Project 6: Indicator Evaluation
CS7646

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1 INDICATORS

In this section I will be introducing the five indicators I choose for my trading algorithm. My indicators were SMA (Simple Moving Average), EMA (Exponential Moving Average), TEMA (Triple Exponential Moving Average), RSI (Relative Strength Index), ROC (Rate of Change).

1.1 SMA (Simple Moving Average)

The way SMA works is rather simple, It takes (like the name implies) the moving average of over a given number of days. It takes all the closing prices for a pre chosen number of days , adds them all up and divides by the number of days. Each day it adds a new closing value and removes the oldest closing value and recalculates. This gives us SMA. (Hayes)

The way this indicator works is if the price goes below the SMA line it is a sell signal. If the price goes above the line it indicates a buy signal. This can be seen in the figure below.

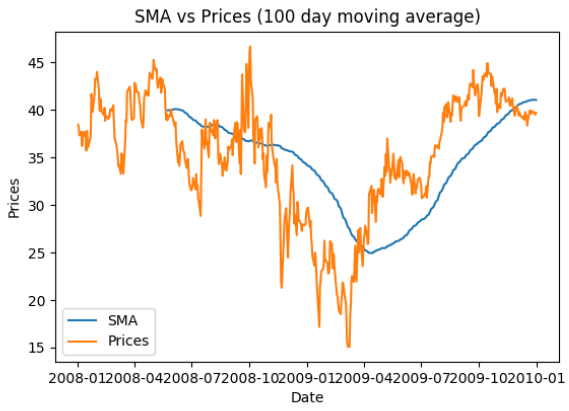

Figure 1—SMA using 100 day moving average

1.2 EMA (Exponential Moving Average)

EMA works very similarly to SMA. It also takes the average over a pre-set number of days, however the difference between the two is that EMA weights recent data heavier than old data. The reason for this is that SMA can sometimes be slow to react to market changes and EMA attempts to adjust for this.

Again very similar to SMA, EMA generates a buy signal when the price goes above the EMA line and sell signal when the price drops below it. This is shown below. (Chen)

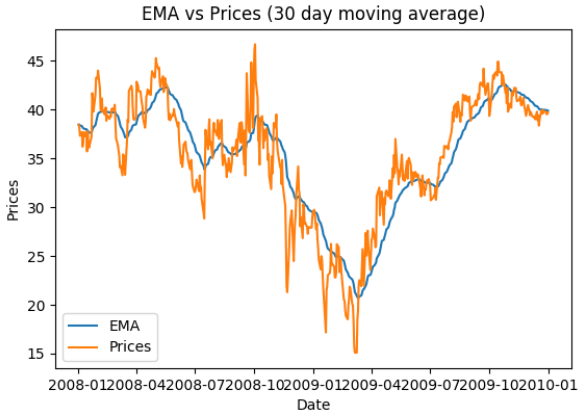

Figure 2—EMA using 30 day moving average

1.3 TEMA (Triple Exponential Moving Average)

TEMA is an even more refined version of EMA. The way this is calculated is you first get a normal EMA over a certain period. Once you receive that array you take an EMA over that EMA. This produces another array. Then you take the EMA of that array one more TIME. TEMA is final created using: TEMA = 3 * (ema1 - ema2) + ema3. The reason for this is that EMA sometimes does not take market trends into account fast enough so we need TEMA to speed up the process even more.

However this is treated the same when looking for buying and selling indicators TEMA generates a buy signal when the prices goes above the TEMA line and sell signal when the price drops below it. This is shown below. (Mitchell)

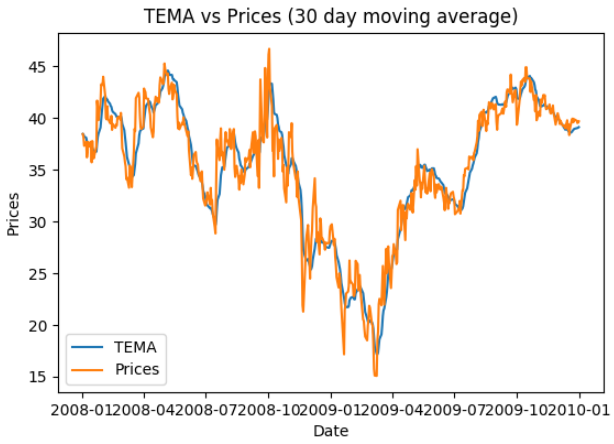

Figure 3— TEMA using 30 day moving average

1.4 RSI (Relative Strength Index)

RSI is a momentum indicator that works by finding the percentage change of gains and losses over a pre-set period of time. The percentage tells you if a stock is trending in a specific direction and how quickly it is changing.

The buy and sell signals here are if RSI goes above 70, this indicates that the stock is overbought and if RSI crosses back below 70 it represents a sell signal. In the same way if the RSI drops below 30 this represents that this stock is oversold and when the stock crosses over back over 30 this is a buy signal. This can be seen in the chart below.(Fernando)

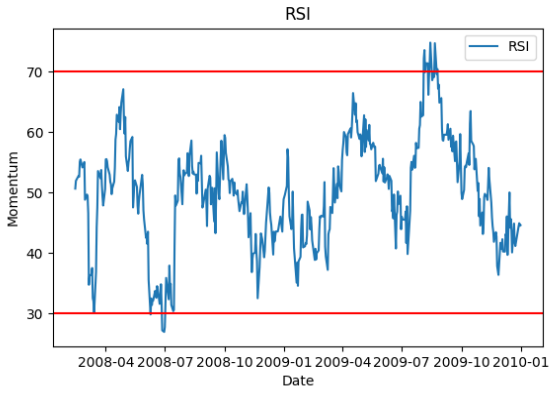

Figure 4— RSI using 30 day period

1.5 ROC (Rate of Change)

ROC is also a momentum indicator. The way ROC is calculated is by taking the closing prices on a given day and then subtracting the difference from the closing prices of a pre-set number of days and then dividing all that by the closing prices of a pre-set number of days. That is then normalized to 100 by multiplying by 100.

This generates a plot where when the stock is moving upward momentum the ROC line will be positive and when the stock is moving downward momentum the ROC line is negative. Here the buy signal is when the line crosses from negative to positive and the sell signal is when the line crosses from positive to negative. This is shown below. (Mitchell)

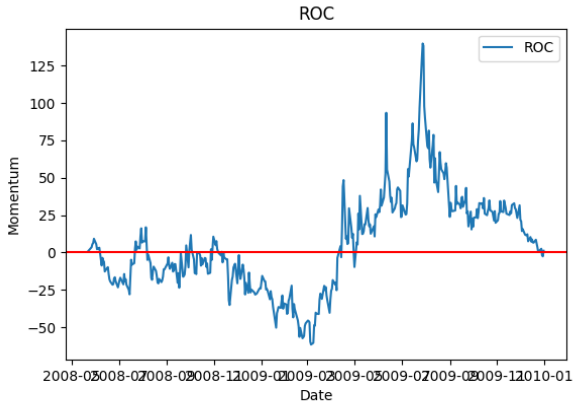

Figure 5— RSI using 100 day period

2 THEORETICAL OPTIMAL STRATEGY

In this section I will describe how a trading strategy that is perfect would look like. The way I developed my strategy was since I was allowed to peek into the future I would look at the next day and see what the stock was doing. If the stock increased the next day I would buy 1000 shares of the stock or if I already owned the stock I would hold it. If the stock was going to fall the next day, I would short the stock 1000 shares or if I already had a short position I would hold it. This

continued on and for the entire period trading and (as you would expect) the results were quite great. Here is the comparison against a Bench where I bought and held 1000 shares for the entire trading window.

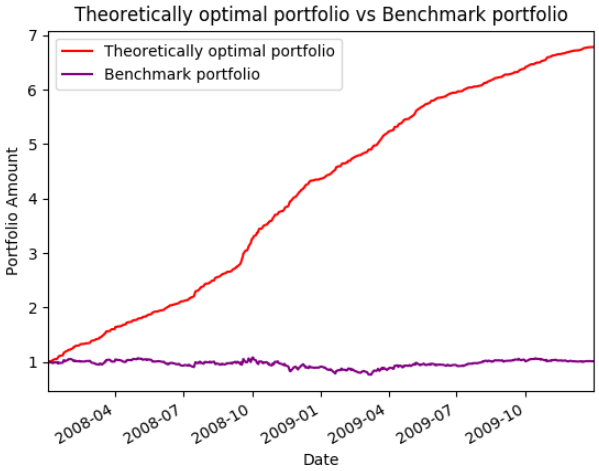

Figure 6— TOS vs Benchmark

	TOS	Benchmark
Cumulative Returns	5.786100	0.012299
Standard Deviation of Daily Returns	0.004547	0.017004
Mean of Daily Returns	0.003816	0.000168

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