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Efficiency of Technical Analysis for the Stock Trading

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Abstract

The purpose of this study is to determine which indicators are more capable of showing more accurate sell and buy signals on the LQ45 index by using the oscillator indicator Moving Average Divergent Convergent (MACD), Bollinger Band, and Relative Strength Index (RSI). This research combines several indicators, whereas some previous studies use only one fator in their research so that there is no better visible difference and indicators. The results in this study indicate that the sell signal can be captured well by the Bollinger band and MACD indicators, but it cannot be captured properly by the RSI, the volume can be small or heading and are in the side ways, while the MACD plays a too slow role in capturing the signal buy compared to Bollinger bands and RSI. The use of a single indicator will never show a buy and sell signal that is really accurate, this is based on the results of research that shows the difference in timeliness in Bollinger, RSI and also MACD so that the combination of several types of indicators will be better compared to using single indicators. Although in statistics there are no significant differences, there are only differences in increment and improvement in the placement of existing values, but in this case, the order of this value is crucial for traders because it requires very high accuracy to determine the right decision in daily transactions.

Introduction

In this era of globalization, investing has become a familiar word and has become a common thing that is done by the world community, especially Indonesia. According to Tandelilin (2017), investment is a commitment to a number of funds or other resources made at the time, with the aim of obtaining a number of benefits in the future. Many choices of investment fields already exist today and one of them is stock. According to Hermuningsih (2017), stock is one of the investment fields that is quite attractive but has a high risk. Investors can invest in stocks using a long-term strategy for profit, but there are other ways that can be used to develop funds from stock investments, namely trading activities (Abbey and Doukas, 2012).

In every stock trading transaction, investors or investment managers are faced with the choice to buy or sell shares. Every mistake in making investment decisions, will cause losses for investors. Therefore, an accurate and reliable analysis is needed to be used as the basis for investment decision making. There are two types of analysis in the world of stock investment, namely fundamental analysis and technical analysis (Ahmar, 2017). According Ahmar (2017) said that in conducting technical analysis using previous price movements and/or other market data, such as transaction volumes, to assist in the decision making process on the trading asset market. This decision is usually obtained by implementing some simple rules on the stock price hierarchy).Technical analysis consists of various indicators to assist decision making with several categories of indicators. Some categories of indicators are indicators to determine trends used to determine whether market conditions are in an uptrend or downtrend. The indicator category used to determine the signal when buying and selling is an oscillator indicator (Ahmar et al, 2017). The oscillator is an indicator that precedes or leads price movements. Leading Indicator can quickly predict price movements, generally used to measure whether overbought or oversold (Ahmar, 2018).

Dynamic capital market activities in a country will illustrate the good condition of the business climate in the country concerned. A good capital market performance is a barometer for the health of the economy which will lead to investor enthusiasm to return to investing (Tandelilin, 2017), where the index is a reflection of stock price movements in the capital market. Therefore, the direction and magnitude of changes in the index in the capital market is one of the benchmarks for investors in order to invest in the capital market. The purpose of investors in investing is to maximize returns, without forgetting investment risk factors that must be addressed (Anghel, 2015). There are several sources of risk that can influence the magnitude of an investment risk, including market risk, interest rate risk, inflation risk, liquidity risk, political risk, and so forth. Political events are one of the non-economic risks that can affect investors' decisions in investing in the capital market, because a country's political situation basically affects the country's economic conditions Due to abnormalities during the election up to the inauguration of the president namely on 17 April 2019 to 20 October 2019 with charts obtained from IDX, where the index is at critical levels, this technical indicator research uses data after the president's inauguration to obtain normal and stable graph again as a benchmark for testing and observation. Based on the data, the objectives of this study are :

- To find out whether Bollinger Band is able to show strong and accurate signals in making a decision to Buy or Sell shares in the stock market.
- To find out whether MACD is able to show a strong and accurate signal in making a Buy or Sell decision on the stock market.
- To find out whether RSI is able to show strong and accurate signals in making a Buy or Sell decision on the stock market.
- To find out whether the combination of the three indicators above is able to provide a signal equation and provide a stronger signal compared to a singular signal.

This research is expected to be useful for traders as input and evaluation of investment in shares. This research is expected to provide study material and input for future researchers who want to examine the same objects and themes.

Theoretical Background

According to IDX LQ45 is stock market index of Indonesia that was first launched on February 24, 1997 consisting of 45 of the most actively traded shares. The considerations underlying the selection of shares included in the LQ-45 Index are high liquidity and market capitalization selected through several selection criteria (Praditha e, 2018), namely:

- It is included in the 60 ranks of the largest total shares transactions in the regular market (average transaction value over the past 12 months).
- The order is based on market capitalization (average market capitalization value over the past 12 months).
- It has been listed on the IDX for at least 3 months.
- Have good financial conditions, prospect of growth, high transaction value and frequency

Ivanovski et al (2017) in his research says the oldest technical clue that appeared in Joseph de la Vega's record of the Dutch market in the 17th century. The principle of technical analysis is derived from the observation of financial market behavior for hundreds of years. The technical approach to investing is essentially a reflection of the notion that prices are moving in a trend determined by changes in investor attitudes towards various economies, monetary, political and psychological forces. The art of technical analysis, for that is art, is to identify the trend reversal at a relatively early stage and rises on the trend until the weight of evidence suggests or proves that the trend has been reversed (Prabhata, 2012). The main idea of technical analysis is to use data from past price movements to determine where prices will move next (Pushpe et al, 2007). The most important thing from technical analysis is how the analysis is able to recognize trends as early as possible. Technical analysis is done by utilizing patterns of index or price movements from time to time. The history of price movements can be data every few seconds, minutes, hours, weeks, months, or maybe annual data, depending on needs. Therefore, technical analysis users believe that if used correctly, technical analysis can provide a more practical and faster guidance so that it can provide more optimal benefits. Technical analysis is used based on 3 assumptions (Prabhata, 2012), namely :

- The market discounts all relevantinformation.
- Price moves in trends.
- History tends to repeat itself.
- The MarketDiscounts All Relevant Information.

Moving average convergence divergence (MACD) is a trend-following momentum indicator that shows the relationship between two moving averages of prices, calculated by subtracting the 26-day exponential moving average (EMA) from the 12-day EMA. A nine-day EMA of the MACD, called the "signal line", is then plotted on top of the MACD, functioning as a trigger for buy and sell signals According to Ivanovski et al (2017) . MACD consists of two lines, namely the MACD line and the signal line. MACD lines are usually blue in the format EMA 26 - EMA 12. Signal lines are usually red in EMA 9 format. MACD can generate buy and sell signals. Buy signal happens when the MACD line crosses the signal line. It is said to be a sell signal when the MACD line crosses below the signal line.

Bollingber band processing yields a channel of upper, lower and middle bollingerbands. The calculations can be done as in equation according to AsiaPac Finance in (Seker et al, 2013)

Upper Band = SMA (n) + k*Standard Deviation (n)
Lower Band = SMA (n) - k*Standard Deviation (n)
n = period (default: 2)

Bollinger Bands consist of a centerline and two price channels (bands) above and below it. The centerline is an exponential moving average, the price channels are the standard deviations of the stock being studied.

The bands will expand and contract as the price action of an issue becomes volatile (expansion) or becomes bound into a tight trading pattern (contraction).

The relative strength index (RSI) is a momentum indicator developed by Welles Wilder,that compares the magnitude of recent gains and losses over a specified time period tomeasure speed and change of price movements of a security According to Ivanovski et al (2017). RSI is formed by combining the two indicators above and below an analyst will find it easier to get information on the direction of the trend or reversal, as each stock price moves to touch the upper or lower band. This information can be used to make decisions when it is best to buy and sell shares.

A buy signal is a signal that shows when an investor buys or does not sell the stock. Buying signals can be determined by looking at stock price movements on stock price charts and also by looking at the volume of demand and supply. It can be said as a buy signal if the price movement chart is pointing up from down at a certain point, and is supported by a demand volume smaller than the supply volume (Abdul-Rahim et al, 2016). A sell signal is a signal that shows when an investor is selling or does not buy the stock. Selling signals can be determined by looking at the movement of stock prices on stock price charts and also by looking at the volume of demand and supply. It can be said as a sell signal if the price movement chart is pointing up then down at a certain point, and is supported by demand volume greater than supply volume.

MACD shows the difference between the exponential moving average (exponential moving average, commonly abbreviated as "EMA"), which is fast and slow than the closing price. MACD is a trend following indicator and is designed to identify changes in symptoms (trends), and is generally not recommended for use in volatile market conditions. Three forms of trading signals can be obtained, namely :

- MACD line that crosses the signal line.
- MACD line that crosses zero.
- The difference between the price and the MACD level.

Signal crossing is a normal trading rule where it is a buy signal if the MACD crosses up through the signal line or becomes a sell signal when the MACD crosses downwards. This crossing can occur frequently so other research must be carried out to ensure buy and sell signals. Histogram shows that when a crossing occurs, when the MACD line crosses through zero in the histogram, it can be said that the MACD has crossed the signal line. This histogram can also help as reflection when two lines come together. Both may still arise but come together, so that the falling histogram can be a sign that the crossing may be approaching.

Bollinger Bands is to detect Overbought and Oversold, to obtain information on the continuation of the direction of the trend and the magnitude of the volatility of stock prices illustrated through the Bollinger band. The calculation period used in Bollinger Bands is 20. Stock movements outside the Upper Line indicate Overbought conditions, while stock movements outside the Lower Line indicate Oversold conditions. A Buy Signal occurs when the stock is in Oversold condition. Conversely, a sell signal occurs when the stock is Overbought. The RSI is also an oscillation indicator that makes it easy for traders to determine overbought or oversold market conditions. It evaluates asset prices on a scale of 0 to 100, taking into account the period 14. If the RSI value is equal to or less than 30, then the market is considered close to the bottom (oversold), and if above 70, then the market is considered close to the high limit (overbought) for that time period and will fall.

Methodology and Results

This study uses a qualitative approach by looking at the comparison of graph changes listed on the indicator. Then, a quantitative test is performed with a different type of test research to determine how accurately the difference is statistically using SPSS aids with K-S normality testing and also the Paired Sample T-Test and Interpretation Test with SPSS. Based on the data obtained, the LQ45 index is the index with the most liquid category among other stocks that can represent trading that runs on a daily scale. By using the LQ45 index

as a benchmark, the use of indicators is expected to represent the criteria and characteristics of the companies incorporated in the LQ45 index.
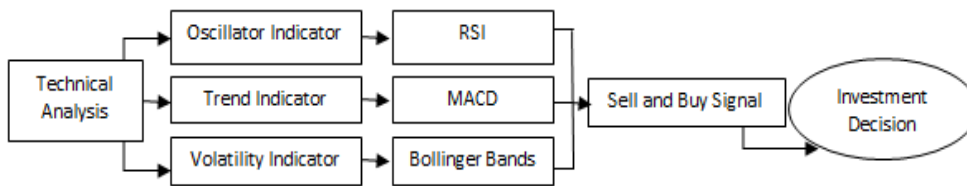

Figure 1: Conceptual framework
Source: Authors' construction

Based on the results of previous studies and theories, the hypotheses in this study are as follows (See Fugure 1) :

H1 = MACD is able to provide Buy and Sell signals accurately
H2 = Bollinger Bands are able to provide Buy and Sell signals accurately
H3 = RSI is able to provide Buy and Sell signals accurately
H4 = MACD, Bollinger Bands, RSI together show the accuracy of the Buy and Sell signals

Chart data that has been collected is based on daily prices in the form of scales and graphs which are then processed and analyzed. Data analysis is performed using descriptive techniques where the data is tested for truth with existing theories and analyzed carefully by describing each graph and the signals on the graph. So, it is able to form and show sell or buy signals by looking at the point of saturation between buy and sell in the charts on each indicator. With sample data that is 30 days after the inauguration of the Indonesian president, due to abnormalities in the election period until the inauguration of the president, namely on 17 April 2019 to 20 October 2019, the graphs obtained from IDX are shown in Fugure 2.

Figure 2: Graph of inauguration of the Indonesian president abnormalities
Source: Yahoo Finance

The data in this study have different units of measurement so the original data must be transformed (standardized) before it can be analyzed. Thus, it is necessary to transform it into the z-score. Solimun stated that if the data has different units and the scale is heterogeneous, then the units can be removed (become the same) and the scale becomes homogeneous (-4 - +4) by means of transformation into Standardize data. In this study, secondary data is transformed in the form of standardization, then the Z-Score data will be used for all tests ranging from normality, classic assumption tests to hypothesis testing.

Transformation to Z score is very useful when we want to compare two different distributions. By transforming the two distributions, we are standardizing the distribution to be compared. After the distribution to be compared is standard, then we can compare it. Z-score is a standard score with mean = 0 and SD = 1, with a range of scores ranging from -3 to +3. To avoid using this negative sign in its calculations, researchers usually change this z-score to form a T-score first to avoid negative signs. T-scores can be calculated with the formula T = 50 + 10 (Z). T-scores are standardized scores that produce a distribution with mean = 50 and SD = 10.

Table 1: One-Sample Kolmogorov-Smirnov Test

		Tupper	TBlow	TRSI	TMacd12	TMacd26
N		30	30	30	30	30
Normal Parameters[a,b]	Mean	50.0000	50.0000	50.0000	50.0000	50.0000
	Std. Deviation	10.00000	10.00000	10.00000	10.00000	10.00000
Most Extreme Differences	Absolute	.129	.197	.089	.114	.132
	Positive	.073	.167	.089	.090	.132
	Negative	-.129	-.197	-.081	-.114	-.122
Test Statistic		.129	.197	.089	.114	.132
Asymp. Sig. (2-tailed)		.200[c,d]	.004[c]	.200[c,d]	.200[c,d]	.190[c]

a. Test distribution is Normal.

b. Calculated from data.

c. Lilliefors Significance Correction.

d. This is a lower bound of the true significance.

- Based on the Table 1 on Bollinger upper, the asymp value. Sig (2-tailed) has a number of 0.200 (multiplied by 100%) and a number of 20% is obtained. Because the number 20%> 5%, then the distribution of normal values.
- Based on the Table 1 on Bollinger low, the asymp value. Sig (2-tailed) has a number of 0.004 (multiplied by 100%) and a number of 0.4% is obtained. Because the numbers are 0.4%> 5%, the distribution of values is not normal.
- Based on the Table 1 on RSI, the asymp value. Sig (2-tailed) has a number of 0.200 (multiplied by 100%) and a number of 20% is obtained. Because the number is 20%> 5%, the distribution of values is not normal.
- Based on the Table 1 on MACD 12, the asymp value. Sig (2-tailed) has a number of 0.200 (multiplied by 100%) and a number of 20% is obtained. Because the number is 20%> 5%, the distribution of values is not normal.
- Based on the Table 1 on MACD 26, the asymp value. Sig (2-tailed) has a number of 0.190 (multiplied by 100%) and 19% is obtained. Because 19%> 5%, the distribution of values is not normal.

Data normality means that the amount of data above the average value and below the average value are the same and form a bell shape. Data normality is an absolute requirement to use regression analysis.
Because the existing data have abnormalities, the different test is continued by using the Wilcoxon Test to see the differences in the existing data.
The negative rank of the test results shows the number of decreases with the average explained by the mean and the increase in value is explained by the Sum of rank with the amount of data explained by N from the Table 2.

Table 2: Rank results

		N	Mean Rank	Sum of Ranks	
TRSI - TUpper	Negative Ranks	19[a]	15.3	291	a. TRSI < Tupper
	Positive Ranks	11[b]	15.8	174	b. TRSI > Tupper
	Ties	0[c]			c. TRSI = Tupper
	Total	30			d. TRSI <TBlow
TRSI - TBlow	Negative Ranks	17[d]	13.5	230	e. TRSI >TBlow
	Positive Ranks	13[e]	18.1	235	f. TRSI = TBlow
	Ties	0[f]			g. TMacd12 < TRSI
	Total	30			h. TMacd12 > TRSI
TMacd12 - TRSI	Negative Ranks	12[g]	15.7	188	i. TMacd12 = TRSI
	Positive Ranks	18[h]	15.4	277	j. TMacd26 < TRSI
	Ties	0[i]			k. TMacd26 > TRSI
	Total	30			l. TMacd26 = TRSI
TMacd26 - TRSI	Negative Ranks	10[j]	18.7	187	m. TUpper< TMacd12
	Positive Ranks	20[k]	13.9	278	n. TUpper> TMacd12
	Ties	0[l]			o. TUpper = TMacd12
	Total	30			p. TBlow< TMacd12
TUpper - TMacd12	Negative Ranks	12[m]	17.1	205	q. TBlow> TMacd12
	Positive Ranks	18[n]	14.4	260	r. TBlow = TMacd12
	Ties	0[o]			s. TUpper< TMacd26
	Total	30			t. TUpper> TMacd26
TBlow - TMacd12	Negative Ranks	14[p]	17.1	239	u. TUpper = TMacd26
	Positive Ranks	16[q]	14.1	226	v. TBlow< TMacd26
	Ties	0[r]			w. TBlow> TMacd26
	Total	30			x. TBlow = TMacd26
TUpper - TMacd26	Negative Ranks	14[s]	16.9	237	
	Positive Ranks	16[t]	14.3	228	
	Ties	0[u]			
	Total	30			
TBlow - TMacd26	Negative Ranks	13[v]	18	234	
	Positive Ranks	17[w]	13.6	231	
	Ties	0[x]			
	Total	30			

Hypothesis testing is shown to conclude whether the hypothesis is acceptable or not, this can be seen from the SPSS data results below (See Table 3).

Table 3: Test Statistics

	TRSI - TUpper	TRSI - TBlow	TMacd12 - TRSI	TMacd26 - TRSI	TUpper - TMacd12	TBlow - TMacd12	TUpper - TMacd26	TBlow - TMacd26
Z	-1.203[b]	-.051[c]	-.915[c]	-.936[c]	-.566[c]	-.134[b]	-.093[b]	-.031[b]
Asymp. Sig. (2-tailed)	.229	.959	.360	.349	.572	.894	.926	.975

a. Wilcoxon Signed Ranks Test
b. Based on positive ranks.
c. Based on negative ranks.

From the Table 3, because of Asymp. Sig (2-tailed) is valued more than 0.05, it can be determined that there are no fundamental differences from the three indicators so that to determine the sell or buy, the trader can use any indicator because there is no fundamental difference when compared between the three indicators.

After the president is inaugurated on October 21, 2019, the condition of shares in Indonesia has returned to stable with shown in the Figure 3.

Figure 3: Graph of shares in Indonesia after inaguration day
Source: Yahoo Finance

In the Figure 3, it can be seen that the movement of stocks began to run stable with regular ups and downs. Therefore, qualitative testing can also be done by first using technical indicators individually.

In Bollinger bands, a measure of market volatility is seen in the width of the band. If volatility is high, the distance between the two bands will widen. It usually occurs when conditions change in sideways to become trending conditions. Conversely, low market volatility is seen in the distance of the two bands which are narrowing, and usually occurs when there is a change from trending market conditions to sideways.
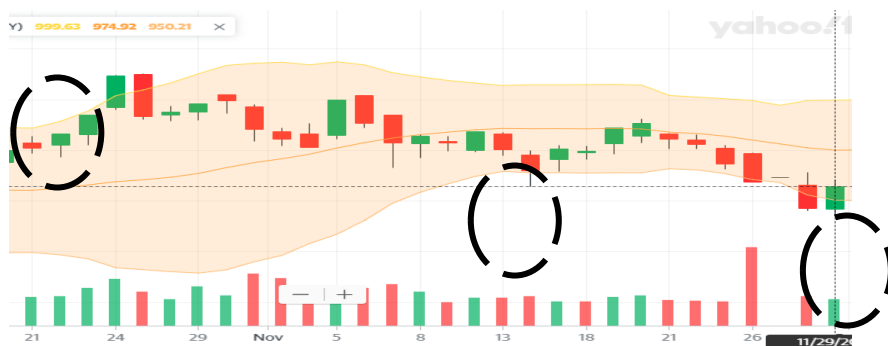

Figure 4: Graph with Bollinger Indicator that show buy and sell signal
Source: Yahoo Finance

In Figure 4, it can be seen that on October 24, there was overbought. This is marked by the release of the share price at Bollinger's upper limit and followed by the failure of the share price. This is considered by traders as a sell signal because it is indicated that prices will decline and is proven by continuing decline of stock prices until they reach oversold points on November 14, 2019. Stock prices also break the lower limit of the Bollinger indicator which shows buy signals for traders but due to failure of the stock price breaking the midline of the Bollinger on the 19th of August, this rising signal was considered as a sell signal. This is reinforced by the width of the small Bollinger pipe which shows the condition of the stock being side ways. Thus, there was a decline again and a buy signal occurred again on November 29 because it succeeded in breaking through the stock price against the lower band in Bollinger. In the end, the upside sign re-breaks the lower band the next day which indicates a buy signal.

RSI has its own way of determining trends. In determining trends through the RSI, level 50 is needed as a barrier. If the RSI signal is above 50 then the trend is going up, whereas if it's below 50 then the trend is

going down. This means that if the RSI indicator value is above 80, then the price has been overbought whereas if the RSI indicator value is below 20, then the price has been oversold.

Figure 5: Graph with RSI Indicator that show buy and sell signal
Source: Yahoo Finance

In Figure 5, there are only three signals obtained. First, on October 24, there was a sell signal where overbought occurred as indicated by the RSI chart that approached the upper line limit of 80. On November 5, there was a false sell signal because the RSI chart showed the number 59 but failed to increase and instead declined again. The next signal is shown on November 28 as a buy signal because the chart is nearing the lowest point where the graph is at number 33 with a low of 20 and this shows a fairly vague buy signal as a reference.

Figure 6: Graph with MACD Indicator that show buy and sell signal
Source: Yahoo Finance

The wider the distance created from the two EMA lines, the volume on the histogram is also wider, and so is the reverse. If the EMA-12 and EMA-26 cross exactly, then: If the EMA-12 is above the EMA-26, the MACD value is positive and the MACD area is above zero, an uptrend is happening. If EMA-12 is below EMA-26, the MACD value is negative and the MACD area is below zero, then a downtrend is happening. If EMA-12 crosses EMA-26, the MACD signal line moves from negative to positive, the trader can open a "buy" position. If EMA-26 crosses EMA-12, the MACD signal line moves from positive to negative, then traders can open "sell" positions. From the chart above it can be seen that there are crossing down from the fast indicator (blue line) and the slow indicator (red line) which are decreasing which indicates that there is a sell signal on November 7 and almost re-crossing on November 21st. This should be an indicator of buying, but because the crossing does not occur, this is usually called a false signal that will only indicate a decline / increase in stock prices due to changes in the stock market.

Conclusion

Statistically, the comparison between each of these indicators does not show a significant difference indicated by Asymp. Sig (2-tailed) which is more than 0.05 and can be determined that there are no

fundamental differences from the three indicators.But descriptively, the Negative rank of the test results shows the number of decreases with the average explained by the mean. Then, the increase in value is explained by the Sum of rank with the amount of data explained by N from the results above. So, it can be explained that this shows the difference between each graph in showing the numbers when paired with the current stock price.

It can be seen that starting from October 24 there was an equation between Bollinger and RSI which in the graph shows the RSI graph that almost touched the upper limit. This condition shows a sufficient sell signal even though it is not indicated in the MACD because there are no fast and slow line crosses on the indicator. But MACD gave a sell signal on November 7 which when viewed from the stock price the signal was too late for the trader to react to make a decision as well as the signal that occurred on November 29 where the only signal was RSI and Bollinger.nIt concluded that the sell signal can be captured well by the Bollinger band indicator and also the RSI. MACD acts too slow in capturing buy and sell signals compared to Bollinger bands and RSI.

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