Data 698

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**Final Project Proposal (version 3)**

**Research Objective**

This research study examines the efficacy of technical indicators and predictive modeling in optimizing a set of investment strategy for the S&P 500. Trading decision, i.e., buy, sell, hold, are generated by RSI, MACD and a predictive model. Each of these three protocols/strategies would be applied to each security on the S&P 500. This is a hypothetical longitudinal study and we would apply the three strategies to all stocks for over a decade (since 2010). At the end, we would compare the performance of each security against the benchmark index in order to evaluate the efficacy and differentiate the best trading strategy among the three.

**Hypotheses**

1) Null hypothesis (H01): all indicators/predictive model make no significant difference in terms of the investment’s alpha when comparing against the index

2) Null hypothesis (H02): there is no significant difference in terms of the investment’s alpha (generated by the indicators/predictive model) among sectors

3) Null hypothesis (H03): a predictive model built from using the features generated by the technical indicators do not perform significantly better than the technical indicators

**Methodology**

We can conduct this hypothetical study using simulation on historical data of the S&P 500. We begin the simulation by investing $10,000 in January 2010 for each stock from the S&P 500. We make a daily trading decision based on prior trading day performance. Each trading decision (“entry”, “exit”) is based on the signals (“buy”, “sell”, “hold”) generated by the indicators and a predictive model. We will measure each individual performance by the end of February 2022.

**Sample Data**

This is open-source data, e.g., quantmod. Below is a mock-up of a data frame for the experimental simulation.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **symbol** | **CompanyName** | **sector** | **RSI** | **MACD** | **Predictive Model** |
| A | Agilent Technologies Inc | Health Care | $3,000 | $2,000 | $1,000 |
| AAL | American Airlines Group | Industrials | $1,000 | $3,300 | $1,500 |
| AAP | Advance Auto Parts | Consumer Discretionary | ($500) | ($700) | ($900) |
| AAPL | Apple Inc. | Information Technology | $2,500 | $2,000 | $1,500 |
| ABBV | AbbVie Inc. | Health Care | ($900) | $200 | $300 |