Project 4 - Manual Strategy

Indicators

For this project I used three indicators. The Moving Average Convergence Divergence, Bollinger Bands, and the difference between SMA-5 and SMA-20.

- Moving Average Convergence Divergence
  - The Moving Average Convergence Divergence (MACD) is calculated by subtracting the 26-day exponential moving average (EMA) from the 12-day EMA.
  - The EMA is different from a Simple Moving Average (SMA) because it gives more weight to newer data points
  - Whenever the value of MACD goes from negative to positive, it is a signal to buy.
  - Whenever the value of MACD goes from positive to negative, it is a signal to sell.

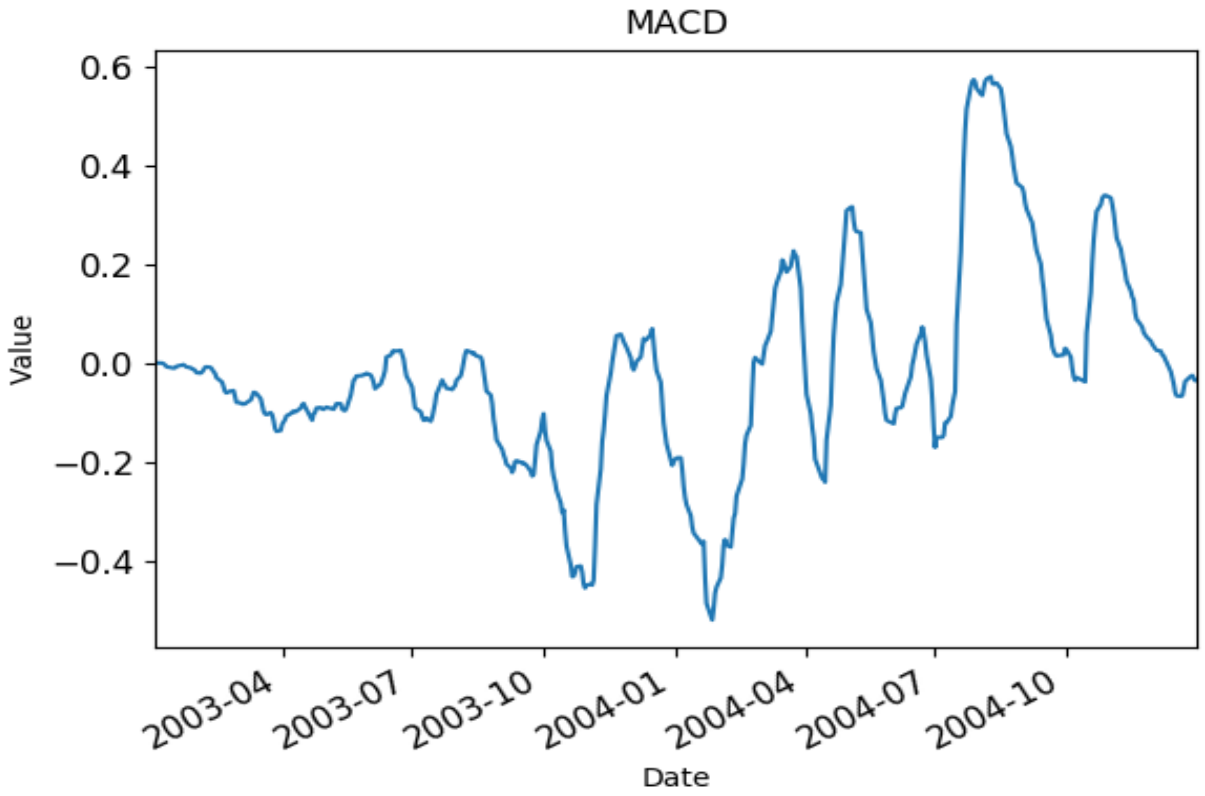

Figure 1: The Moving Average Convergence Divergence. Compare this with Figure 2. To notice the trend between the MACD's relation to 0 and Price

Figure 2: Price of NFLX over the in-sample period

- Bollinger Bands
    - The upper Bollinger Band is calculated by taking the SMA and adding two standard deviations to it.
    - The lower Bollinger Band is calculated by taking the SMA and subtracting two standard deviations from it.
    - If the price is outside of the Bollinger Bands on the lower end, it indicates a time to buy.
    - If the price is outside of the Bollinger Bands on the upper end, it indicates a time to sell.

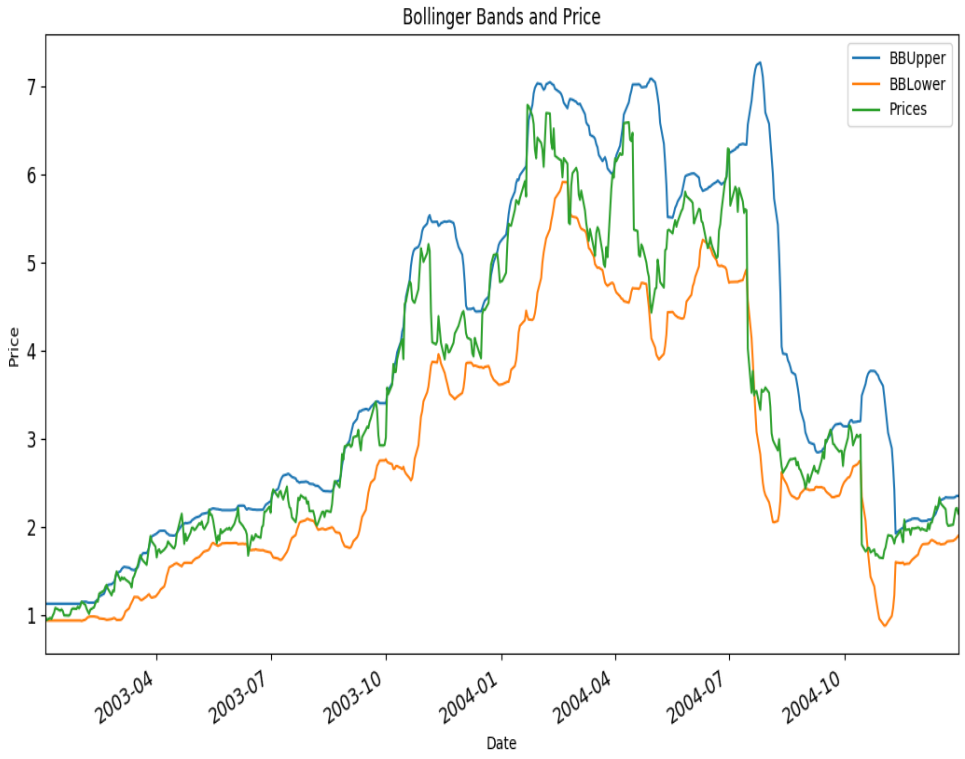

Figure 3: Shows the Price of NFLX and the Bollinger Bands generated from stock data over the in-sample period we are interested in times when price is not within the bands.

- Difference Between SMA-5 and SMA-20
    - The SMA is calculated by taking the rolling average of a number of points. For SMA-5 we take 5 points, for SMA-20 we take 20 points.
    - The SMA-5 is a short-term average and the SMA-20 is a long term average.
    - If the SMA-5 is less than the SMA-20 it indicates a time to buy, and any time the SMA-5 is greater than the SMA-20 we should sell.

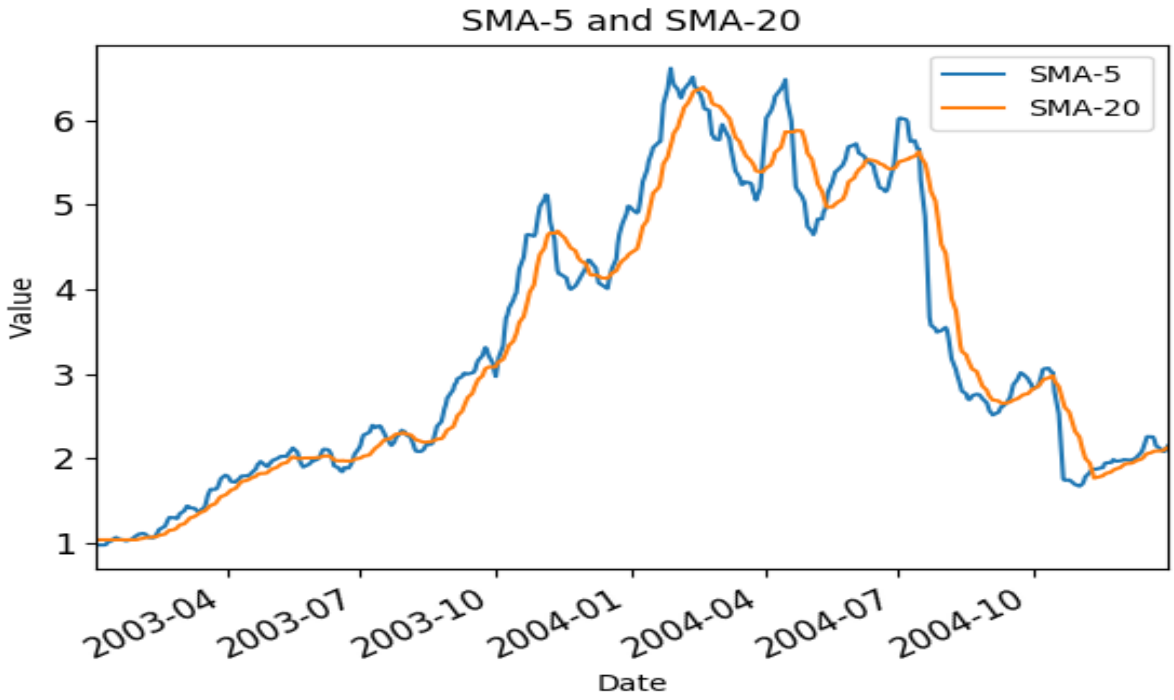

Figure 4: Shows the trend lines of SMA-5 and SMA-20 over the in-sample period. We are interested in the inflections between these.

Best Possible Strategy

To evaluate the Best Possible Strategy, we expect to have a knowledge of the future. If the current price is greater than the next day's price we sell, if the current price is less than the next day's price we buy. If we are in an extreme position where we have bought previously and should buy more, or if we have sold all we can and should sell more, no change occurs. 1000 shares in either direction are extremities. With the exception of the initial Buy/Sell we always trade 2000 shares to push us into an extreme position.

Manual Strategy

The Manual Strategy takes the indicators we mentioned earlier and combines them. If an indicator signals a buy we give a point towards buying. If an indicator signals a sell we give a point toward selling. The maximum points towards buying or selling an indicator can have is 3. The minimum is -3. If the net value is positive we buy, if it's negative we sell. If we are in an extreme position where we have bought previously and should buy more, or if we have sold all we can and should sell more, no change occurs. 1000 shares in either direction are extremities. With the exception of the initial Buy/Sell we always trade 2000 shares to push us into an extreme position.

	Benchmark In/Out	Best In/Out	Manual In/Out
Cumulative Return	0.0661 / 0.1394	2.9973 / 2.2502	0.1218 / -0.1257
Average Daily Return	0.0001 / 0.0002	0.0028 / 0.0024	0.0002 / -0.0002
Standard Deviation	0.0085 / 0.0060	0.0034 / 0.0025	0.0101 / 0.0073

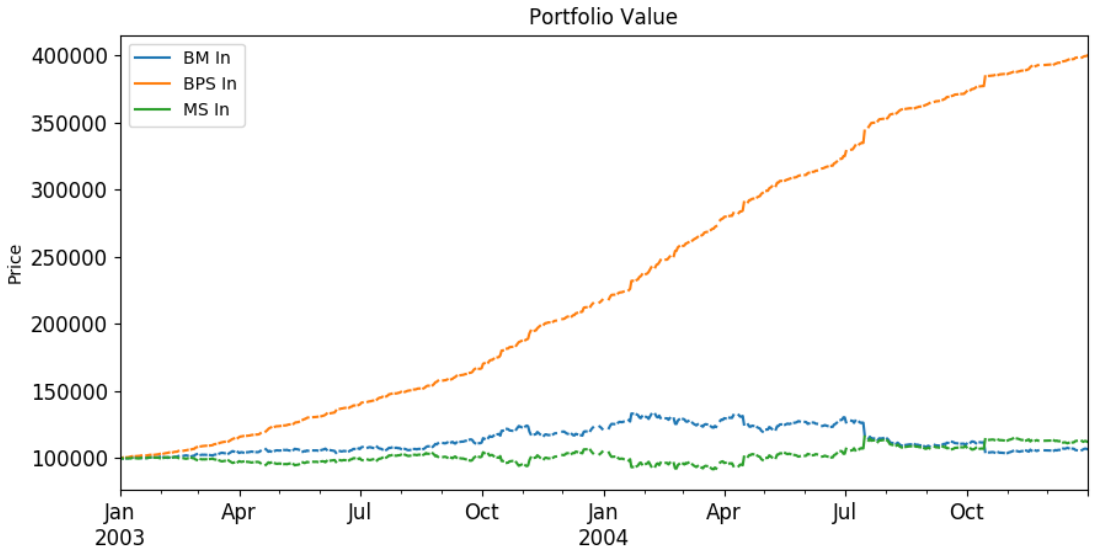

Figure 5: Comparison of the results of the Benchmark, the Best Strategy, and the Manual Strategy in-sample

Comparative Analysis

In comparing the results of the in-sample and out-of-sample data. We notice that our strategy performs poorly out-of-sample.

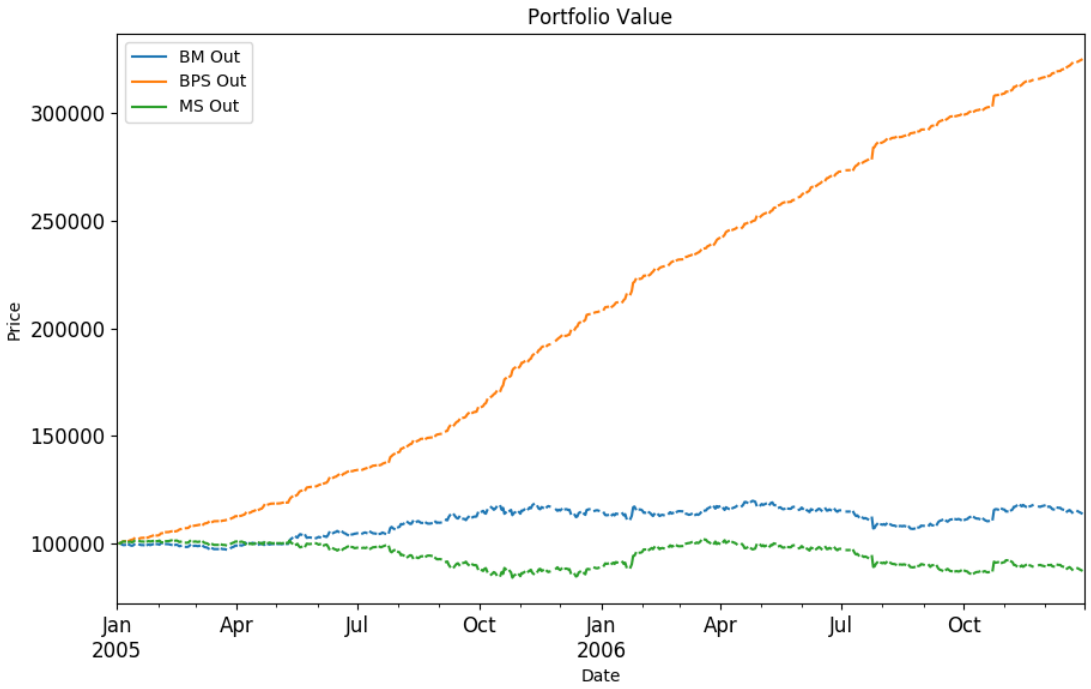

Figure 6:Comparison of the results of the Benchmark, the Best Strategy, and the Manual Strategy out-of-sample

One thing I found was that giving Bollinger Bands greater weight in my Manual Strategy greatly improves out-of-sample performance, this makes sense because large deviations generally matter more and the Bollinger Bands metric is used to detect large deviations. I chose not to change the weighing because my in-sample value went down by doing so. Since we were training to in-sample data, I focused on improving that.