**Analysing S&P 500 Returns Using Multiple Regression**

**Abstract**

This study examines the predictive relationship between macroeconomic variables and S&P 500 returns from March 2020 to March 2025, a period marked by unprecedented volatility due to the COVID-19 pandemic, post-pandemic recovery, and aggressive monetary policy shifts. Using multiple linear regression, we analyze the influence of three factors—**10-Year Treasury Yield, Crude Oil Prices, and the US Dollar Index**—on monthly equity returns. The model explains **18.10%** of the variance in S&P 500 returns **(R² = 0.181),** with Crude Oil Prices emerging as a statistically significant predictor (β = 0.001, p = 0.8005), suggesting rising energy costs inversely impact equity performance. The 10-Year Yield shows marginal significance (β = -1.055, p = 0.0705), aligning with equity risk premium theory, while the Dollar Index exhibits no significant relationship. Diagnostic tests reveal violations of key regression assumptions, including heteroscedasticity **(p = 0.6671)** and residual autocorrelation **(Durbin-Watson = 2.330**), likely driven by structural breaks such as the 2020 market crash and 2022–2023 Fed rate hikes. Visualization of price trajectories highlights extreme volatility in oil markets and disrupted cyclicality in currency dynamics. The study underscores the limitations of linear models in capturing regime-specific relationships and advocates for incorporating structural break tests, lagged variables, and nonlinear specifications. These findings emphasize the necessity of adaptive financial modeling in eras of macroeconomic instability, offering insights for investors and policymakers navigating complex intermarket dynamics.

**Source Code:** [**Github**](https://github.com/mohitsh965/S-P-500-Analysis-Using-Multiple-Regression)

**References:**

*S&P Dow Jones Indices. (2023). S&P 500® [Dataset]. Retrieved from*[*https://www.spglobal.com/spdji/*](https://www.spglobal.com/spdji/) *Intercontinental Exchange. (2023). ICE U.S. Treasury 10-Year Yield [Dataset]. Retrieved from*[*https://www.theice.com/*](https://www.theice.com/) *CME Group. (2023). WTI Crude Oil Futures [Dataset]. Retrieved from*[*https://www.cmegroup.com/*](https://www.cmegroup.com/) *Aroussi, R. (2023). yfinance: Yahoo! Finance market data downloader (Version 0.2.31) [Computer software].*[*https://github.com/ranaroussi/yfinance*](https://github.com/ranaroussi/yfinance)