PS_1

Regression Analysis with NASDAQ and USD/ILS Daily Yields (2017-2024)

Step 1: Data Collection

Collect daily historical data for the USD/ILS exchange rate and the NASDAQ index from January 2017 to April 2024. This data can typically be obtained from financial data providers such as Yahoo Finance or Investing.com.

Step 2: Data Preparation

Convert the daily prices into daily yields (returns). This is done by calculating the percentage change from one day to the next. Perform this calculation for both USD/ILS and NASDAQ.

Step 3: Data Splitting

Split the data into training (2017-2020) and testing sets (2021-2023). The first four years will be used to develop the model, and the last three years will be used to test its predictive power.

Step 4: Regression Analysis

Use a statistical software package or programming libraries such as Python's **statsmodels** or **scikit-learn** to run a linear regression where daily yields of USD/ILS are the dependent variable and daily yields of NASDAQ are the independent variable. The regression model would be:

$$\text{USD/ILS Yield} = \beta 0 + \beta 1 \times \text{NASDAQ Yield} + \epsilon$$

Fit the model using the training dataset.

Calculate the Correlation Coefficient

Calculate the Pearson correlation coefficient between the daily yields of USD/ILS and NASDAQ. This can be done using Python's **pandas** library with the **.corr()** method.

Interpret the correlation coefficient:

Near +1 or -1: Strong correlation, indicating a strong relationship between the yields of USD/ILS and NASDAQ.

Near 0: Little to no linear correlation.

Step 5: Interpret the Results

Evaluate the output from the regression model. Key metrics to consider include:

Coefficient (β1): Indicates the relationship strength and direction between NASDAQ yields and USD/ILS yields. A positive coefficient suggests that as NASDAQ yields increase, USD/ILS yields also increase, and vice versa.

Intercept (β0): The expected value of USD/ILS yield when NASDAQ yield is zero.

R-squared: Measures how much of the variability in USD/ILS yields can be explained by NASDAQ yields.

p-values: Assess the statistical significance of the coefficients.

Step 6: Model Testing

- Test the model using the test dataset by predicting the USD/ILS yields and comparing them to the actual yields. Analyze the residuals (the differences between predicted and actual yields) to assess the model's accuracy and reliability.
- Check for residual normality and potential biases.

Step 7: Variations over time

To further enrich the analysis you should break down the data into different intervals and examining how the relationship between USD/ILS yields and NASDAQ yields might vary over time, you can conduct segmented regression and correlation analyses. This approach helps identify if certain periods were influenced by unique factors (such as economic events or policy changes) that might have affected the relationship between these variables differently.

Rolling Correlation

To capture more dynamic shifts in correlation, calculate a rolling correlation with a suitable window (e.g., 30 days). This analysis will provide a more granular view of how the correlation evolves day by day within and across the defined periods.

Plot these rolling correlations to visually assess fluctuations and trends.