Stock Market Technical Indicator Investigation

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Introduction:

Background

Ever since I was young, I have held an interest in the stock market. In grade seven I would tell my dad to buy or sell certain stocks for me. He would give me any profits if the trades I made money, and I would have to pay him anytime my trades lost money. By the end of grade 7, I made about 20 bucks - not a substantial amount, but enough to get me interested.

Purpose

With this IA I would like to analyze the effectiveness of some of the tools that are often used when trading stocks. Hopefully, during this investigation, I will learn something about the stock market that will be able to help me make a trading strategy of my own in the future. I see a stock trader as a possible career path, and this investigation into the statistics, probabilities, and patterns present in the stock market might help me actually make some money one day.

Background/Parameters:

Technical Analysis

There are many ways to make decisions about which stocks to buy/sell and when. For example, I could do lots of research about the history of a certain company, see that they consistently make good business decisions, predict that their future decisions will continue to be just as good, and therefore buy that company's stock. This is a good method of making money in the stock market, however any kind of mathematical analysis here is very limited. What interests me more, is a relatively new area of study called "technical analysis". Technical analysis of the stock market is another method of figuring out how and when to trade various stocks. Technical analysts identify buying or selling opportunities by looking at trends gathered from historical trading activity, such as price movement and volume traded. Throughout this investigation, I plan using some of the popular tools made by previous technical analysts. These "tools" are better known as "Technical Indicators".[1]

[1] Adam Hayes, "Technical Analysis Definition," Investopedia. www.investopedia.com/terms/t/technicalanalysis.asp (accessed December 5, 2019).

Technical Indicators

Technical indicators are calculations and formulas that take in the stock's historical data, and indicates specific buying and selling opportunities (these opportunities are better known as *buy signals* or *sell signals*). Within this investigation I plan on analyzing 5 very popular indicators, so I can: See which ones are better at predicting a stock's future price, the best conditions for each indicator, if two indicators work better than one, etc...

Below is a list of the 5 technical indicators I will use, along with a quick explanation of how I will use them to determine buy/sell signals. A link to a more in depth explanation on each of the indicators listed in table 1 can be found in the footnotes.

Table 1: Technical Indicators

Indicator Name	Description Of Indicator
Moving Averages Crosses[2]	A moving average is an average of a stock's previous closing prices over a certain period of time. The larger the period of time is used to calculate the moving average, the "slower" the moving average is considered to be. Many analysts consider buying opportunities to occur when a faster moving average crosses a slower moving average. I will consider a buy signal to occur on the day that the 5-day exponential moving average crosses above the 35-day exponential moving average. I will consider a sell signal to occur on the day that the 5-day exponential moving average crosses below the 35-day exponential moving average.
Stochastic Oscillator (%D Indicator)[3]	A calculation that takes in the price of the stock over the last 14 days and returns a value in between 0-100. As the days pass, this value will oscillate between 0-100. Many analysts consider a stock to be "overbought" when the stochastic oscillator reads over 80, and "oversold" when the stochastic oscillator reads under 20.

[2] Casey Murphy, "Moving Averages: Strategies," Investopedia. www.investopedia.com/university/movingaverage/movingaverages4.asp (accessed February 5, 2019).
[3] Adam Hayes, "Stochastic Oscillator Definition," Investopedia. www.investopedia.com/terms/s/stochasticoscillator.asp (accessed February 5, 2019).

	I will consider a buy signal to occur the day that the stochastic oscillator reading crosses above 20. I will consider a sell signal to occur the day that the reading crosses below 80.
Relative Strength Index (RSI)[4]	Very similar to the stochastic oscillator. A value based on the past 14 days of stock price data that oscillates between 0-100. Considered overbought when above 70, and oversold when below 30. I will consider a buy signal to occur when the RSI's reading crosses above 30, and a sell signal when the reading crosses below 70.
Money Flow Index (MSI)[5]	Extremely similar to RSI and Stochastic Indicator, however the MFI takes the volume of stock traded into account as well. I will consider a buy signal to occur when the MFI's reading crosses above 20, and a sell signal when the reading crosses below 80.
Moving Average Convergence Divergence (MACD)[6]	A bit more complex. The MACD is a relationship between two moving averages of a stock's price. For more information on when buy/sell signals are determined, as well as how the indicator is calculated, see the link in the corresponding footnote below.

Historical Data and Backtesting

For this assessment, I will be getting historical stock price and volume data from Google Finance. I am able to put the data I receive into a spreadsheet and find the points in time where various technical indicators (See Table 1) would have produced buy/sell signals. I will then be able to see how well these buy/sell signals would have worked, when they would have worked, and how accurate/consistent they were. I will also be able to see how much profit I would have potentially made if I had executed trades based upon all the buy/sell signals.

[4] James Chen, "Relative Strength Index - RSI Definition," Investopedia. www.investopedia.com/terms/r/rsi.asp (accessed February 5, 2019).
[5] Cory Mitchell, "Money Flow Index - MFI Definition and Uses," Investopedia. www.investopedia.com/terms/m/mfi.asp (accessed February 5, 2019).
[6] Adam Hays, "Moving Average Convergence Divergence (MACD)," Investopedia. www.investopedia.com/terms/m/macd.asp (accessed February 5, 2019).

This method of testing strategies against historical data is often referred to as “Backtesting”. After backtesting an indicator, I can then hope (assuming that the trends and patterns of the market of the future stays similar to the market of the past), that the performance of that indicator in the past will be representative of the performance of the indicator of the future. (This method of backtesting is extremely similar to a term used in probability: finding the *expected value*)

Age of Historical Data

With Google Finance, I can get data from the 1970s, but I don’t think I want to. From what I understand, the stock market was very different back then. Now that processes such as automatic trading with computer algorithms have become widespread, I believe it is safe to assume that the stock market of today acts very differently compared to the stock market of the 1970s. I also believe that big events (like the economic crash of 2008/2009) would have also forced the economies of the world to adapt and evolve. I don’t think that the markets of 2005 would act similarly to the markets of the 2010s. It is because of these reasons, I will only use relatively recent data: The oldest stock data I will use will be from February 17, 2016. I will be able to obtain stock price and volume data every day since that date.

Emotional Trading And Exchange Traded Funds (ETFs)

I would like to address the fact that the stock market is a very “emotional” space. What I mean by this is that many companies’ stock prices are heavily influenced by unpredictable events. For example: Elon Musk smoking weed caused the stock price of his company (Tesla) to drop significantly. Technical indicators focus on *trends* and *patterns* that occur in a stock’s prices, not the change in price of a stock due to some unpredictable, “emotional” event. Therefore, in order to properly analyze a technical indicator, some solution must be found in order to work around these emotional events.

My solution to this problem, is to only use ETFs (Exchange Traded Funds) during my investigation. Unlike a common stock (like Tesla) that is very susceptible to “emotional” events, an ETF usually follows an entire sector of an economy. It is very rare for entire sectors of an economy to be heavily influenced by unpredictable, emotional events. It is because of this reason, that I believe an ETF will contain many more patterns and trends that a technical indicator will be able to analyze effectively.

Table 2 is a list comprised of all 6 of the ETFs that I will be using during this investigation. The list includes the ETF name, and that ETF’s *stock symbol* or *ticker symbol* A ticker symbol is an abbreviation used by traders to identify different stocks in the stock market. During the rest of this exploration I will refer to the ETFs by their tickers instead of their full names.

Table 2: List of Large Exchange Traded Funds and Ticker Symbols

ETF Name	Ticker Symbol
S&P 500	SPY
Emerging Markets	EEM
Gold Trust	GLD
Nasdaq	QQQ
China Large Cap	FXI
Non-US large Stocks	EFA

Buying/Selling

Most technical indicators give both buy and sell signals. During this investigation, I am going to assume that I can buy and *sell short* any stock without any troubles (in real life, *selling a stock short* is usually a little more difficult than buying a stock). “Selling a stock short” is the opposite of buying a stock. When *selling short*, I am betting against a stock. The loss in value that the stock’s price experiences would become my profit when I *exit the position.* Exiting a position simply means to sell any stock one owns, or buy back any stock one has *sold short*.

Length Of Positions/Trades

During backtesting, I would like to look at how successful various indicators would have predicted a stock’s future price. However, some indicators may do a good job at predicting a stock’s price over the next 3 days while being completely incapable of giving any kind of accurate prediction over then next 10 days. Some others may perform in the opposite fashion. For this reason, I would like to test how well every indicator would perform within 3 different time frames: Short term time frame (1-3 days after the indicator produces a buy/sell signal), medium term (4-6 days after a buy/sell signal), and long term (7-10 days after a buy/sell signal). By essentially creating 3 test conditions for every indicator, I will be able to get a better picture of what each indicator’s strengths and weaknesses are.

Quantifying The Success of an Indicator

% Mean Future Gain

When an indicator gives a buy/sell signal, I need to figure out how well that signal would have actually performed. For this, I want to look at the stock's prices within the defined time frame. For example, if I were looking at how a particular signal would have performed in the medium term, I would only look at the stock's prices 4-6 days past the date that the buy/sell signal was produced.

I want to assume that if I was trading a cerian stock by using the indicator in real time, I would cash out at a random point within the given time frame. Because I am assuming this, I can take the mean of the stock's prices within the given time frame to get a single value I will call the "Mean Future Price". This "Mean Future Price" can then be compared to the initial price that the stock was bought or sold short at to produce the "% Mean Future Gain".

The "% Mean Future Gain" value can be calculated as follows:

$$\%\ Mean\ Future\ Gain = 100\% \times \frac{Mean\ Future\ Price - Initial\ Price}{Initial\ Price}$$

Where:

$$Mean\ Future\ Price = \frac{\Sigma(Prices\ of\ Stock\ Within\ Given\ Time\ Frame)}{Number\ of\ Days\ of\ Given\ Time\ Frame}$$

Definition of "Good Signal", and "Indicator Success Rate"

Now, with a % mean future gain calculated for every signal that occured over the past 3 years, I can now figure out how often an indicator produces a *good signal*. I define a "good signal" as a signal that would have indicated a profitable trade. So if I was only looking at the long term time frame, a "good signal" would have occurred if a buy signal occurred on a certain day, and the long term % mean future gain that day was greater than 0%.

With that being said, the "Indicator Success Rate" can be calculated as follows:

$$Indicator\ Success\ Rate = 100\% \times \frac{Number\ of\ Good\ Signals\ Produced}{Total\ Number\ of\ Signals\ Produced}$$

It should be noted that the formula for the *Indicator Success Rate* is very similar to the equation of the probability of an event. This isn't a coincidence, as I would be using this *Indicator Success Rate* as the probability of making a good trade in the future. The assumption that I'm making here is that these indicators and the stock market act

something like dice: I can roll a dice 100 times, find the rate of 6s that occur per role, and use this newfound rate to act as a probability that a 6 will be occur on the next roll. With my backtesting, I am doing the exact same thing, however instead of finding the probability of a 6 occurring on the next role, I am finding the probability that a signal will indicate a profitable trade the next time that signal is produced.

Now, there are many possible flaws/limitations associated with the assumption that the stock market will act like a die. The biggest one being that I'm assuming the stock market's trends and patterns will remain somewhat consistent in the future. The market conditions change from day to day, and an indicator that worked really well last year might not work at all in the year to come.

An of extension that could be made to this investigation would be to find factors in the stock market that affect certain Indicators' success rates. For example, a rise in interest rates could cause a decline in the market for a couple months, thus leading to an increased success rate for an indicator that tends to produce many sell signals.

Indicator Success Rate vs Mean Potential Profits

Even though it is nice to see how likely it is for each indicator is to predict a good trade, it doesn't quite express the whole story. When trying to find a success rate for an indicator, I'm only looking at a trades in one of two ways: a trade is either good or it's bad. The problem here, is that I can't see *how good* the good signals were or *how bad* the bad signals were. The indicator could have indicated good trades more times than indicating bad trades, but if it produced bad buy/sell signals that would have lost me significantly more money than I would have gained when the indicator produced good trades, I might have lost lots of money overall. This is why I will also calculate the "Mean Potential Profits" for every indicator as well as the success rates.

The "Mean Potential Profits" of an indicator can be found with the following formula:

$$Mean\ Potential\ Profits = 100\% \times \frac{Total\ Potential\ Profits}{Total\ Number\ of\ Signals\ Produced}$$

Where:

$$Total\ Potential\ Profits = \Sigma|Mean\ Future\ Gain\ of\ all\ Good\ Trades| - \Sigma|Mean\ Future\ Gain\ of\ all\ Bad\ Trades|$$

It should be noted that the mean potential profits will be a percentage as most profits in relation to the stock markets are usually expressed as a percentage.

Analysis

Spreadsheet

All raw data that will be referred to in rest of the analysis can be found here (Raw data, processed data): https://docs.google.com/spreadsheets/d/1IAKk8RMskf_2NkFfJGiY-CjIx1ICoHc_M3pKdqjjRvc/edit?usp=sharing

The processed data can also be found in the Appendix, however the raw data can only be found in the spreadsheet since there is too much data for a Google Doc to handle efficiently.

Explanation of Spreadsheet:

The first sheet titled “Final Data Extraction/Analysis” contains all the final extracted *Indicator Success Rate* and *Mean Potential Profits* for every stock, every indicator, and every time frame. Also, on the first sheet there is some extra analysis that will be discussed later on.

Every sheet after that is simply named after the ETF that it contains. Each of these sheets contain roughly 3 years of daily stock price and volume data from each ETF, as well as all buy/sell signals from every indicator over the same 3 years. These sheets also contain each ETF’s *Indicator Success Rate* and *Mean Potential Profits* for every indicator and time frame (all of this information has been copied into “Final Data Extraction/Analysis”). For the rest of this investigation, when referring to the spreadsheet, it can be assumed that I am referring to the “Final Data Extraction/Analysis” sheet unless otherwise stated.

First Look

In the “Analysis” section of the “Final Data Extraction/Analysis” sheet, I have processed the data in a couple different ways. I would like to look at the table titled: “Table 3: All Indicator Success Rates”. Here I have taken the mean of each indicator’s success rates, across every ETF. The columns separate the various indicators’ success rates into the 3 time frames. This way, some initial trends can be observed: Firstly, it seems as if the EMA Crossover Indicator, and the %D (Stochastic Oscillator) Indicator both tend to perform better when used within a shorter time frame. The MACD, RSI, and MFI indicators, all seem to act in an opposite way: They all predicted an ETF’s price in the long term much better than they were able to predict an ETF’s price in the short term.

All of the trends mentioned above can also be observed in “Table 4: All Indicators’ Potential Profits”. This table shows the mean of each indicator’s potential

profits across every ETF. The EMA and %D indicators would have generated more profits when trading in the shorter terms than in the longer terms, while the MACD, RSI, and MFI Indicators would have generated more profit if used in the longer term time frames.

What's also interesting, is that although the EMA Crossover indicator has an overall success rate that is greater than 50% (that is, over all time frames, it produced more good signals than bad signals), it's overall mean potential profits is negative. This means, that although the indicator produced good buy/sell signals most of the time, when it produced bad buy/sell signals, the signals were *really* bad.

It should also be noted, that on the final row of both tables 3 and 4, are the mean of every indicators' success rates and the mean of every indicators' potential profits. By adding this last row to both tables, I can see how well all the indicators performed over all the ETFs: not very well (disappointingly). Overall, there was a success rate of 49.27%, meaning that there were more bad trades than good trades. Also, the overall potential profits of each indicator was 0%, meaning that no money would be made if making trades based on the indicator's signals.

Double Indicator

Although it seems as if some indicators in certain situations seem to work very well, (for example, when using the RSI indicator in the long term time frame when trading FXI, the success rate is 87.5%) when choosing an indicator and time frame at random, the success rates are rarely much better than 50%. It might almost be better to flip a coin to generate trading advice, than to listen to the indicators! This made me wonder, what if 2 indicators both produced a buy or sell signal at roughly the same time? If the Indicators acted like coins, then success rates and potential profits shouldn't change. However, if there really is something behind the indicator formulas, the added requirement of a second buy/sell signal might just weed out some of the false signals, and result in better success rates and potential profits.

I then defined a new buy/sell signal: If 2 indicators produced both produced a buy or a sell signal within 3 days of each other, a new "Double Indicator" buy/sell signal would be produced. The success rate of this new indicator for every ETF, for every time frame can be seen in row 9 of the spreadsheet linked above. Also, the mean potential profit values for this new indicator can be seen in row 17. I condensed these 2 rows of data into into 2 small tables. The table labeled: "Table 5: Mean Double Indicator Success Rate" shows the mean success rate for the double indicator across all ETFs. The table labeled: "Table 6: Mean Double Indicator Potential Profits" shows the mean potential profits for the double indicator across all ETFs.

Tables 7 and 8 showcase the difference in the success rates and potential profits between all indicators used by themselves, and the new double indicator. The values

found in table 7 show the increase in the success rate when switching from the average indicator by itself, to the double indicator. Table 8 shows the increase in the potential profits when changing from the average single indicator, to the double indicator. As can be seen from the tables, every value is positive, showing that that when using 2 indicators, the chances of making a good trade increases over all time frames by about 4.12%, and the profit one can expect to make over all trading time frames will also increase by about 0.29% per trade. It also seems that the Double Indicator performs better in the longer time frames shorter ones.

Extension/Small Tangent: How Much Money Could I Make in a Year? (The Power of Compounded Returns)

So, for fun, if I wanted to make some trades using the results from this investigation, how much money might I expect to make?

Firstly, I would want to decide which indicator to use when making trades: In the "Final Data Extracted From Other Sheets" section of the spreadsheet linked above, It can be seen that when using the RSI indicator to generate long term signals for FXI (cell Y6), I *might* be able to expect 1.29% profit per trade. However, I wouldn't want to base too many trades off of that one scenario alone, in case it's a fluke result (more on that later). Instead, I would like to see how much money I might expect to make if I used the double indicator for medium term trades.

From the data gathered prom my investigation, I could expect to make and average of 0.35% every trade if using the double indicator. This is for medium term trades, so each trade would last 4-6 days, or an average of 5 days per trade. I want to assume that I would only have a year to make trades. This means I can make approximately 50 trades. I also want to assume that I start with $1000. If I completely disregard broker fees, and assume that I'm able to find enough trades to keep my money completely invested the entire year, I could use a modified compound interest formula to estimate how much money I would compound over one year:

$$\begin{aligned} Final\ Amount &= Principal \times (1 + Average\ Profit\ Per\ Trade)^{Number\ of\ Trades\ per\ Year} \\ &= \$1000 \times (1 + 0.35\%)^{50} \\ &= \$1190.88 \end{aligned}$$

So in one year, with close to perfect conditions, I can expect to make approximately $190.88. That's an annual rate of about 19%! This is insane when compared to current an alternative method of investment like a GIC that might advertise a comparatively measly annually rate of 3%. It should be noted that the GIC is a much safer way of making money, and this small scale investigation is nowhere near as in depth as I would like it to be before I start throwing money at it. This does however, show that the results found in this investigation show a little potential. At first, when

looking at an average potential profit per trade of 0.35%, I thought it was too small to really get excited about. However, when used over a year, with compounded returns, that very small looking 0.35% per trade turns out to be very significant amount of cash return.

Possible Extension: Statistical Significance

Although the potential profits that I could have made are exciting, I can't really tell if the numbers I have found are just a fluke. Some things I was able to take away from this investigation I feel pretty confident in. For instance, I feel very confident that it's going to be more likely for me to make good trades when using more than one indicator at a time. However, it seems a little absurd to assume that all the values found in the final analysis are 100% accurate. For instance, it seems unlikely that the long term success rate for the RSI indicator when trading FXI is (and will continue to be) 87.5%. By looking at columns BJ and BM of the spreadsheet named "FXI", it can be seen that there was only a total of 8 signals produced by the RSI indicator over 3 years. I definitely wouldn't want to put any large amount of money on an indicator that's only been tested 8 times in the last 3 years. The double indicator on the other hand, produced well more than 200 signals over the past 3 years. I have a lot more faith in the potential profit found for the double indicator than the RSI used on FXI since the double indicator has been tested so much more. This is the main reason why I chose to look at the potential profits of the double indicator for my tangent above.

But this begs the question: How much can I really rely on the data I've produced? How many signals should I require before being able to reliably say that a certain indicator has a success rate of X%? This is where adding some statistical significance calculations into my investigation would have been useful. If I ever do plan to put any kind of money on my results, I would want to determine a p-value and reject a null hypothesis to prove that there is statistical significance associated with the profitable success rates/potential profits found within this investigation.

Conclusion

The results I found during this investigation surprised me a little bit. Firstly, I didn't think that I could find a method of buying/selling stocks (double indicator) that could make me any substantial amount of money. The second thing that surprised me, was how poorly the indicators I tested perform when used by themselves. Most of these indicators have been around for years, and were developed by very smart people to get an actual edge in the trading world. Yet, it seems as if the indicators give little more insight into the market than a coin flip does.

Something that I barely touched on before, but might as well mention here, is the capability of each indicator to produce a “false signal”. A false signal is when a indicator produces a inaccurate signal due to a number of factors such as: timing lags, irregularities in data sources, smoothing methods… Basically, not the fault of the indicator formulas/calculations themselves, just a random byproduct of all indicators no matter what[7]. What this means, is that all indicators are going to give some random signals, at random times. This is why I think that the double indicator ended up working so good: The double indicator would require 2 false signals to be generated within 3 days of each other to produce a false signal of its own. Because the false signals occur at random times, it's very rare that two of them will occur within 3 days of each other. However, when the market is actually acting in such a way that a certain indicator should signal a buying/selling opportunity (when “real” signals are produced), it’s going to be more likely that another indicator will produce a similar signal within 3 days. In this way, the double indicator is able to filter out most of the false signals, while being able to listen to the “real” signals. This is why I believe, that the double indicator produced better results than everything else.

[7] James Chen, “False Signal,” Investopedia. www.investopedia.com/terms/f/false-signal.asp (accessed February 18, 2019).

Appendix

Final Data Extracted From Other Sheets:

SPY	Short Term	Medium Term	Long Term
Indicator Success Rate			
EMA Crossover	50.00%	46.67%	43.33%
%D Indicator	34.15%	36.59%	36.59%
RSI Indicator	37.50%	37.50%	50.00%
MFI Indicator	37.50%	25.00%	25.00%
MACD Indicator	47.46%	47.46%	47.46%
Double Indicator Success Rate	42.86%	50.00%	53.57%
Mean Potential Profits			
EMA Crossover	0.14%	-0.14%	-0.13%
%D Indicator	-0.19%	-0.12%	-0.29%
RSI Indicator	-0.14%	-0.39%	-0.37%
MFI Indicator	-0.14%	-0.39%	-0.37%
MACD Indicator	-0.11%	-0.23%	-0.21%
Double Indicator Mean Potential Profits	-0.14%	0.07%	-0.11%

EEM	Short Term	Medium Term	Long Term
Indicator Success Rate			
EMA Crossover	50.00%	38.89%	44.44%
%D Indicator	62.79%	48.84%	51.16%
RSI Indicator	52.63%	47.37%	57.89%
MFI Indicator	22.22%	44.44%	55.56%
MACD	44.44%	50.79%	50.79%

Indicator			
Double Indicator Success Rate	53.06%	55.10%	59.18%
Mean Potential Profits			
EMA Crossover	-0.25%	-0.70%	-0.60%
%D Indicator	0.17%	0.18%	0.06%
RSI Indicator	-0.65%	-0.44%	0.00%
MFI Indicator	-0.65%	-0.44%	0.00%
MACD Indicator	-0.10%	0.03%	0.13%
Double Indicator Mean Potential Profits	-0.04%	0.75%	1.15%

GLD	Short Term	Medium Term	Long Term
Indicator Success Rate			
EMA Crossover	63.64%	54.55%	60.61%
%D Indicator	64.86%	48.65%	56.76%
RSI Indicator	72.73%	63.64%	72.73%
MFI Indicator	45.45%	54.55%	45.45%
MACD Indicator	46.03%	47.62%	39.68%
Double Indicator Success Rate	51.43%	42.86%	62.86%
Mean Potential Profits			
EMA Crossover	0.19%	0.36%	-0.02%
%D Indicator	0.07%	0.23%	0.12%
RSI Indicator	0.01%	0.11%	-0.20%
MFI Indicator	0.01%	0.11%	-0.20%

MACD Indicator	0.09%	-0.04%	-0.17%
Double Indicator Mean Potential Profits	-0.10%	-0.29%	-0.05%

QQQ	Short Term	Medium Term	Long Term
Indicator Success Rate			
EMA Crossover	63.33%	66.67%	53.33%
%D Indicator	51.16%	41.86%	41.86%
RSI Indicator	33.33%	33.33%	33.33%
MFI Indicator	35.71%	35.71%	57.14%
MACD Indicator	31.03%	39.66%	55.17%
Double Indicator Success Rate	48.84%	46.51%	60.47%
Mean Potential Profits			
EMA Crossover	0.36%	0.27%	0.00%
%D Indicator	0.00%	-0.23%	-0.43%
RSI Indicator	-0.26%	-0.34%	-0.14%
MFI Indicator	-0.26%	-0.34%	-0.14%
MACD Indicator	-0.25%	-0.45%	0.08%
Double Indicator Mean Potential Profits	0.03%	-0.09%	-0.15%

FXI	Short Term	Medium Term	Long Term
Indicator Success Rate			
EMA Crossover	52.27%	45.45%	43.18%

%D Indicator	50.00%	47.73%	52.27%
RSI Indicator	62.50%	62.50%	87.50%
MFI Indicator	62.50%	50.00%	62.50%
MACD Indicator	49.18%	55.74%	57.38%
Double Indicator Success Rate	53.49%	58.14%	60.47%
Mean Potential Profits			
EMA Crossover	0.06%	-0.31%	-0.34%
%D Indicator	0.05%	0.31%	0.12%
RSI Indicator	0.22%	0.04%	1.29%
MFI Indicator	0.22%	0.04%	1.29%
MACD Indicator	0.06%	0.06%	0.16%
Double Indicator Mean Potential Profits	0.48%	1.14%	1.26%

EFA	Short Term	Medium Term	Long Term
Indicator Success Rate			
EMA Crossover	53.13%	43.75%	43.75%
%D Indicator	51.16%	60.47%	48.84%
RSI Indicator	40.00%	46.67%	40.00%
MFI Indicator	80.00%	60.00%	60.00%
MACD Indicator	36.51%	46.03%	49.21%
Double Indicator Success Rate	53.33%	53.33%	55.56%
Mean Potential Profits			

EMA Crossover	-0.14%	-0.31%	-0.42%
%D Indicator	0.22%	0.38%	0.28%
RSI Indicator	0.61%	0.80%	1.04%
MFI Indicator	0.61%	0.80%	1.04%
MACD Indicator	-0.10%	-0.25%	-0.07%
Double Indicator Mean Potential Profits	0.11%	0.52%	0.69%

After data processing:

Table 3: All Indicator Success Rates

	Short Term	Medium Term	Long Term	All
EMA Crossover	55.39%	49.33%	48.11%	50.94%
%D Indicator	52.35%	47.35%	47.91%	49.21%
RSI Indicator	49.78%	48.50%	56.91%	51.73%
MFI Indicator	47.23%	44.95%	50.94%	47.71%
MACD Indicator	42.44%	47.88%	49.95%	46.76%
Mean	49.44%	47.60%	50.76%	49.27%

Table 4: All Indicators' Potential Profits

	Short Term	Medium Term	Long Term	All
EMA Crossover	0.04%	-0.09%	-0.25%	-0.11%
%D Indicator	0.10%	0.11%	0.00%	0.05%
RSI Indicator	-0.01%	0.01%	0.27%	0.07%
MFI Indicator	-0.01%	0.01%	0.27%	0.07%
MACD Indicator	-0.06%	-0.13%	-0.02%	-0.08%
Mean	0.01%	-0.02%	0.05%	0.00%

Table 5: Mean Double Indicator Success Rate

Short Term	Medium Term	Long Term	All
50.50%	50.99%	58.68%	53.39%

Table 6: Mean Double Indicator Potential Profits

Short Term	Medium Term	Long Term	All
0.06%	0.35%	0.47%	0.29%

Table 7: Difference between Double Indicator Success Rate and Mean of All Indicator Success Rates

Short Term	Medium Term	Long Term	All
1.06%	3.39%	7.92%	4.12%

Table 8: Difference between Mean Double Indicator Potential Profits and Mean of All Indicators' Potential Profits

Short Term	Medium Term	Long Term	All
0.04%	0.37%	0.41%	0.29%