



Efficiency of Malaysian stock market: A revisit based on analysts' recommendations

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Abstract

A market is efficient in the weak form when current prices reflect past market information (prices and volumes) in such that a technical analysis is no longer a viable tool for generating abnormal returns. This study re-investigated the weak form efficiency of Malaysia stock market using technical trading strategies. To ensure reliability, transactions are executed based on the buy recommendations made by research houses registered with Bursa Malaysia. The weak form efficiency was tested based on the profits from selling signals of 5 most popular technical analysis indicators; namely shooting star, MACD oscillator, relative strength index, momentum indicator and simple moving average. The sell signals were generated using ChartNexus, one of the most contemporary technical analysis software. This study examined 547 buy recommendations from the recent year of 2013, involving 213 counters listed on Bursa Malaysia. The preliminary results showed that around 64 percent of the recommendations are accurate, i.e., generate positive returns. While the finding implies about 34 percent room of errors in the professional security analysts' recommendations, the economically and statistically significant abnormal returns generated through the technical trading strategies provide solid evidence against weak form efficiency of the Malaysian stock market.

Keywords: abnormal returns, ChartNexus, Malaysia stock market, market information, technical trading strategies, weak form efficiency

Introduction

An efficient market is conceptually defined as one where prices of all securities quickly and fully reflect all available relevant information (Fama, 1970). The main implication of an efficient market is that investors will not be able to consistently earn abnormal profits based on the information that they use to make their investment decisions. Yet, there are three forms of market efficiency and each form depends on the type of information used to evaluate the reflection in price. This study focused on the weak form efficiency (most basic level of efficiency) which relies on information of past prices and volumes. In the context of stock trading, the effectiveness of trading strategies in technical analysis is a direct test of the weak form efficiency. These trading strategies are associated with certain trends and patterns that technical analysts obtain from past prices and/or volumes to predict future price movements. Given that most technical investors still rely on fundamental analysis to create their personal investment universe, this study resorted to the buy recommendations of 10 registered research houses published in the website of Bursa Malaysia (formerly known as Kuala Lumpur Stock Exchange, KLSE) to proxy for the fundamental analysis component.

Technical analysts pose a valid defence against the total reliance on fundamental analysis for practical stock trading. Fundamental analysis is good at creating a universe of common stocks to focus ones'

attention on, but unless the investors are taking a long position in the stocks, a market timing instrument is needed to execute profitable trading. Undervalued stocks are not likely to appreciate toward the fair value unless and until adequate homogeneous perceptions are formed to drive the price of the stocks. With heterogeneity in market perception being a common characteristic in any stock market, such a coincidence is rarely the case, particularly in the context of active trading activities which involve a short-term investment horizon. Active stock market players are constantly looking for the best timing to buy and sell their stocks to earn their profit.

Empirically, evidence on the efficiency of Malaysian stock market is still leaning toward at best weak level. Moreover, the popularity of technical analysis and fuss about the validity of technical analyst recommendation provide a motivation for the present study to pay this issue another visit. Relying on ChartNexus, one of the most contemporary technical analysis software, this study will identify sell signals based on five of the most popular technical trading strategies. Specifically, sell signals known as shooting star, MACD oscillator, relative strength index, momentum indicator and simple moving average will be used to determine if technical analysis is effective in generating abnormal returns. In short, evidence of weak form efficiency will be obtained based on the statistical significance of the magnitude of the returns in excess of the market generated through the technical trading strategies under studied. If the Malaysian stock market is efficient in the weak form, none of the technical trading strategies should produce significant abnormal profits.

The other two forms of market efficiency are the semi-strong and strong forms. A market is efficient in the semi strong form when information on market data and publicly available information are reflected in the price of stocks. Examples of publicly available information include announcements on earnings, dividends and stock split, new product developments, accounting changes, management changes, research analysts' report and so on. Strong form market efficiency is the most stringent form as stock prices fully reflect all information, public and non-public. The non-public information can be divided into two broad categories; inside information which is restricted to certain groups such as corporate insiders and specialists on the exchanges, and private information which is obtained through the use of private resources of interested parties such as fund and investment managers.

The remainder of this article will be discussed in the following manner. The next section reviews the relevant literature. This is followed by a section describing the methodology, another presenting and discussing the results of the study and finally, a section which presents the conclusion and the implications of the study.

Objective of study

This study examines the market efficiency of Malaysian stock market in its weak form. In doing so, it also examines the viability of ChartNexus as a technical analysis tool to predict the trend and prices of stocks trading on Bursa Malaysia. The reliability of the application's timing ability is critical in such that investors adopting it can make a better investment decision in the stock market.

Literature review

Conceptually, the efficient market hypothesis (EMH) which posits that prices of security quickly and fully reflect all available relevant information is first proposed by Fama (1965). The concept is given an economic argument by Samuelson (1965) in that price changes must be random or unpredictable if they are properly anticipated. Fama (1965) also suggested that the EMH can be operationally defined by identifying the structure of various information sets available to market participants into three categories; weak, semi-strong and strong. The weak form comprises historical prices and volumes information. The semi-strong form widens the scope to include all publicly available information which in the modern

world of technological sophistication can reach really deep into the companies. The stretch of semi-strong form information has really thinned out the scope of strong form information which specifically caters for only private and inside information. This study focuses on the weak form market efficiency such that, by default its null hypothesis suggests that since the current price already reflects all market (price and volume) data, the past information has no value and therefore cannot be used to predict changes in the future price.

There are two basic methods that can be used to analyze securities; namely fundamental analysis and technical analysis. Fundamental analysis relies on characteristics and fundamentals of a company to estimate the value of its securities. Meanwhile, the technical analysis relies on movements of past prices and volumes of the securities to identify the best time to make decisions about the investment. Technical analysis is most prevalent in the stock markets because prices and volumes of common stocks change continuously. Technical analysts too rely on fundamental values but merely to create a smaller universe of good stocks. Nonetheless, their final trading (buy or sell) decisions are made through charts and other tools such as indicators and oscillators to identify the patterns and trends of the securities.

Empirically and as far as previous studies on Malaysia are concerned, the results about the Malaysian market efficiency are rather inconclusive. By focusing on the most recent studies, the list of proponents of efficient Malaysian stock market include Munir and Mansur (2009) who found that the Kuala Lumpur Composite Index (KLCI) is a nonlinear series that is characterized by a unit root process and this is consistent with the efficient market hypothesis. The study also found that return on KLCI cannot be predicted using its own historical stock prices. Another study by Mun et al. (2008) investigated market efficiency based on the leverage effect on movement in Malaysian stock market. They found that the market does not capture bad or good news and such a market behavior suggests that the market behaves irrationally or is random walk. None of the technical and fundamental analysis performed can predict the stock price.

Meanwhile, other literature reports results which indicate that the Malaysian stock market is inefficient. For instance, Hamid et al. (2010) investigated the weak form market efficiency in Asia Pacific region including Malaysia and they found evidences against the weak form efficiency based on the gap of arbitrage benefits. Another study by Fred et al. (2012) investigated the advantage of technical analysis in reducing risk and generating profits. Their study found that technical analysis generates returns greater than that of a passive strategy. Specifically, they found that if no transaction cost is involved, 12 out of 13 trading systems can produce significantly positive gross returns. If transaction costs increase to 0.44%, 9 out of 13 trading systems produce significantly positive returns; and lastly, if transaction costs increase to 0.84%, only 4 out of 13 trading system can produce significantly positive returns. These results provide additional support to the claims that Malaysian stock market is weak form inefficient since market data and historical information used in technical trading systems contain values and make abnormal profits.

Similar inefficient market is documented in a study by Chin (2008) who investigated the Malaysian market weak form efficiency using 9 (daily) sectorial indices. He discovered that almost all sectorial markets which implied the tendency for price level return to their initial trend path which provided the useful information in future forecasting. This result implied that most of the sectorial stock markets are weak form inefficient under the structural change except property index

In a more comprehensive study, Worthington and Higgs (2006) examined weak form efficiency in 15 Asian stock markets including Malaysia. Their study showed that all markets are inefficient in the weak form based on results of serial correlations and runs tests. However, when tested using the unit root test, all markets were found to be efficient except for Australia and Taiwan. In their study, the results of variance ratio tests also indicated that none of the markets is characterized by random walks (not weak form efficient) except for Hong Kong, New Zealand and Japan. Upon finding that volatility of returns is persistent in Bursa Malaysia, Balkiz (2003) concluded that the market is predictable and not informationally efficient in the weak sense. In a slightly different manner, Norli et al. (2010) also found evidence against weak form efficiency. They found that the Malaysian stock market significantly overreacted to economics events, political news, and SARS outbreak and significantly underreacted to the

September 11th terrorist attacks. They concluded that the behavior of Malaysian stock market is not consistent with the weak form of EMH in the short run and that investors still can earn abnormal profit in Malaysian stock market.

Methodology

This study uses the buy recommendations suggested by 10 security houses that are registered in Bursa Malaysia (refer to Table 8). Security analysts are the experts in terms of stock valuation, whereby the adoption of their recommendations limits the bias in stock selection as their recommendations certify the good intrinsic values of the stocks. For the period that spans from 1 January to 31 December 2013, there were 547 buy recommendations recorded in the Bursa Malaysia website. The 547 buy recommendations involved 121 common stocks, implying that some stocks have multiple buy recommendations throughout the year. Each buy recommendation was then matched against a sell signal which is associated with any of the 5 technical trading indicators selected in this study (MACD, momentum, RSI, shooting star and moving average), detected using the ChartNexus. Descriptions of these technical strategies are provided in the Appendix. The selections of the 5 indicators are based on the facts that these strategies are among the most popular with investors and researchers.

This study measures effectiveness of the technical trading strategies using the total return (R) formulation which focusses on the capital gain yield (i.e., assuming that no dividend is paid during the investment period). The total return for any particular buy recommendation can be represented as follows;

$$R_i = \frac{(P_{S,i} - P_{B,i})}{P_{B,i}} \quad (1)$$

where R_i is the total stock return from the i th technical trading strategy (i represents MACD, momentum, RSI, shooting star, or moving average), $P_{B,i}$ is the stock price on the date of the buy recommendation of a particular stock, and $P_{S,i}$ is the price on the date of the sell signal of the i th technical trading strategy is detected. The same return formulation is used to measure the average market performance during the same investment horizon. In this study, price indices of the KLCI are used to calculate the market return. Meanwhile, the nominal monthly return of the 3-month Treasury bill (T-Bill) is used to approximate the risk-free rate of return.

This study employed several tests to statistically determine the significance of the total return of a security that is generated from the technical trading strategy. As basic tests, the total return generated from each of the technical trading strategies was tested against zero (H_0 : Total return of technical trading strategy is not significantly different from zero) and then against the market average performance (H_0 : Total return of technical trading strategy is not significantly different from the average market performance). The third test was the Jensen's alpha, which tests whether a stock or a portfolio outperforms or underperforms the market. As an application of the capital asset pricing model (CAPM), Jensen's alpha can be represented in the following regression equation;

$$(R_i - R_F) = \alpha + \beta_i(R_M - R_F) + \varepsilon \quad (2)$$

where α is the Jensen's alpha which measures the performance of the stock relative to the market and net of the risk-free return, R_i is the total return from the i th trading strategy in Equation (1), R_m is the total return on the market portfolio (KLCI) during the same investment period as the respective trading strategy i , β is the factor loading of the market risk premium, R_F is return on the risk-free security (T-Bill), and ε is the error term. In addition to the total returns of all sell signals, we also calculated the returns of only profitable sell signals. This is assuming that investors, having known such signal will not produce a

capital gain, would only act on a sell signal if the sell signal occurs at a price that is higher than the price at the buy date.

Results and discussion

Table 1 summarizes the detailed outputs for each of the technical trading strategies. Of the five trading strategies, momentum is the most frequent (311) sell signal detected. The sell signals account for slightly more than half of the buy recommendations selected for the study. In other words, upon identifying a buy recommendation in Bursa Malaysia, an investor has a 50/50 chance of finding a sell signal using this strategy. Interestingly, on average the sell signal can be detected within a three-week trading time (N(D) ~ 15 days) and more interestingly, similar trend is reported for all strategies. A considerable frequency of sell signals is reported for the shooting star as this strategy produces about 20 percent (106 times) of sell signals for the overall buy recommendations.

Table 1. Summary of profile and performance of selected technical trading strategies

Technical Strategy	N (%)	N(D)	N(PR)	R _i	R _M
Momentum	311 (56.86%)	17.16	190 (61.09%)	4.32%	1.01%
Shooting Star	106 (19.38%)	16.11	71 (66.98%)	4.19%	1.31%
RSI	66 (12.07%)	15.76	52 (78.79%)	4.94%	0.57%
MACD	17 (3.11%)	9.35	3 (17.65%)	-1.63%	0.24%
SMA	1 (0.18%)	19.00	0 (0%)	-1.76%	-1.71%
Multi Signals	46 (8.41%)	17.15	37 (80.43%)	3.25%	1.27%

Notes: N = number of sell signals of the respective strategy and figure in percentage is N/547.
 N(D) = number of days between buy and sell signals.
 N(PR) = number of successful strategy i.e., one that generates positive returns.
 R_i = total stock return for the *i*th strategy.
 R_M = total return on the market portfolio (KLCI).
 Figures for N(D) and returns are the mean values.

In the terms of accuracy, shooting star is slightly more reliable than the momentum as the former generates a higher success rate (67% versus 61%). Relative strength index (RSI) produces 66 or about 12 percent sell signals while MACD reports only 3 percent sell signals. Although relatively difficult to occur, RSI generates the highest success rate (N(PR) ~ 79%) compared to the other 5 strategies including the multiple signals. Multisignals refer to few cases where more than one strategies are detected on a given buy signal. The least reliable technical trading strategy to adopt is most probably the SMA strategy. Not only it is difficult to spot as it only reports 1 sell signal for the whole 547 buy recommendations, when the signal is spotted, it produces a negative return (R_i = -1.76%).

Assuming investors religiously follow the sell signals whenever they spot one, the performance or returns of the strategy can generally be inferred based on the mean values reported in Table 1 and illustrated in Figure 1 (dotted bar). It is rather obvious from the mean values that the trading strategies are consistently generating total returns that are relatively higher than the market. Two exceptions are the MACD and SMA strategies which overall result in negative mean returns. The two strategies happen to be the less frequent occurrences as far as this study is concerned. Figure 1 illustrates that the relative performance of the trading strategies and it is shown that other than MACD and SMA, on the average, investors are obtaining returns that are higher than the market. Note that Figure 1 also shows that the total returns of profitable signals are always higher than the respective total market returns which maintain at an average of less than 2 percent throughout all trading strategies.

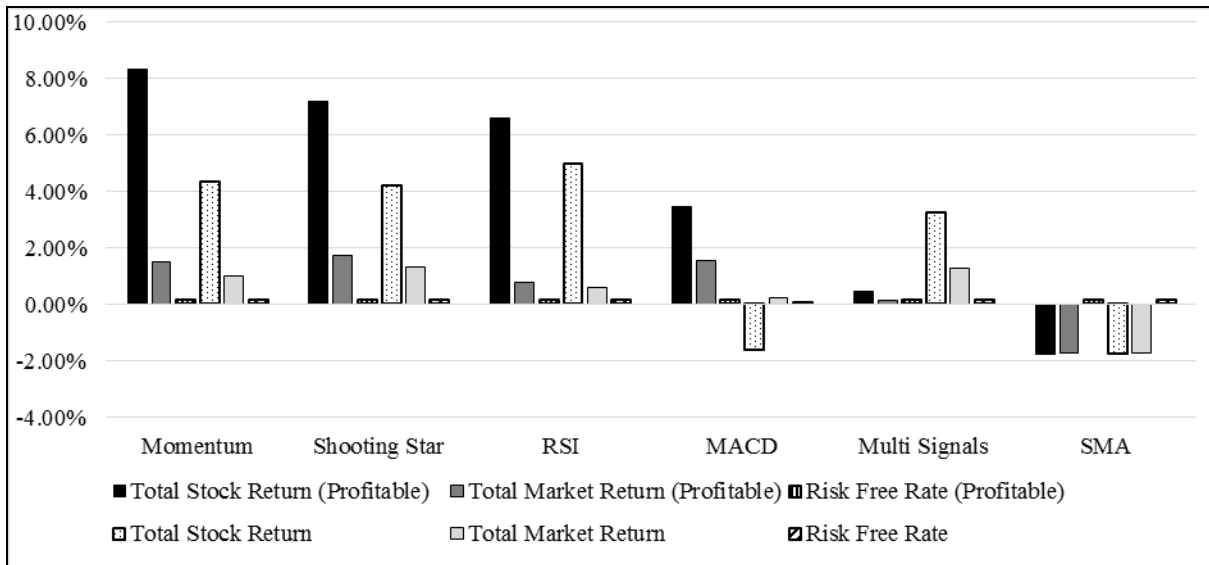


Figure 1. Relative performances of the technical trading strategies for all sell signals and profitable signals

Next, Table 2 summarizes the means for the 3 different return measures for each of the 5 trading strategies (recall that SMA produces only 1 signal and it generates negative return). All the 15 return

Table 2. Summary of the t-test for all data

Trading Strategy	Return	Mean (μ)	t-value ($H_0: \mu_R \neq 0$)	Sig	t-value ($H_0: \mu_R \neq \mu_M$)	Sig
Momentum	R_i	0.0432	7.173	0.000***		
	$R_i - R_f$	0.0418	6.950	0.000***		
	$R_i - R_m$	0.033	5.689	0.000***	5.689	0.000***
Shooting Star	R_i	0.0419	4.727	0.000***		
	$R_i - R_f$	0.0406	4.615	0.000***		
	$R_i - R_m$	0.0288	3.805	0.000***	3.805	0.000***
RSI	R_i	0.0493	6.250	0.000***		
	$R_i - R_f$	0.0481	6.108	0.000***		
	$R_i - R_m$	0.0436	5.956	0.000***	5.956	0.000***
MACD	R_i	-0.0162	-2.187	0.044**		
	$R_i - R_f$	-0.0170	-2.315	0.034**		
	$R_i - R_m$	-0.0186	-2.633	0.018**	-2.633	0.018**
Multi Signal	R_i	0.0325	4.24	0.000***		
	$R_i - R_f$	0.0311	4.067	0.000***		
	$R_i - R_m$	0.0197	2.65	0.011**	2.65	0.011**

Notes: Asterisks *** indicate significance at 0.001 level.
 Asterisks ** indicate significance at 0.05 level.
 Asterisk * indicates significance at 0.001 level.

series are significantly different from zero at least at the 0.05 level. Except for the negative returns reported for the MACD, the results consistently show that technical trading strategies are effective in producing large profits. The significant total returns net of the risk-free rate of returns ($R_i - R_F$) indicate that the trading strategies correctly reward investors for undertaking the risky investment in common stocks. Nonetheless, the more important finding is the significant results of the market adjusted returns ($R_i - R_M$); as this valid evidence that technical trading strategies are effective in producing significant abnormal returns. This inference is supported by the results of the t-test on the mean difference between R_i and R_M .

Table 3 summarizes the mean of the same 3 different return measurements estimated for each of the 5 different trading strategies, but now focusing only on the profitable signals (recall that SMA produces only 1 signal and it generates negative return). The t-test ($H_0: \mu_R \neq 0$) results show that except for the MACD strategy, all return series are significant at least at the 0.01 significance level. The results, particularly the significant results of the market adjusted return ($R_i - R_M$) confirmed our earlier conjecture that trading strategies are still effective in producing significant abnormal returns. This finding also implies that market timing is still relevant in the context of Malaysian stock market. Comparing the magnitude of the mean returns reported in Tables 2 and 3, one should be able to deduce that acting on the sell signals only when the signals occur at a price higher than the buy price (profitable trading) will generate returns which are always higher than taking the sell signals literally. Doing so will also reduce the transaction costs as less number of sales and new purchases need to be executed.

Table 3. Summary of the t-test by using profitable recommendation

Trading Strategy	Return	Mean (μ)	t-value ($H_0: \mu_R \neq 0$)	Sig	t-value ($H_0: \mu_R \neq \mu_M$)	Sig
Momentum	R_i	0.0830	10.566	0.000***		
	$R_i - R_F$	0.0815	10.405	0.000***		
	$R_i - R_M$	0.0679	8.758	0.000***	8.758	0.000***
Shooting Star	R_i	0.0719	6.988	0.000***		
	$R_i - R_F$	0.0705	6.931	0.000***		
	$R_i - R_M$	0.0547	6.301	0.000***	6.301	0.000***
RSI	R_i	0.066	7.9300	0.000***		
	$R_i - R_F$	0.0646	7.777	0.000***		
	$R_i - R_M$	0.0582	7.354	0.000***	7.354	0.000***
MACD	R_i	0.0346	2.154	0.164		
	$R_i - R_F$	0.0331	2.057	0.176		
	$R_i - R_M$	0.0193	0.879	0.472	0.879	0.472
Multi Signal	R_i	0.046	6.197	0.000***		
	$R_i - R_F$	0.0446	6.045	0.000***		
	$R_i - R_M$	0.0319	4.331	0.000***	4.331	0.000***

Notes: Asterisks *** indicate significance at 0.001 level.

Asterisks ** indicate significance at 0.05 level.

Asterisk * indicates significance at 0.001 level.

Next, Table 4 shows result of the regression test for estimating the Jensen's alpha to gauge the performance of the trading strategies. Jensen's alpha has accounted for the risk free rate in the regression calculation. The results show that the coefficients of the market risk premium ($R_m - R_f$) are significant in explaining returns of all 5 technical trading strategies, indicating that market risk premium has certain bearing on the returns of the strategies. These results are consistent regardless of whether the sample includes all sell signals or only focusing on the profitable signals, with two exceptions i.e., MACD and multi-signal strategy. More specifically, with Jensen's alphas being significant in 8 out of 10 regression

models, the results can be considered strongly leaning toward indicating that technical strategy investment is capable for generating abnormal returns. In other words, the evidence is more toward suggesting inefficient rather than efficient market in the weak form.

Table 4. Regression results for Jensen's alpha (α)

Strategy	A	Prob	B($R_m - R_f$)	Prob
Panel A. Regression results for Jensen's alpha (α) for all sell signals				
Momentum	0.0295	0.000***	1.4151	0.000***
Shooting Star	0.0105	0.173	2.5552	0.000***
RSI	0.0414	0.000***	1.5156	0.0013***
MACD	-0.0183	0.0256**	0.7959	0.285
MultiSignal	0.0223	0.0228**	0.7748	0.1335
Panel B. Regression results for Jensen's alpha (α) using profitable recommendation				
Momentum	0.0704	0.000***	0.8213	0.0446**
Shooting Star	0.0322	0.0012***	2.4378	0.000***
RSI	0.0575	0.000***	1.1204	0.0265**
MACD	0.0472	0.3492	-1.0161	0.6333
MultiSignal	0.0381	0.0004***	0.5161	0.3074

Notes: Asterisks *** indicate significance at 0.001 level.

Asterisks ** indicate significance at 0.05 level.

Asterisk * indicates significance at 0.001 level.

Overall, the result from the regression of Jensen's alpha is somewhat contradicting the results of some previous studies (Munir & Mansur, 2009; Mun et al., 2008) which indicated that Malaysian stock market is efficient in the weak form. However, the results in general are inclined to support those of other previous studies which suggest that Malaysian stock market is in inefficient in weak form market. The evidences were documented in Hamid et al. (2010), Fred et al. (2012), Chin (2008), Balkiz (2003), and Norli et al. (2010).

Conclusion and implications

This study examines the weak form efficiency of Malaysian stock market using 547 buy recommendations that are provided throughout 2013 by registered security houses and sell signals of 5 selected technical trading strategies. From the t-tests, return measures from all technical trading strategies are significantly different from zero at least at the 0.05. One exception is for the MACD strategy when only profitable sell signals are considered. The results are further confirmed with the significant Jensen's alphas. These findings prove that technical trading strategies are significant in generating abnormal returns. More encouraging results are obtained through more powerful regression analysis of Jensen's alpha. Overall, the results of this study are sufficient to suggest that Malaysian stock market is still inefficient in the weak form. This finding is indeed consistent with those documented in earlier studies (eg., Balkiz, 2003; Chin, 2008; Norli et al., 2010; Worthington & Higgs, 2013). As such, this study adds new evidence to the literature on market efficiency of weak form in the context of an emerging market. Yet, a strong conclusion should only be drawn from results of other different technical analysis software available in the market such as MetaStock, Gstock, Reuters 3000 Xtra, Trader Made, Statmetrics, eSignal, CQG and MultiCharts.

The weak form inefficiency implies that investors who are proficient in using technical analyses have a great chance of obtaining abnormal profit from the timing the stock market, in particular from using the ChartNexus software. Mastering a systematic tool such as this could be an effective approach to improve financial literacy which is proven influencing the financial wellbeing among Malaysian youths, even though insignificantly (Idris et al., 2013). Indeed, as much initiatives should be given in developing smart young stock traders as they would have in developing entrepreneurs in this country. Not only because stock market has been universally accepted as one of the gold mines, but more importantly it is because systematic trading strategies still work to generate abnormal returns. The traits required for a successful entrepreneurs (Ling et al., 2009) are in fact not much different from stock traders, especially when it comes to tolerating risks since stock market is know to be highly volatile.

Professional fund managers or money managers should use this technical analysis application to manage their funds in order to achieve and maintain desired portfolio risk and maintain correct diversification and earn profit from the market. The results of this study also imply that the buy recommendation of the security houses registered in Bursa Malaysia can be considered viable source of reference for timing the entry to the market. Evidently, this study finds that about 64% of 547 times buy recommendations generate profits. Profitable or not, investors have the tendency to outperform the market by taking the buy recommendations and sell the stocks on any signal triggered from the examined technical trading strategies except SMA. Meanwhile, more risk-averse investors may opt to reduce their risks by relying on the more accurate recommendations by the more conservative security houses. Finally, this finding also implies that the ChartNexus application is a reliable instrument to detect sell signals.

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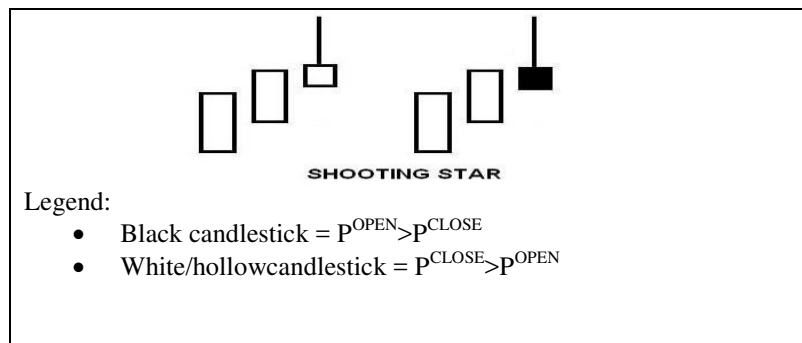
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APPENDIX

Description of selected technical strategies

Shooting Star

Shooting star candlestick is 1 of 4 star formations in candle theory (Pasternak 2006). The other 3 types of star formations are morning star, evening star and doji star. Different with others star, shooting star will only occur at the top of up trends of a candlestick graph. The top of the shooting star looks like an inverted hammer but it occurs on a down trend candlestick bar. It is defined as a long upper wick and at least two times the length of the lower body. For a shooting star, the long upper wick indicates that buyers drive prices up during the period which a candle is formed but encounters selling pressures which drive prices back down for the period to close near to where it opens. As this occurs in an uptrend, the selling pressure is seen as a potential reversal sign. When the shooting star occurs, the preceding candle should have a large real body. After the day or week the shooting star occurs, the mean market should ideally gap higher. The stock price should then increase sharply. At this point, it appears as though the longs are in a complete control. However, at some points during the day or week, the profit taking activities will occur. The small real body will be shown if stock price closes near the open price, so the shooting star will have a small body and large upper shadow. Typically, no lower shadow or a very small shadow will be created. If the bulls and bears are at war with each other, a small real body will be shown. If the bull is controlled during the uptrend, the two sides will match.



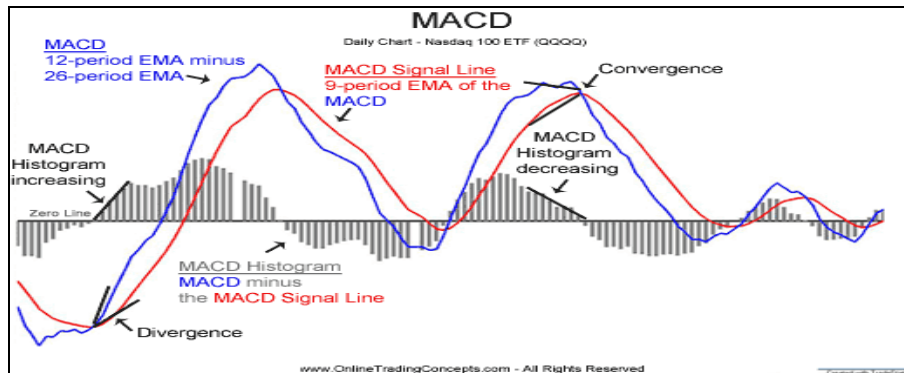
Source: Generated from Upfront Trader and Shooting Star Reversal Signal available at <http://www.upfronttrader.com/2013/11/14/hammer-shooting-star-reversal-signal/>

Figure A1. Trading signal of a shooting star

MACD Oscillator

Moving average convergence divergence (MACD) is a technical analysis indicator introduced by Appel (1979). MACD is used to spot changes in the strength, direction, momentum and duration of a trend of stock prices. Until now, MACD is one of the simplest and more effective momentum indicators available. The MACD turns two trend-following indicators that is moving average into a momentum oscillator by subtracting the longer moving average from the shorter moving average. MACD offers the “trend following and momentum”. MACD fluctuates between above and below the zero lines as the moving averages, centerline, crossovers and divergences to generate signals. MACD is a collection of three signals of MACD line, signal line or average line and the difference or divergence and calculated from historical price data and most often closing price. The first line of MACD called the “MACD line” is equal to the difference of a “fast” exponential moving average (EMA) and a “slow” exponential moving average. The “signal line” or the average line is an exponential moving average. The difference between the MACD line and signal line is called histogram time series. A fast EMA responds more quickly than a slow EMA in changes on the stock prices. Comparing EMAs of different period, MACD line can indicate

changes in the trend of a stock. Analysts can detect subtle shifts in the stock's trend by comparing the difference to the average. The MACD Oscillator is special because it combines momentum and trend in one indicator, manifesting unique blend of trend and momentum that can be applied to daily, weekly or monthly charts. MACD line is constructed using the actual difference between two moving averages.

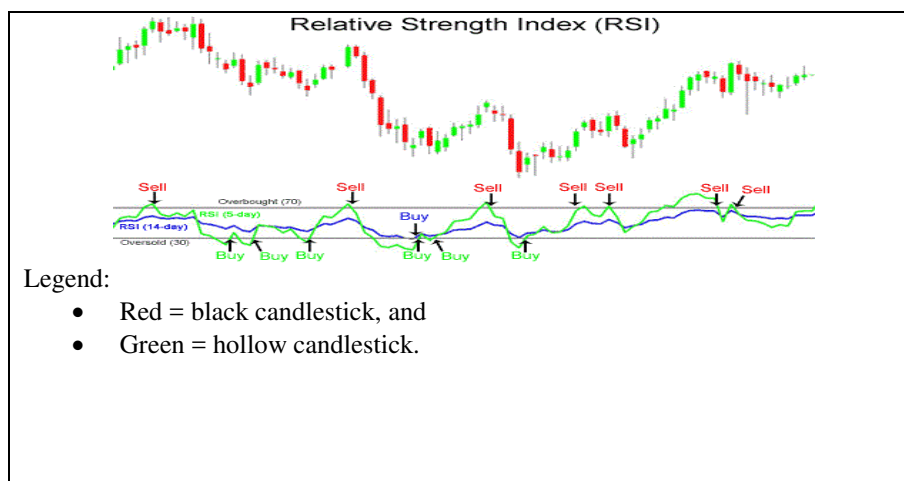


Source: Generated from Stock Diamond available at <http://www.stockdiamond.com/Technical-Analysis/using-buy-a-sell-signals-a-screening-stocks.html>

Figure A2. Trading signals of MACD

Relative Strength Index

Relative Strength Index (RSI), introduced by Wilder (1978) in the “New Concepts in Technical Trading Systems”, is commonly used in the analysis of financial market and has become one of the most popular oscillator indices. RSI charts the current and historical strength or weakness of a stock based on the closing prices of a recent trading period. RSI is a momentum oscillator which measures the speed and change of price movements. The RSI computes momentum as the ratio of higher close to the lower close, creating a stronger positive change for a stock with a higher RSI compared to another with a stronger negative change. Typically, a RSI will complete within a 14-day time frame. According to Wilder (1978), a RSI oscillator is in an overbought territory when it scores above 70 and oversold territory when the score is below 30. A score of RSI between 30 and 70 is considered neutral while 50 is a sign of no trend.

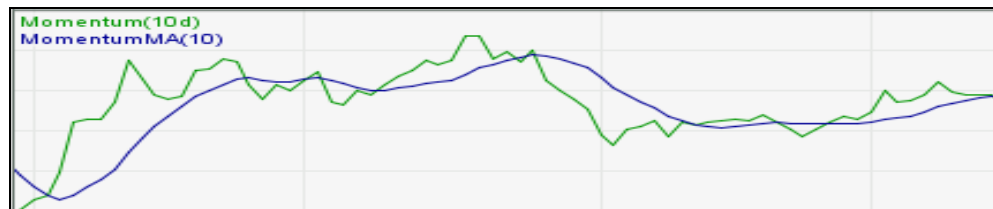


Source: Generated from Online Trading Concepts, Relative Strength Index (RSI) available at <http://www.onlinetradingconcepts.com/TechnicalAnalysis/RelativeStrengthIndex.html>

Figure A3. Trading signals of relative strength index (RSI)

Momentum Indicator

The Momentum Indicator is used to compare the current price in relation to where the price was in the past. If the current price is higher than the past price, then the momentum indicator will be positive. In contrast, the momentum indicator is negative if the current price is lower than the price in the past. A buy signal is triggered when the momentum indicator crosses above the zero line. The crossing of the zero line implies that the price of the stock, future or currency pair is reversing course, either by having bottomed out or by breaking out above the recent highs. This also is a bullish signal. On the contrary, a sell signal is triggered when the momentum indicator crosses below the zero line. A cross of the zero line can generally mean two things; that the future, currency pair or stock price has topped out and is reversing, or that the price has broken below the recent lows. This also is a bearish signal.

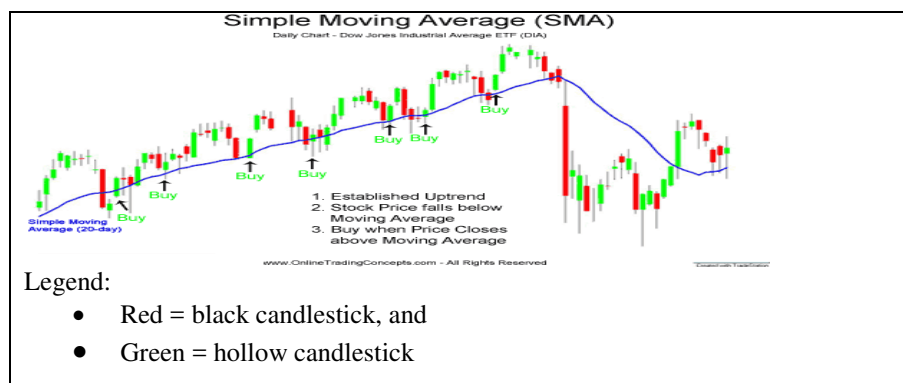


Source: Generated from ChartNexus.

Figure A4. Trading signals of momentum

Simple Moving Average

Simple moving average is the most popular technical analysis tool used by traders or investors to identify trend direction. This indicator is also commonly used to generate the buy and sell signals. Simple moving average is an average or mean of the stock price. The period selected depends on the type of movement of interest, such as short, intermediate or long term. Moving average level can be interpreted as a “support” in a rising market, or a “resistance” in a falling market. One characteristic of the SMA is that if the data have a periodic fluctuation, then applying an SMA of that period will eliminate that variation. However, a perfectly regular cycle is rarely encountered. When the stock price is in an uptrend and subsequently, the moving average is in an uptrend and the moving average has been tested by price and price has bounced off the moving average a few times, then buy on the next pullbacks back to the simple moving average.

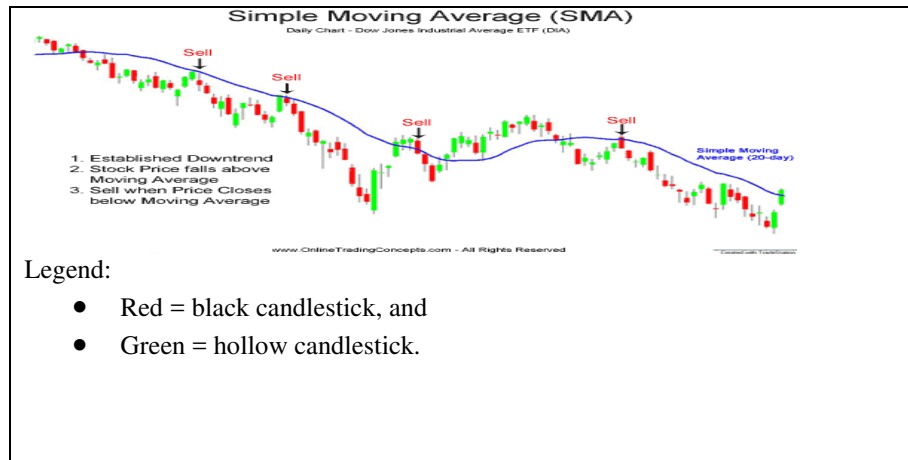


Source: Generated from Online Trading Concepts, Simple Moving Average available at <http://www.onlinetradingconcepts.com/TechnicalAnalysis/MASimple.html>

Figure A5. Trading signals of simple moving average (SMA)

When the price is in a downtrend and the moving average is in a downtrend, the price tests the SMA above and is rejected a few consecutive times. In such a case, buy on the next rally up to the simple

moving average. SMA is a strategy that is seldom found even through the ChartNexus application. This rare case can be attributed to the condition of SMA which requires an uptrend or downtrend market.



Source: Generated from ChartNexus

Figure A6. Trading signals of simple moving average (SMA)