Methodology for LEI and SP 500 Stock Returns Analysis

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1 Introduction

This document details the methodology used in the *LEI and S&P 500 Stock Returns Analysis* project. The goal of this analysis is to investigate the predictive power of the U.S. Leading Economic Index (LEI) on monthly returns of the S&P 500. The study applies Ordinary Least Squares (OLS) regression to examine the relationship between LEI changes and stock returns, alongside correlation analysis to assess the association visually.

2 Methodology

2.1 Data Collection and Preparation

The U.S. LEI data is obtained from a CSV file, '"USALOLITONOSTSAM (2).csv"', which contains monthly values of the LEI Index. The data is loaded and prepared for analysis by setting dates as the index and calculating the month-over-month percentage change:

$$\text{LEI Change}_{\%\text{MoM}} = \frac{\text{LEI}_t - \text{LEI}_{t-3}}{\text{LEI}_{t-3}} \tag{1}$$

where LEI_t is the LEI value at time t.

2.2 OLS Regression Analysis

An Ordinary Least Squares (OLS) regression is used to investigate the relationship between monthly changes in the LEI and S&P 500 returns. The regression model is defined as:

$$\text{Returns}_{\text{S\&P500}} = \alpha + \beta \cdot \text{LEI Change}_{\%\text{MoM}} + \epsilon \tag{2}$$

where:

- α is the intercept,

- β represents the coefficient for LEI changes,
- ϵ is the error term.

The results of the regression, including the coefficient β and its statistical significance, are saved in the '"OLS_Regression_Results.txt"' file.

2.3 Correlation and Visualization

To visually assess the relationship, time series plots and scatter plots are generated. The correlation analysis involves plotting monthly LEI changes against monthly S&P 500 returns, providing a visual representation of any linear association. Key visualizations include:

- Time series of monthly S&P 500 returns and LEI changes.
- Scatter plot to illustrate correlation between LEI changes and S&P 500 returns.

3 Assumptions

- The relationship between LEI changes and S&P 500 returns is assumed to be linear, justifying the use of OLS regression.
- The LEI Index and S&P 500 returns are assumed to be stationary over the analysis period.

4 Conclusion

The **LEI and S&P 500 Stock Returns Analysis** project explores the potential predictive power of LEI changes on stock returns. The results from OLS regression and visual correlation analysis provide insights into whether fluctuations in the LEI Index could be an indicator for future stock market performance.