

In this script, the Vector Autoregression (VAR) model is being used to analyze the impact of several macroeconomic variables on the returns of ETFs, which is an exchange-traded fund that tracks different sectors of the U.S. stock market.

VAR models are used in statistics to capture the linear interdependencies among multiple time series. They generalize the univariate autoregressive (AR) model by allowing for more than one evolving variable. All variables in a VAR model are treated symmetrically; each variable is a linear function of past lags of itself and past lags of the other variables.

In this context, the VAR model is used to estimate how changes in GDP growth, inflation rate, unemployment rate, federal funds rate, M2 money stock, building permits, and Purchasing Managers' Index (PMI) affect the returns of the ETF. The model is fit with a lag order determined by the Akaike Information Criterion (AIC), which is a measure used to compare the goodness-of-fit of different statistical models.

After fitting the VAR model, Impulse Response Functions (IRFs) are plotted for each macroeconomic variable on an ETF's returns. The IRFs show the response of an ETF's returns to a one standard deviation shock (impulse) to each of the macroeconomic variables, while holding all other shocks equal to zero. This helps us understand how an ETF's returns might react to sudden changes in each of these macroeconomic variables.

The plots present the estimated impact on an ETF's returns (y-axis) over the next six quarters (x-axis) following a one standard deviation increase in the corresponding macroeconomic variable. The solid line in the middle is the estimated impact, while the dashed lines above and below represent the upper and lower bounds of a 95% confidence interval for this estimate. If the interval contains zero, it indicates that the impact is not

statistically significant at the 5% level.