Comparative study on Optimized Moving Average types, Buy-and- Hold Trading Strategies

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Abstract

Forecasters in the financial market are of the opinion that past price and volume from Technical analysis make available important and useful information which can lead tosubstantial trading profits. This paper examines comparative study between Exponential Simple Moving Average (ESMA) Trading Strategy and the popular Simple Moving Average (SMA). We discovered that the initial conventional SMA crossover strategies have generated higher risk-adjusted portfolio return in contrast to the simple buy-and-hold approach. The optimized Exponential Simple Moving Average (ESMA) trading strategy demonstrate variation in its strategy as profits are observed in some lower periods of intersection , which show higher return as evaluated against the original SMA and the Buy-and Hold (B&H) strategy, while some show low strategy return. This was as a result of added stringent and predefined trading rules that moderate trading signals, thereby reducing the number of trades and increasing the profit returns.

Keywords: *Forex Trading, Technical analysis; moving average; buy-and- hold strategy; crossover strategy; SMA;ESMA.*

1. Introduction

Technical analysis deals with the study of past price variation with the intent of forecasting future price movement, which, if done precisely, can lead to substantial trading profits. The proof of the profitability trading is detected in (Park, C., 2004; Irwin S.H., 2004) manuscript. The prices understudied are mostly financial instruments for example; currencies, commodities, and foreign currencies.

Technical analysis has been widely applied by the financial practitioners for market timing in buying or selling securities. Practitioners have been using technical trading systems and rules to profit from the financial market and attempt to earn above-average return and outperformmarket benchmarks. Several researchers such as: Sweeney et al., (1988), Brock et al., (1992), Levich et al., (1993), Taylor., (1994), Fama et al., (1966),Kaufman, (2005) and Covel, (2011) have explored whether such trading systems and rules can lead to better performance than a simple buy-and-hold strategy. Among many technical trading strategies, the conventional Simple Moving-Average (SMA) trading system is the most renowned trend-following strategy and widely used strategy in the market.

In this study, we want to examine whether such optimized Exponential SimpleMoving Average (ESMA) system could generate average return for in currency market .Furthermore, we have added several filtered rules for the ESMA trading system and test whether it performs better risk-adjusted return than the original SMA trading system. Numerous studies carried out in the past as well have tended to confirm that Technical Analysis does not surpass simple buy-and-hold strategy when transaction costs are integrated (Fama et al., 1966; Ready, 1997; Bessembinder et al.,1998). Furthermore, when applying market-timing strategies, there are no better

advantages (Sullivan et al., 2003;Bauer & Dahlquist., 2001).

The use of technical analysis as market timing tool in making investment decision whether to buy, hold, or sell, is an active investment strategy that attempts to outperform the simple buy-and-hold passive strategy. At the center of technical analysis exists a certainty where the trend of prospective currency prices can be forecasted by means of technical indicators resulting from historical prices.Among the most common presupposition is that security prices move in trends. So, the most widely used market- timing strategy is the trend-following strategy, where it attempts to follow the trend and ride on it.

Until the 21st century, the interest has widespread in the increasing of academicliterature on studying the technical analysis of the financial market. As some of the trend-following rules help depositors to reduce huge losses throughout the bear markets that occurred in the 2000s. Several studies found evidence that are in favor to Technical Analysis (Brock et al., 1992; LeBaron, 1999; Lo et al 2000; Neely, 2002; Wilcox & Crittenden, 2009; Zhu & Zhou, 2009). They established that strictly observing technical trading rules, offers profitability as well as significant market return when evaluated against the simple buy-and-hold strategy , excluding transaction costs. Furthermore, simple technical trading strategy can generate comparable returns in contrast to investing approach relying on economic and financial fundamentals (Olszewski, 2001).

The most popular strategy of trend-following is the SimpleMoving-Average crossover (SMA) strategy. among various technical indicators, the moving-averages predominantly show predictive power in the stock market; probably it matches or exceeds of those macroeconomic variables (Neely et.al., 2013).This study examine the effectiveness of optimized Exponential Simple Moving-Average (ESMA) trading system as a better performance technical trading system comparing conventional Simple Moving-Average (SMA) crossover strategy and simple buy-and-hold strategy.

2. Literature review

Experts in Technical analysis are of the opinion that data on past price and volume afford vital and valuable information in predicting future price movements in the financial market. Technical analysis employs a number of techniques, the most common of which are charts, trading rules and cycle analysis. Charting relies on detecting graphical patterns in the price. Patterns are generally defined as reversal and persistence patterns. Reversal patterns seen using Candle sticks consist of; the head and shoulders, double tops/bottoms and rounded tops/bottoms. Persistence patterns comprise flags, pennants, wedges and rectangles. Studies of charting are often limited by the need to design a pattern recognition algorithm to extract the model even though studies of charting are becoming progressively more common. (Dempster & Jones, 2002 ; Dawson & Steeley ,2003, Wang, 2007; Chan, 2009 and Leigh & Purvis & Ragusa, 2008)

Schwager, (1995) found out that many fund managers and top traders using Technical Analysis. Also, Covel, (2011) quotes examples of successful large hedge funds that extensively use Technical Analysis without having fundamental knowledge about the market. Scholars have long been skeptical regarding the realism of Technical Analysis, despite the popularity and adoption by market practitioners. Several reasons for academics doubt on the usefulness of Technical Analysis are: (1) early theoretical studies on random walk and efficient market models disregard excess return and profitability in technical trading (Fama & Blume, 1966;Cowles, 1933), (2) there is no theoretical basis on Technical Analysis being research; and (3) challenges in demonstrating the true effectiveness on technical trading rules mainly due

to bias in data-inteference (Sullivan et al., 2003; Lo & MacKinlay, 1990; Jegadeesh, 2000) where the same data set are frequently being used for model selection and implication. Thus, it is not astonishing that academics have yet to conclude the effectiveness of Technical Analysis.

Similar previous studies give results that are reliable with the market efficiency through experiential testing that future price cannot be predicted by Technical Analysis. For instance, the benefits of Technical Analysis in generating excess return is offset when transaction costs areincluded (Fama & Blume, 1966; Ready, 1997; Essembinder & Chan, 1998). Even though with the contrary opinion in Efficient Market Hypothesis (EMH), Technical Analysis is still being studied extensively by many researchers and market practitioners. Here, we can see that there are two philosophies that are contradictory with each other, the random walk efficient market theory and technical analysis. If financial currency traders apply Technical Analysis based on hard fact, then it seems that the markets are inefficient. Otherwise, if the markets are efficient, then it appears that the financial community is probably wasting a huge amount of resources on Technical Analysis.

Hypothetically, incomplete fundamental information probably is a major factor investor use Technical Analysis. Brown & Jennings, (1989) demonstrate that rational investors can make profit by establishing expectations from historical prices. According to Blume et al., (1994) confirm that traders who utilize market statistics perform better than those who do not. It is in the circumstances of incomplete information; investors face model uncertainty even though stock returns are fairly predictable. Several researchers examine different technical trading rules and provide consistent result that Technical Analysis providing information beyond those that have already reflected in market price (Brock et al., 1992; Lo et al.,2000). For example, Blume et al., (1994) show that if prices do not react instantly to new information, volume may provide information that is not available in the market. Among many other studies (Brock et al., 1992; LeBaron, 1999; Neely, 2002) shows that using Moving Average generated signals provides profitability and significant gain in currency trading.

2.1. Problem statement

In view of the extensive established literature related to financial market on random walk and efficient market hypothesis which tends to nullify the use of technical analysis in predicting future price and profitability of above-normal market profit, however，on the contrary, while several current studies exemplify that technical analysis and trading rules which give bullish-bearish signals which generate enhanced performance more than simple-buy-and-hold strategy. Nevertheless, several top traders, expert fund administrators as well as Commodity Trading Advisors (CTAs) make use of Technical Analysis(TA) along with technical trading techniques (Covel, 2011; Schwager,1995) reviewed the persistence in implementation level of managed funds and observed that managers' proficiency and their dependence on diverse trading systems to undertake investment resolution is seen to have a positive result being visible on the persistence of the tradings′performance .

Consequently, we examine if the exploitation of technical analysis as well as technical trading rules can provide improved performance other than the easy buy-and-hold strategy in Forex markets.Furthermore, we want to study if extra rules to the optimized Exponential Simple moving average will add up the value and function more effectively than the conventional Simple Moving -Average crossover strategy. The research objectives of this study are as follows:

i. To review whether technical trading system, utilizing the typical Simple Moving-Average crossover strategy, outshine the simple buy-and-hold approach.
ii. To investigate if the implementation of the optimized Exponential Simple Moving-Average (ESMA) strategy can provide the unrivaled performance.

3. Research Methodologies

3.1. Sample data

The secondary data based on Great British Pound (GBP) currency pairs historical prices will be collected from OANDA Forex Broker platform. The data series used in this research is monthly and wekly records from first trading day in 2011 to the last trading day in 2018, a collection of 7-years of daily data, to back -test the conventional and Optimized Exponential Simple moving average ESMA crossover trading strategy.

3.2. Simple Moving Average (SMA)

Calculating the averages of current prices is most likely the most recurrent method for smoothing Prices and sifting out "noise" or unimportant market oscillations with movement.

Moving average, MA (n) = Sum of n closing price / n (1)

Where: n = the number of periods in moving average

3.3 Exponential Moving Average (EMA)

The calculation formula for EMA is seen to be more complicated than the SMA formula and follows these steps:

Select a "price" setting – assume "closing price";

Select a "period" setting – assume "10" for example;

Compute the "Smoothing Factor" = "SF" = 2/(1 + "10"); (2)

Therefore, New EMA value = SF X New Price + (1- SF) X Previous EMA value (3)

Trading signals are used to enable FOREX traders enter or exit a trade. When signals are released, a Long Position (Buy order) or Short Position (Sell order) is executed; this is dependent on the positioning of the croosover on the charts, also, an exit signal is displayed, the trade is executed to close (liquidate) their positions.

3.4. Original Simple Moving Average Crossover System

The original conventional Simple Moving Average (SMA)crossover rule is absolutely dependent on only entry point and exit point from the SMA crossover with short period SMA and long period SMA. No stop-loss rule is set to cut off losses. Entry point is defined as the open (Buy/Long) position when entry signal is displayed at the signal day's entry price. Exit point is also defined as the close (Sell/Short) position when exit signal is shown at the signal day's closing price.

3.5. Optimized Exponential Simple Moving-Average (ESMA) Crossover Approach

The optimized ESMA crossover rule is centerd on the combination of exponential and simple moving average rules with some additional trading rules and criteria added with the intention to enhance its risk-adjusted return. Some of the trading rules and criteria are as follow: stop-loss, least holding period, no trade entry on narrow-range day, no trade entry on white candlestick day, etc.

4. Results

Table 1.0 Illustrative statistics for the simple buy-and-hold approach

Total No. of Months	**84**
Avg. Profit per month (%)	0.0211
Avg. Loss per month (%)	-0.0120
Reward-to-Risk ratio	0.7000
Strategy Return	0.5561
Portfolio avg. return (geometric return)	0.0022
Standard deviation of return	0.0021
Sharp Ratio	0.0472
Skewness	-0.1421
Kurtosis	0.5872

From the available data on table 1.0, the simple buy-and-hold approach generates an overall return of 0.5561%. The average monthly return is 0.22% with a standard deviation of 2.20%, consequently, the risk-adjusted profit called (sharp ratio) is 0.047% (meaning that ,for every unit risk carried out, the average monthly profit will rise by 0.047%). Also, the approach has a maximum drawdown of -7.11% during September-2014; and a highest upside gain of 6.23% in March 2015. Using Financial statistical analysis, the Profit distribution is quite proportioned except for its flatter and thinner tail, having a skewness of -0.14 and kurtosis of 0.542 (negative kurtosis, platykurtic). This implies that the central mean is lower and broader, and has the tails being thinner and shorter. Profits as a result of this distribution has not much significant oscillation which validates the investment exploiting this strategy less risky.

Table 2.0 Summation of trades based on varied period values of different moving averages

Strategy Category	**B&H**		**MA (4,8)**	**MA (10,20)**	**MA (20,50)**	**MA (1,100)**	**MA (1,150)**
Total No. of Trades	84	Original SMA	25	38	55	110	135
		Optimized ESMA	150	98	78	30	12
Reward-to Risk Ratio	0.42	Original SMA	1.88	1.70	3.85	2.78	6.30
		Optimized ESMA	1.40	1.30	2.65	2.78	4.50
Total Strategy Return	0.5561%	Original SMA	109.11%	122.02%	152.42%	181.24%	310.23%
		Optimized ESMA	341.14%	151.26%	155.23%	122.02%	113.16%
Geometric Mean Return	2.10%	Original SMA	0.47%	0.50%	0.91%	1.44%	1.52%
		Optimized ESMA	2.23%	1.44%	1.19%	0.54%	0.65%
S. Deviation of Return	2.20%	Original SMA	1.51%	1.78%	3.52%	4.94%	4.52%
		Optimized ESMA	4.61%	4.94%	3.93%	2.13%	1.73%
Sharpe Ratio	0.05	Original SMA	0.15	0.14	0.12	0.14	0.18
		Optimized ESMA	0.23	0.15	0.13	0.14	0.19
Skewness	-0.14	Original SMA	1.11	1.23	1.69	1.92	1.20
		Optimized ESMA	0.87	0.92	1.94	1.92	0.91
Kurtosis	0.54	Original SMA	3.00	4.05	7.02	3.91	2.51
		Optimized ESMA	1.53	2.52	5.02	3.88	1.16

4.1. The Simple Moving-Average crossover strategy

From table 2.0 above, the original conventional SMA crossover strategies is seen generating higher risk

-adjusted portfolio return when evaluated against the simple buy-and-hold strategy, which is visible in the higher sharpe ratio. The profits are certainly skewed to the right with excess kurtosis (when, kurtosis > 0, it is termed to be leptokurtic) where its central mean is taller and sharper with longer and fatter tails. This shows that how the return is distributed holds few frequency for slight changes as the observed bassed on the clustering around the mean, however this also indicate that large variation in return are more visible around the fat tails.

From Table 2.0, the MA of 1-150 displays the maximum strategy return for the combination of conventional SMA crossover (using two periods of SMA), seconded by 1-100, 1-50, 10-20 and 4-8 SMA. The SMA crossover (e.g., MA (1-150) indicates the most trading frequency when evaluated to two short Period SMA crossover (e.g.,MA(4-8)), as the previous strategy tends to generate frequent trading signals than the present. Even though the previous generates frequent trading signals having slight average profit per trade and little unpredictability in return, in due course, the strategy generates better return than the second strategy (fewer continous trading signal, as well as significant average return for every trade executed and large return volatility).

4.2 Optimized Exponential Simple Moving-Average (ESMA) Crossover Strategy

As shown in table 2.0, correspondingly, every of the ESMA crossover strategies have generated higher risk-attuned portfolio profit when evaluated against the simple buy-and-hold along with the original conventional SMA crossover strategy, as visible in the higher sharpe ratio. The profits are positively skewed to the right along with their kurtoses which are in general ,reduced when compared to the original conventional SMA crossover strategy. This implies that this optimized ESMA strategy has reduced significant volatility that compels the investment to be less risky when compared to the original SMA crossover strategy, evident that the risk-adjusted profit is higher.

The optimized ESMA crossover strategy equally exhibits signs of unpredictability in its strategy return seen in some periods (Using Exponential & Simple MA period values)of crossover, which show higher return unlike the the original SMA strategy, whereas , some display decreased strategy return.This could likely be as a result of the stringent added trading rules that trim down trading signals, thereby reducing the number of executable trades. In particular is the added rule for a trade buy entry signal (open a trade when white candle Crossover is spotted, no trade entry on dark candle or market trending days), that has considerably separated and reduced the signal for executing trades while the original strategy exhibits.

Similarly, the stop-loss rule has controlled the impending loss as visible in the maximum drawdown , which shows that the optimized ESMA strategy is less significant than the original SMA strategy,when exposed to equal amount of maximum gain. The ESMA strategy that outshine the original SMA strategy are with varying periods of Exponential and Simple MA (4-8, 10-20, 20-50).

5. Conclusion

In general, the implementation of technical trading system via moving-average strategy perfoms better than the simple buy-and-hold strategy with enhanced risk-adjusted profits. Even though the optimized ESMA crossover strategy enhance the strategy efficiency which generate improved strategy profits, as well as reduce distribution of ptofit inconsistency and less significant trades executed when compared to the original SMA crossover strategy, mainly due to the additional trading rule applied.

However, the optimized ESMA can be further modified to increase its efficiency by developing an intelligent

automated trading system , then using machine learning- genetic algorithm to test and train the trading system with the imported data (algorithmic trading system).

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