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EFFECTIVENESS OF USING CANDLESTICK PATTERN AND DIVERGENCE ANALYSIS TECHNIQUES IN READING FOREX MARKET PRICE MOVEMENTS

Fajra Insani Kudadiri, Redy Herinanto Albertus, Junaidi Affan
STIE SBI Yogyakarta
Email : redy.herinanto@gmail.com

Abstract

This study aims to determine the effectiveness of candlestick pattern signals and divergence signals in providing returns, and to compare the two signals in providing returns. The population in this study were the major currency pairs. The data used is secondary data taken from observations on forex market price movements from 2015 to 2019 totaling 100 data. Thestatistical tests used in this study are, the one sample t-test, and the independent t-test. The one sample t-test was used to test hypothesis 1 and hypothesis 2, while the independent t-test was used to test hypothesis 3. The results showed that: candlestick patterns in the majority of results show a positive and significance, divergence in the majority of results shows a positive and significance, and comparison of divergences with candlestick patterns in the majority of results shows a negative and not significance. Based on the results of this study, the following conclusions are drawn: candlestick patterns are effective in providing returns, divergences are effective in providing returns, and candlestick patterns and divergences are no difference at providing returns.

Keywords: *candlestick patterns, divergence, event study, return*

1. INTRODUCTION

Investment has been known for a long time in human life. The activities of buying land, building houses, and buying gold are common investment activities that have long been known to the public. More modern investment systems, such as mutual funds, the stock market, and the foreign exchange market, have also become widely known to the public. Investment is an activity within a certain period of time during which the investor expects to get a higher value than the initial capital.

There are many reasons that make investment inseparable from people's lives. These reasons are investment as a need, investment as a desire, investment to reduce the effect of inflation, investment as an increase in wealth, and investment as a guarantor of uncertainty in the future.

Investment can be categorized into 2 categories, namely: Investment in the real sector, and investment in the financial sector. In the 1970s and 1980s, some money owners preferred to invest their money in the real sector, such as establishing factories (manufacturing), housing, agriculture, plantations, trade, and others.

After the monetary crisis that hit Indonesia in 1997-2000, investors began to look for other investments that could generate higher returns in a shorter time. At that time, investment in the financial sector began to develop and experienced a boom in Indonesia (Frento 2011:4). Capital owners prefer the financial sector as their investment area because this sector does have several advantages. For example, it is more liquid, the rate of return is higher and faster even though it is also in line with the level of risk. In addition, there are also many products on offer, including stocks, indexes, foreign exchange/forex, commodities, and so on. The advantages of this financial sector seem to contradict the real sector.

Investment in the real sector has several drawbacks. For example, in terms of capital, this sector tends to require more capital. Due to the large amount of capital, the liquidity is not as fast as in the financial sector. The advantage of this investment is that its value rarely goes down and always increases from time to time, but on the other hand after a few years, if we want to disburse the investment, then we have to find someone who has enough funds to buy a house whose value may have gone up by tens to

hundreds percent. Finding such buyers is not easy, this is where liquidity problems arise, besides that another weakness of the real sector is that it tends to take longer to develop (Frento 2011:04).

One of the instruments for investment in the financial sector is the foreign exchange market/forex market. The forex market as an investment instrument in the financial sector is classified as the most high risk high return. This means that in the forex market an investor can generate profits of up to tens of percent per transaction and at the same time can suffer losses in the same amount.

The forex market is the most active and liquid market today. This market operates 24 hours a day and 5 days a week. As an OTC (over the counter) product the forex market moves from Australia, Asia, Europe, and America continuously, the forex market operates without a physical location and does not have a centralized exchange, its operations occur between a global network of banks (major banks), companies , and individuals who exchange one currency for another.

The absence of a physical location allows this market to operate 24 hours a day, moving from one time zone to the next in various financial centers of the world (Frento 2011:6). Furthermore, investing in the forex market is often referred to as a trader. Traders when dealing with the forex market need a set of knowledge on which to base investment decisions. This set of knowledge is often referred to as a trading system. The Big Indonesian Dictionary explains that the system can be interpreted as an orderly arrangement of theoretical views, principles, and so on. In the context of a trader, a trading system is a way or trading rules that are organized, regular and repeated (Wira 2020:10).

The trading system has several constituent components, namely: Fundamental Analysis and Technical Analysis. Fundamental Analysis is an analysis that takes into account factors such as company performance, business competition analysis, industry analysis, macro-micro economic and market analysis (Wira 2019:3). Fundamental analysis is an analysis that relies on news that is happening in the world or currently circulating. The content of this news becomes a driving force for market emotions to determine the value of a currency, stock or other instrument (Frento 2011:40). Technical analysis is a technique that analyzes stock price fluctuations within a certain time frame. From this movement, certain patterns will be seen that can be used as a basis for making purchases or sales (Wira 2019:3). Technical analysis is an approach to analyzing patterns of price movements in the past to determine prices in the future (Frento 2011:40).

Risk Management is an attempt to identify, analyze, and control risks in every company activity with the aim of obtaining higher effectiveness and efficiency. Risk is the uncertainty that occurs from every situation and decision taken. It's just that the consequence of risk management is the reduction or loss of some investment funds (Frento 2011:409). Risk management in trading can be categorized into trading risk management and market risk management (Frento 2011:41). While in the scope of the market, the psychological understanding of the market can be interpreted with matters relating to the circumstances and scope of the market. Market psychology can be investor psychology or consumer psychology.

As part of the trading system, technical analysis has a very important role in translating currency price movements in the forex market. Generally, the price movement will be described as a graph. The chart is the main indicator of price movement. So technical analysis serves to translate the chart of the price movement. Prices on charts generally move in 3 main phases, namely uptrend, downtrend, and consolidation.

Uptrend is a condition where the price has increased from the previous price. Downtrend is a condition where there is a decrease from the previous price. Consolidation is a phase where prices move within a certain range of price levels. The three phases are determined by momentum and volume.

The type of chart that is often used in technical analysis is the candlestick chart. Candlestick charts consist of rows of bars shaped like candles. The highest and lowest prices can be seen on the vertical line, while the opening and closing prices can be seen from the size of the candle body, both at the top and bottom. Candlestick charts have two colors that represent rising (green) and falling (red) prices. Candlestick charts have the advantage of being able to provide market psychology information. In addition, candlestick charts can form price movement signal patterns in the market.

The research of Naved and Srivastava (2015) aims to test the profit obtained by using oscillator indicators. In this study, the stochastic oscillator with the full stochastic type is used. This study collected 300 pilot data from 2004 to 2014 on the S&P CNX. In addition, this research was conducted using trading rules and a combination of several combinations of parameter values on the stochastic, namely values 7 to 21 in %K, values from 3 to 7 in %D, and values from 3 to 7 in SMA. These results show that, the best performance of the stochastic oscillator on S&P CNX can be achieved using the 21%K, 3%D, and 3SMA periods. During this period, the use of stochastic resulted in a profit of 6,979 points, with a total of 321 transactions, 158 transactions made a profit, while 163 transactions did not generate a profit. With 49.22% accuracy.

The research of Alwiyah and Liyanto (2012) aims to find consistency in predicting price movements in the GBP/USD and EUR/USD currency pairs using candlestick techniques, moving avarage convergence divergence (MACD), and the stochatic oscillator. The research was conducted using a $10,000 demo account. The use of a demo account is done to reduce decision making bias in trading. The study was conducted by conducting live trading during the period from June 13th 2011 to July 8th 2011. The results showed that the use of technical analysis in the forex market proved to be profitable. The experimental results were divided into 2 bi-weekly trading groups with a total of 23 transactions. The first bi-weekly experiment yielded a profit of $544, while the second bi-weekly resulted in a profit of $123. Alwiyah and Liyanto admit that the profit generated is less than expected because they are too quick to cut losses on trading.

Brisolin's research (2015) tries to test a strategy system based on price movements and the hidden divergence that is formed. In his research, Brisolin used the chaikin oscillator. This trading system was then tested on indices, namely DOW JONES, S&P500, NASDAQ Composite, FTSE100, DAX30, and RUSSELL 2000. The results showed that the use of price movement strategies and hidden divergence with the chaikin oscillator indicator resulted in positive returns.

The forex market (foreign exchange) is a market for trading the currency of a country with the currencies of other countries (Frento, 2011:15). There are lots of currency pairs traded, including EUR/USD, USD/JPY, AUD/USD, and so on. The forex market is a market that rotates 24 hours a day for 5 days a week without a centralized broker. The ease of transacting on the forex market allows an investor to enter or exit the market easily. An investor can choose to trade in a long period of time, or in a short timeframe, or even in a matter of seconds.

The forex market is a market that is classified as a high risk high reward market. The existence of leverage allows for increased profit potential while increasing risk. Unlike stocks where stock movements are affected by the performance of a company, movements in the forex market are purely influenced by the effects of supply and demand on the currency being traded.

There are 2 main techniques that are often used in forex market analysis, namely fundamental analysis and technical analysis. Technical analysis is a technique that analyzes price fluctuations within a certain time frame, or in relation to other factors such as transaction volume (Wira 2019:3). Because of that technical analysis uses a lot of graphs, it will be seen that certain patterns are used as the basis for making purchases or sales (Wira 2019:4).

Modern technical analysis develops from certain generally accepted principles. These principles are derived from Dow Theory. The Dow Theory resulted from a series of articles written by Charles Dow in The Wall Street Journal from 1900 to 1902.

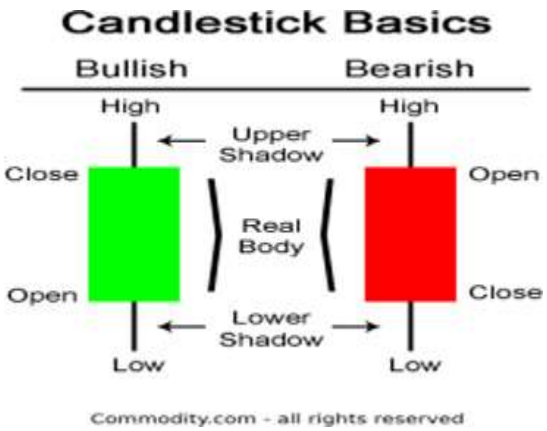
Dow Theory has 6 important assumptions, namely;

1. Market Action Discounts Everything,
2. The Market Is Compromised of Three Trends,
3. Primary Trend Have Three Phases,
4. The Avarages Must Confirms Each Other,
5. The Volume Confirms The Trend,
6. Trend Remains Intact Until It Gives a Definite Reversal Signal.

Candlesticks were first introduced by a Japanese rice trader named Munihesa Homma in the 1700s. Starting from his regular record of the market's opening, closing, high, and low prices every day, Homma described candlestick patterns that were eventually used as a reference at that time. In his book entitled "Sakata Rules", Homma explains the basic patterns of candlesticks and how to use them. This method was then brought from Japan, and was popularized by Steve Nisson and summarized again in his book entitled "Japanese Candlestick Charting Technique".

Candlesticks consist of 3 main constituent components, namely:

1. The body of the candles, shows the opening and closing prices at the time of the transaction. In a bullish market condition the closing price is higher than the opening price, while in a bearish condition the closing price is lower than the opening price.
2. Upper Shadows, the tail at the top of the body of the candle represents the highest price reached in the transaction. In market psychology, the length of the upper tail represents the strength of the buying at that time.
3. Lower Shadows, the tail at the bottom of the body of the candle represents the lowest price reached in the transaction. In market psychology, the length of the lower tail represents the strength of the selling action at that time.



Candlestick patterns are patterns that are formed on candlestick charts that can predict the direction of prices when the patterns are fully formed. There are three categories of candlestick patterns, namely:

1. Neutral Pattern: candlestick in the form of a neutral pattern is when this candlestick appears, the trend that occurs is difficult to predict, whether it is bullish or bearish (Wira 2019:60).
2. Continuity Pattern: candlesticks that form a continuity pattern are when this candlestick appears, the trend that occurs is expected to continue (Wira 2019:61)
3. Reversal Pattern: is when the pattern is formed the price is likely to experience a trend reversal.

The stochastic oscillator was developed by George C. Lane in the late 1950s. Stochastic is an indicator that shows the location of the closing price compared to the lowest/highest price range over a certain period of time (Wira 2019:114).

The stochatic oscillator is an indicator that provides information about the momentum and strength of a trend. This indicator informs about how fast and how strong the price is moving. There are three types of stochastic oscillators, namely: fast stochastic, slow stochastic, and full stochastic.

There are four ways to use the stochastic oscillator:

1. Oversold and overbought indicators. Stochastic Oscillator reads whether the price has reached the overbought oversold level. If %K and %D have passed 80 on the stochastic, the price is said to be overbought. Usually in this condition, the price increases quite high and there is an assumption that the price will decrease. Overbought is a sell signal for investors. If %K and %D cross the value of

20 on the stochastic, the price is said to be oversold. Usually in this condition, the price weakens low enough so that there is an assumption that the price will rise. Oversold is a buy signal for investors.
2. Crossover %D against %K. A buy signal is created when the %D value crosses above the %K value and vice versa, a sell signal is created when the %D value crosses below the %K value.
3. As Momentum. By adding the value line 50 on the stochastic oscillator it becomes the reference for price momentum. If %K and %D are above the 50 level on the stochastic value, it means that the momentum is leading to price strengthening. And vice versa, if the value of %D and %K is below the value of 50 on the stochastic oscillator, it means that the price is weakening.
4. Signal Divergence. The stochastic oscillator can be used as a signal for divergence that occurs in prices and indicators. Divergence is a discrepancy between the pattern of price movement that occurs on the chart, and what happens to the analytical indicators. Divergence is a signal that explains whether a trend in the market will continue, or the trend will experience a reversal.

There are two main types of divergence:

1. Regular Divergence (Classic Divergence) is a signal of weakness that occurs in the current trend. Usually the price will experience a reversal when this signal is confirmed.
2. Hidden Divergence is a signal of the continuation of the ongoing trend. Usually after the signal is confirmed, the price will continue to move according to the ongoing trend.

3. RESEARCH METHOD

The population used in this study is currency pairs that are registered and traded on the Iq Option platform. The population in this study were 47 currency pairs. The selection of research data samples using purposive sampling method, which means that the selection of samples takes into account certain criteria that have been made on objects that are in accordance with the research objectives. The selected sample criteria are currency pairs which are categorized as major pairings. The following currency pairs are sampled in this study:

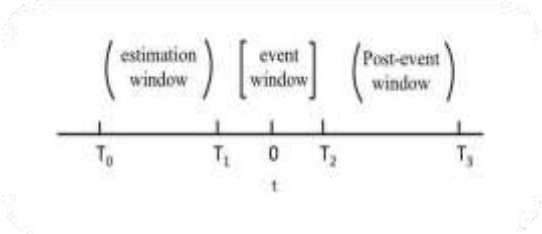
PAIRS	COUNTRY
EUR/USD	EUROZONE/USA
USD/JPY	USA/Japan
GBP/USD	United Kingdom/USA
USD/CHF	USA/Switzerland
USD/CAD	USA/Canada
AUD/USD	Australia/USA
NZD/USD	New Zealand/USA

Types and sources of data in this study using secondary data. The data is obtained from observing the price movements of currency pairs for the period 2015 to 2019. Data collection is done by observing online on the Iq Option application. First, the researcher tries to find the signal that is formed, then records the price formed after that.

Event Study is a study that observes the impact of information announcements on price changes. Event study research usually examines how much of a news effect is reflected by changes in prices. Event Study can be used to test the information content of an announcement. If the announcement contains information, it is expected that the market will react when the information is received by the market. The market reaction is indicated by a change in the price in question. This reaction can be measured by using the change in price.

The standard methodology used in this event study is:

1. Determine the timeline of the event study. Estimation windows are price movements before the event occurs, post event windows are price movements after the event occurs, in this study we will use movements 12 hours after the event occurs.



2. Recording post events. Record by dividing the data into two groups of data. The data grouping is candlestick pattern and divergence.
3. Calculating returns. The return in this study is the price difference between the estimation windows and post event windows to the price at the time the event was formed.
4. Calculate the average of the returns.

In testing hypotheses 1 and 2, the one sample t-test was used. This test is a procedure used to test whether the average of the data used is statistically significant when compared to a certain value. In testing Hypothesis 3, the analysis of the difference test will use the independent t-test. This test was conducted to compare the mean between two groups of data. Independent t sample, which is testing 2 independent samples, is carried out to see which is greater and the significance of the difference between the two averages of 2 group data.

Based on the theoretical study, the author suspects that candlestick patterns, and divergences, are effectively used in reading price movements in the forex market. In addition, it is suspected that divergence is more effective than candlestick patterns, in reading price movements in the forex market.

Thus, the following hypothesis is formulated:
H1: Candlestick pattern signal will generate a positive return on the forex market.
H2: Divergence signal will produce a positive return on the forex market.
H3: Divergence signal will produce a greater return than candlestick patterns signal in the forex market.

4. RESULT AND DISCUSSION

The following is a descriptive statistical table of the average cumulative return candlestick pattern of 50 samples in the forex market taken from signals that occurred in 2015 to 2019. The data is processed using SPSS by looking at the average value and standard deviation. The data is divided into 12 hours of observation period for the price of the appearance of the candlestick pattern signal.

Table 1 Descriptive Statistics Candlestick Pattern

Periode	*N*	*Mean*	*Std.Deviasi*
t+1	*50*	*,00047701*	*,001231659*
t+2	*50*	*,00111968*	*,001667248*
t+3	*50*	*,00111143*	*,001782797*
t+4	*50*	*,00070694*	*,004131367*
t+5	*50*	*,00128365*	*,001826632*
t+6	*50*	*,00130583*	*,003192405*
t+7	*50*	*,00225890*	*,002275392*
t+8	*50*	*,00253023*	*,003172070*
t+9	*50*	*,00283216*	*,003376980*
t+10	*50*	*,00272705*	*,003158299*
t+11	*50*	*,00269928*	*,003291430*
t+12	*50*	*,00288122*	*,004271712*

Figure 1 Cumulative Return Candlestick Pattern

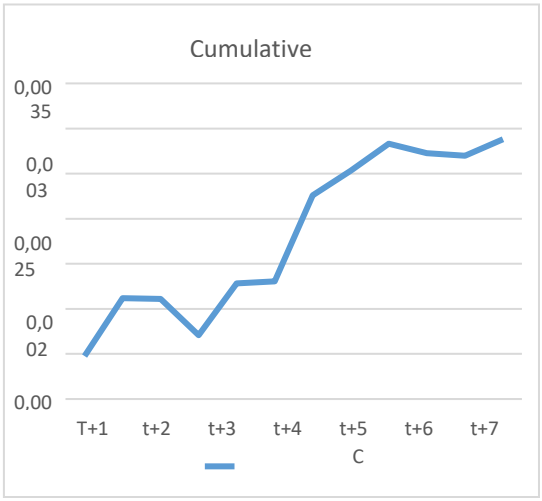


Table 1 above shows that at t+1, the price shows a positive movement with a cumulative return value of 0.00047701 with a standard deviation of 0.001231659. So, at t+1 the price shows a positive movement in the direction of the signal.

At t+2, the price shows a positive movement with a cumulative return value of 0.00111968 with a standard deviation of 0.001667248. So, at t+2 the price experienced a positive movement in the direction of the signal, and experienced a price increase of 0.00064267 compared to t+1.

At t+3, the price shows a positive movement with a cumulative return value of 0.00111143 with a standard deviation of 0.001782797. So, at t+3 the price experienced a positive movement in the direction of the signal, and experienced a price decrease of 0.00000825 compared to t+2.

At t+4, the price shows a positive movement with a cumulative return value of 0.00070694 with a standard deviation of 0.004131367. So, at t+4 the price experienced a positive movement in the direction of the signal, and decreased by 0.00040449 compared to t+3.

At t+5, the price shows a positive movement with a cumulative return value of 0.00128365 with a standard deviation of 0.001826632. So, at t+5 the price experienced a positive movement in the direction of the signal, and increased by 0.00057671 compared to t+4.

At t+6, the price shows a positive movement in the direction of the signal with a value of 0.00130583 with a standard deviation of 0.003192405. So, at t+6 the price experienced a positive movement in the direction of the signal, and increased by 0.0002218 compared to t+5.

At t+7, the price shows a positive movement in the direction of the signal with a value of 0.00225890 with a standard deviation of 0.002275392. So, at t+7 the price experienced a positive movement in the direction of the signal, and increased by 0.00095307 compared to t+6.

At t+8, the price shows a positive movement in the direction of the signal with a value of 0.00253023 with a standard deviation of 0.003172070. So, at t+8 the price experienced a positive movement in the direction of the signal, and increased by 0.00027133 compared to t-7.

At t+9, the price shows a positive movement in the direction of the signal with a value of 0.00283216 with a standard deviation of 0.003376980. So, at t+9 the price experienced a positive movement in the direction of the signal, and increased by 0.00030193 compared to t+8.

At t+10, the price shows a positive movement in the direction of the signal with a value of 0.00272705 with a standard deviation of 0.003158299. So, at t+10 the price experienced a positive movement in the direction of the signal, and decreased by 0.00010511 compared to t+9.

At t+11, the price shows a positive movement in the direction of the signal with a value of 0.00269928 with a standard deviation of 0.003291430. So, at t+11 the price experienced a positive movement in the direction of the signal, and decreased by 0.00002777 compared to t+10.
At t+12, the price shows a positive movement in the direction of the signal with a value of 0.00288122 with a standard deviation of 0.004271712. So, at t+12 the price experienced a positive movement in the direction of the signal, and increased by 0.00018194 compared to t+11.

The following is a descriptive statistical table of the average cumulative return divergence of 50 samples in the forex market taken from signals that occurred in 2015 to 2019. The data is processed using SPSS by looking at the average value and standard deviation. The data is divided into 12 hours period of observing the price divergence signal appearance.

Tabel 2 Descriptive Statistics Divergence

Periode	N	Mean	Std. Deviasi
t+1	50	,00086349	,001879635
t+2	50	-,00053808	,014432244
t+3	50	,00209349	,002655046
t+4	50	,00242807	,003069192
t+5	50	,00114569	,013529329
t+6	50	,00244684	,004705667
t+7	50	,00509357	,012374651
t+8	50	,00470840	,008427516
t+9	50	,00385522	,004385815
t+10	50	,00368609	,004615575
t+11	50	,00401581	,004396074
t+12	50	,00439454	,005802694

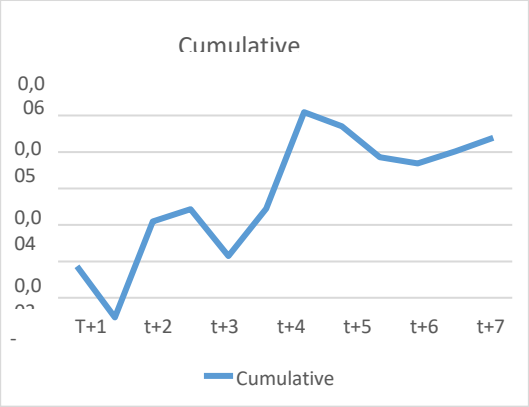


Figure 2 Cumulative Return Divergence

Table 2 above shows that at t+1, the price shows a positive movement with a cumulative return value of 0.00086349 with a standard deviation of 0.001879635. So, at t+1 the price shows a positive movement in the direction of the signal.
At t+2, the price shows a negative movement with a cumulative return value of -0.00053808 with a standard deviation of 0.014432244. So, at t+2 the price experienced a negative movement from the direction of the signal, and the price decreased by 0.00140157 from t+1.

At t+3, the price shows a positive movement with a cumulative return value of 0.00209349 with a standard deviation of 0.002655046. So, at t+3 the price experienced a positive movement in the direction of the signal, and the price increased by 0.00263157 compared to t+2.
At t+4, the price shows a positive movement with a cumulative return value of 0.00242807 with a standard deviation of 0.003069192. So, at t+4 the price experienced a positive movement in the direction of the signal, and experienced a price increase of 0.00033458 compared to t+3.
At t+5, the price shows a positive movement with a cumulative return value of 0.00114569 with a standard deviation of 0.013529329. So, at t+5 the price experienced a negative movement in the direction of the signal, and experienced a price decrease of 0.00128238 compared to t+4.
At t+6, the price shows a positive movement with a cumulative return value of 0.00244684 with a standard deviation of 0.004705667. So, at t+6 the price experienced a positive movement, in the direction of the signal and the price increased by 0.00130115 compared to t+5.
At t+7, the price shows a positive movement with a cumulative return value of 0.00509357 with a standard deviation of 0.012374651. So, at t+7 the price experienced a positive movement in the direction of the signal, and the price increased by 0.00264673 compared to t+6.
At t+8, the price shows a positive movement with a cumulative return value of 0.00470840 with a standard deviation of 0.008427516. So, at t+8 the price experienced a positive movement in the direction of the signal, and experienced a price decrease of 0.00038517 compared to t+7.
At t+9, the price shows a positive movement with a cumulative return value of 0.00385522 with a standard deviation of 0.004385815. So, on t+9 the price experienced a positive movement in the direction of the signal, and experienced a price decrease of 0.00085318 compared to t+8.
At t+10, the price shows a positive movement with a cumulative return value of 0.00368609 with a standard deviation of 0.004615575. So, at t+10 the price experienced a positive movement in the direction of the signal, and experienced a price decrease of 0.00016913 compared to t+9.
At t+11, the price shows a positive movement with a cumulative return value of 0.00401581 with a standard deviation of 0.004396074. So, at t+11 the price experienced a positive movement in the direction of the signal, and experienced a price increase of 0.00032972 compared to t+10.
At t+12, the price shows a positive movement with a cumulative return value of 0.00439454 with a standard deviation of 0.005802694. So, at t+12 the price experienced a positive movement in the direction of the signal, and experienced a price increase of 0.00037873 compared to t+11.
The first hypothesis testing is done by using one sample t-test. This test aims to determine whether the candlestick pattern signal is effectively used in forex transactions. This test uses a significance level of 5% or 0.05 with a total data of 50 transactions. The test will use a base value of 0 as when the signal comes out. If the significance (2-tailed) is less than 0.05, it means that the effective or average signal is not equal to 0. The test is divided into 12 pairs, each indicating the period of observation.

Table 3 One Sample T-test Candlestick Pattern Signal Testing

Periode	One Sample T-test			Result
	t	Df	Sig.(2-tailed)	
t+1	2,739	49	0,009	Significant
t+2	4,749	49	0,000	Significant
t+3	4,408	49	0,000	Significant
t+4	1,210	49	0,232	Not significant
t+5	4,769	49	0,000	Significant
t+6	2,892	49	0,006	Significant
t+7	7,020	49	0,000	Significant
t+8	5,640	49	0,000	Significant
t+9	5,930	49	0,000	Significant
t+10	6,106	49	0,000	Significant
t+11	5,799	49	0,000	Significant

t+12	4,769	49	0,000	Significant

In table 3, the output of one sample t-test shows whether the candle stick pattern is effective or not. Based on the value of Sig. (2-tailed) in the period t+1, t+2, t+3, t+5, t+6, t+7, t+8, t+9, t+10, t+11 and t+12 shows a value of <0.05 which means that during that period the signal is effectively used. Meanwhile, based on the value of Sig (2-tailed) in period t+4 shows a value > 0.05, which means that during t+4 the signal is not effective.

The second hypothesis testing is done by using one sample t-test. This test aims to determine whether divergence signals are effectively used in forex transactions. This test uses a significance level of 5% or 0.05 with a total data of 50 transactions. The test will use a base value of 0 as when the signal exits. If the significance (2-tailed) is less than 0.05, it means that the effective or average signal is not equal to 0. The test is divided into 12 pairs, each indicating the period of observation.

Table 4 One Sample T-test Divergence Testing

Periode	One sample T-test			Result
	T	Df	Sig.(2-tailed)	
t+1	3,248	49	0,002	Significant
t+2	-,264	49	0,793	Not significant
t+3	5,576	49	0,000	Significant
t+4	5,594	49	0,000	Significant
t+5	,599	49	0,552	Not Significant
t+6	3,677	49	0,001	Significant
t+7	2,911	49	0,005	Significant
t+8	3,951	49	0,000	Significant
t+9	6,216	49	0,000	Significant
t+10	5,647	49	0,000	Significant
t+11	6,459	49	0,000	Significant
t+12	5,355	49	0,000	Significant

In table 4, the output of one sample t-test shows whether the divergence is effective or not. Based on the value of Sig. (2-tailed) in the period t+1, t+3, t+4, t+6, t+7, t+8, t+9, t+10, t+11 and t+12 shows the value <0 .05 which means that during that period it was effectively used. Meanwhile, based on Sig (2-tailed) in the period t+2 and t+5, it shows a value > 0.05, which means that during that period the signal is not effectively used.

Hypothesis 3 testing uses independent t-test as a data test tool. The goal is to see if there is an average difference in the divergence signal and the candlestick pattern signal. This test uses a significance level of Sig.(2-tailed) of 5% and the amount of data is 50. Group 1 in the test is a divergence signal and group 2 is a candlestick pattern signal. The basis for decision making is if the value of Sig (2-tailed) < 0.05, then H3 is accepted.

Table 5 Independent T-test Testing

Period	Independent T-test			Result
	Sig.(2-tailed)	Mean difference	Std.Error	
t+1	0,227	,000386479	,000317805	Not Significant
t+2	0,422	-,001657763	,002054602	Not Significant
t+3	0,032	,000982060	,000452275	Significant
t+4	0,020	,001721138	,000727848	Significant
t+5	0,943	-,000137957	,001930696	Not Significant
t+6	0,142	,001016312	,000686803	Not Significant
t+7	0,114	,002834666	,001779378	Not Significant
t+8	0,090	,002178173	,001273460	Not Significant
t+9	0,194	,001023058	,000782807	Not Significant
t+10	0,228	,000959040	,000790928	Not Significant
t+11	0,093	,001316529	,000776646	Not Significant
t+12	0,141	,001513318	,001019007	Not Significant

From the table 5, the independent t-test output shows whether there is a difference in the average price period between the divergence signal and the candlestick pattern signal. Based on the value of Sig (2-tailed) in the period t+3 and t+4, the value of Sig <0.05 indicates that there is a difference in the average return, and is significant between the divergence signal and the candlestick pattern signal. Meanwhile, in the period t+1, t+2, t+5, t+6, t+7, t+8, t+9, t+10, t+11 and t+12 sig > 0.05 indicates there is the difference in the average return, but not significant between the divergence signal and the candlestick pattern signal.

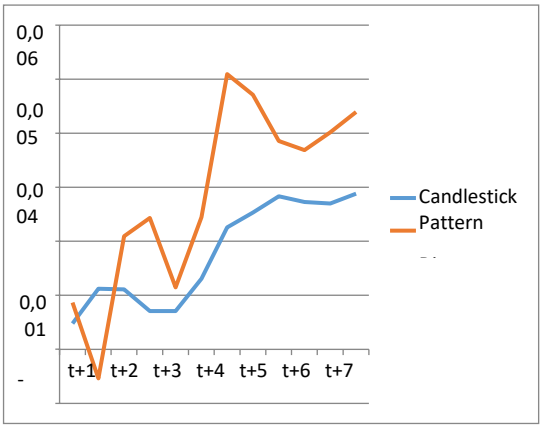


Figure 3 Comparison of Average Returns

On average, the cumulative return of the divergence signal appears to give higher results than the candlestick pattern signal. However, statistically, the two signals did not give a significant difference in providing returns, except for t+3, and t+4. Based on the average cumulative return, in the observation period t+1 to t+6, the price has not shown significant momentum, which means that investors are still hesitant to sell or buy on a large scale. This is a common thing in a market that is reversing direction. Entering the observation period t+6 to t+10, the price begins to find its momentum, where investors have already determined the trade positions taken. There was a slight decrease in average at t+11, which means there is a test on prices that have moved or profit taking by traders.

Based on the average cumulative return value, the divergence in the observation period t+1 to t+5 shows high fluctuations. This allows for major changes in price trends that require strong momentum to change the direction of movement. There has not been an agreement between investors, and there are investors who are still taking advantage of the remaining trends, causing high volatility.
In the observation period t+6 to t+7, based on the cumulative average, it shows that there is a strong momentum according to the signal. This indicates an agreement on the direction of movement by the majority of investors. Then in the observation period t+8 to t+10, the price again underwent a second test. This is common in the forex market where investors take short profits on the market by trading in a short period of time.

The low momentum can be seen from the lower cumulative return on the observation period t+4. In the observation period t+11 and t+12, the price moves back in the direction of the signal. In the comparison picture of the cumulative average return between divergence and candlestick patterns, it can be seen that there are several differences.

In the observation period t+1 to t+5, there is a different fluctuation between the two signals. The fluctuating average cummulative return divergence is higher than the candlestick pattern. Then in the observation period t+6 to t+12, the average cumulative return on divergence is higher than the average cumulative return on the candlestick pattern. This is related to the appearance of the signal.
The majority of divergence signals appear in the major trend, causing high volatility, which is indicated by the cumulative average return. While candlestick pattern signals appear relatively more often in both major and minor trends. This is indicated by its relatively smaller fluctuation.

5. CONCLUSIONS AND IMPLICATIONS

Based on the discussion that has been done, this research aims to analyze the effectiveness of the candlestick pattern signal, divergence signal, and compare the average cumulative return of the two existing signals. The following conclusions are obtained from the results of the study:

1. Candlestick pattern signals are effectively used in reading price movements in the forex market. The majority of hypotheses in the research window t+1 to t+12 were accepted (with a significance level of 5%).
2. Divergence signals are effectively used in reading price movements in the forex market. The majority of hypotheses in the research window t+1 to t+12 were accepted (with a significance level of 5%).
3. Although divergences signal seem provide more return than candlestick pattern signal, but statistically have no difference in providing returns. The majority of hypotheses in the research window t+1 to t+12 are not significant (with a significance level of 5%), except for the observation period T+3 and T+4 which produce significant differences.

Based on the limitations of the problems described above, there are several suggestions for further research:

1. The study was conducted using a wider event window to examine the impact of the signal in the longer term.
2. The research uses currency pairing other than the major pairing as the object of research.
3. Further research can use other analytical techniques in conducting research.

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