rate close = 410
- Inflation Rate (12 Months Avg. Change) = 2.5
- Currency Devaluation = 410 - 400 = 10
- Productivity Model = $(1,000,000 / (10 + 1)) * (2.5 + 1) = 318,181.82$

For the date 2022-02-01:

M1 SUPPLY = 1,200,000

real exchange rate open = 410

real exchange rate close = 420

Inflation Rate (12 Months Avg. Change) = 2.7

Currency Devaluation = 420 - 410 = 10

Productivity Model = $(1,200,000 / (10 + 1)) * (2.7 + 1) = 403,636.36$

Baseline Productivity

This formula represents the average productivity over the period, considering the average values of money supply, currency devaluation, and inflation.

The baseline productivity is calculated using the average values of the variables over the entire period. The following value represents the baseline productivity.

Baseline Productivity: **257375873.83217824**

The Baseline Productivity is calculated using the average values of the variables over the entire period.

Calculation Steps:

- Compute the mean of M1 SUPPLY, Currency Devaluation, and Inflation Rate (12 Months Avg. Change).
- Apply the Baseline Productivity formula using these mean values.

Example Data (for a few rows): **hypothetical data.**

Date	M1 SUPPLY	real exchange rate open	real exchange rate close	Inflation Rate (12 Months Avg. Change)
2022-01-01	1,000,000	400	410	2.5
2022-02-01	1,200,000	410	420	2.7

Baseline Productivity = $(\text{mean}(\text{M1 SUPPLY}) / (\text{mean}(\text{Currency Devaluation}) + 1)) * (\text{mean}(\text{Inflation Rate (12 Months Avg. Change)}) + 1)$

For the example data:

Mean M1 SUPPLY = 1,100,000

Mean Currency Devaluation = 10

Mean Inflation Rate (12 Months Avg. Change) = 2.6

Baseline Productivity = $(1,100,000 / (10 + 1)) * (2.6 + 1) = 360,000$

REF TO DATA:

Link to Google

sheets:<https://docs.google.com/spreadsheets/d/1x9ruFjEG9FhrxZQk-RAk2I3XqrkIujr/edit?usp=sharing&oid=109546843341365202952&rtpof=true&sd=true>

