Commodity Channel Index for trading SET50 Index Futures.

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Abstract

There are several indicators in technical analysis for investors to make decisions on trading Futures. One that has grown in popularity is the Commodity Channel Index (CCI). The main objectives of this research are to make and compare a maximum profit on trading SET50 Index Futures by the CCI using two strategies (CCI crosses the 0-level and CCI overbought/oversold) and find the optimum parameters (periods of CCI) on trading in each time frame for each strategy. The CCI crosses the 0-level strategy generates signals when the CCI value crosses zero-line while the CCI overbought/oversold strategy generates signals when the CCI reaches the overbought (100) or oversold zone (-100). The SET50 Index Futures continuous series' data (S50IF_CONOI) from March 5, 2019, to February 24, 2021, in each timeframe, including Opening, High, Low, Closing prices, and Volume, was collected for analysis. This research used 4 timeframes (10 minutes, 30 minutes, 60 minutes, and 1-day), and 3 periods of CCI (10, 15, and 20 periods) were computed in each timeframe to measure the momentum and oscillator for backtesting. The result showed that the CCI crosses the 0-level strategy was better than CCI overbought/oversold strategy. The overall of 20 periods CCI was better than 10 and 15 periods. The best combination of CCI periods, time frame, and strategy for trading SET50 Index Futures was 20 periods CCI crosses the 0-level strategy in 60 minutes time frame, which resulted in net profit of 570.70, %win of 33.93%, and max drawdown at -36.30, while the net profit for buy and hold on whole periods was -146.40.

Keywords**:** *commodity channel index, trading, SET50 index futures*

1. Introduction

In finance, there are many types of financial instruments such as futures contracts, forward contracts, options, swaps, and warrants. Futures are derivative financial contracts obligating the buyer to purchase an asset or the seller to sell an asset at a predetermined future date, and set price. A futures contract allows an investor to speculate on the direction of a security, commodity, or financial instrument or use it to hedge the price movement of the underlying asset to help prevent losses from unfavorable price changes.

SET50 Index is the first large-cap index to provide a benchmark of investment in The Stock Exchange of Thailand. It is calculated from the stock prices of the top 50 listed companies on SET in terms of large market capitalization, high liquidity.

SET50 Index Futures is the first Futures contracts or product to be traded on Thailand Futures Exchange (TFEX). TFEX is a subsidiary of the Stock Exchange of Thailand (SET) that was established on May 17, 2004, and receives license and permission to trade derivatives products from the Securities and Exchange Commission on Feb 11, 2005 (TFEX, 2005).

Investors who want to invest in Futures contracts must be necessary to know about the security analysis, which was divided into fundamental and technical analysis. Fundamental analysis examines fundamental business factors, such as financial statements and qualitative and quantitative factors, to evaluate the intrinsic value. Technical analysis involves studying charts that show the trading history and statistics for security analysis to make buy and sell decisions. Comparing fundamental analysis and technical analysis for the investors who want to invest in SET50 Index Futures, technical analysis is more important.

There are several theories and tools in technical analysis to makes decisions for trading such as Dow's theory, Elliott's wave, Support, and Resistance levels, Price indicators, Momentum indicators, Volume indicators, Oscillator indicators, and so on. One of the indicators that grown in popularity is the commodity channel index (CCI), which is a momentum-based oscillator used to help determine when is reaching a condition of being overbought or oversold. The CCI, developed by Donald Lambert in 1980, is

now a very common tool for investors in identifying cyclical trends not only in commodities but also equities, futures contracts, and currencies. This indicator compares the current price to the average price over a specific period and assesses price trend direction, allowing traders to identify price reversals, price extremes, trend strength, and provide trade signals to determine if they want to enter or exit a trade.

As with most indicators, the CCI should be used in conjunction with other aspects of technical analysis. CCI fits into the momentum category of oscillators. The CCI typically oscillates above and below a zero line. Normal oscillations will occur within the range of +100 and −100. Lambert's trading guidelines for the CCI focused on movements above +100 and below −100 to generate buy and sell signals. Because about 70 to 80 percent of the CCI values are between +100 and −100, a buy or sell signal will be in force only 20 to 30 percent of the time. When the CCI moves above +100, a security is considered to be entering into a strong uptrend and a buy signal is given. The position should be closed when the CCI moves back below +100. When the CCI moves below −100, the security is considered to be in a strong downtrend and a sell signal is given. The position should be closed when the CCI moves back above −100. (Stockcharts, n.d.).

The traders always tweak their CCI settings, depending on their favorite time frame or trading style. Most of them use the standard settings, CCI set on a 21 period. CCI of 14-period and 50-period are also popular among traders. A shorter CCI period, below 14, with be very volatile and will generate a lot of false signals. A longer CCI period, above 50, smooths out the plotted line and will generate fewer, but more accurate signals. In what concerns the overbought and oversold levels, most traders use the standard levels 100 or -100 lines. Some traders prefer to use the 200 or-200 lines to determine when the market is overbought and oversold, to filter market noise (Marius, 2020).

The basic CCI trading strategy is used to track the movement of CCI compare with something such as the price, 0-level, overbought/oversold level, trendline, the moving of CCI. For this reason, several trading strategies depend on the investor’s styles; for example,

- CCI crosses the 0-level
- CCI overbought/oversold
- CCI breakout trendline
- CCI crossover the moving average
- Divergence between CCI and prices etc.

Different strategies can use the CCI in different ways, including using it across multiple timeframes to establish dominant trends, pullbacks, or entry points into that trend. Some trading strategies based on CCI can produce multiple false signals or losing trades when conditions turn choppy (Mitchell, 2020).

According to the above information, there are many pros and cons of the CCI Index for example good at identifying divergences on the chart, excellent during a trending market condition combined with moving averages, useful at identifying overbought and oversold areas on the chart, lagging indicator, produce numerous whipsaws if used on lower timeframes, does not contain all of the data necessary for a proper analysis of price action, should be used in combination with other tools (Marius, 2020).

Considering trading SET50 Index Futures with another indicator, from "Trading Derivatives with Money Flow Index (MFI)", the research is to find the optimum parameters of Money Flow Index, an oscillator that uses both price and volume to measure buying and selling pressure, for trading SET50 index future using s50z17 as a case study. The backtest result was shown that the maximum net profit was 172.20 points for 20 trading times or the average net profit per trade was 8.61 (Julruksa & Liemmanee, 2018).

The main objective of this research is to focus on trading SET50 Index Futures using the appropriate periods of CCI in each time frame for the CCI crosses the 0-level and CCI overbought/oversold strategies.

2. Objectives

The main objectives of this research are to make and compare a maximum profit on trading SET50 Index Futures by the CCI using two strategies (CCI crosses the 0-level and CCI overbought/oversold) and find the optimum parameters (periods of CCI) on trading in each time frame for each strategy. The CCI crosses the 0-level strategy generates signals when the CCI value crosses zero-line whereas the CCI overbought/oversold strategy generates signals when the CCI reaches the overbought (100) or oversold

zone (-100). This research used 4 timeframes (10 minutes, 30 minutes, 60 minutes, and 1-day), and 3 periods of CCI (10, 15, 20 periods) were computed in each time frame for backtesting.

3. Materials and Methods

This research used S50IF_CONOI data, a Set50 Index Futures continuous series, from software "eFin Stock Pickup" to analyze. To compare the backtest result, the data requires the same period data include Opening, High, Low, Closing prices, and Volume that is current or up-to-date for every timeframe. All possible data in the timeframe of 10 minutes, 30 minutes, 60 minutes, and 1-day that complies with this condition start from March 5, 2019, to February 24, 2021. The CCI with 10, 15, and 20 periods were computed in each timeframe to measure the momentum and oscillator of SET50 Index Futures in the market. Formulas for CCI are as follows:

CCI = (Typical Price – 20 period SMA of Typical Price) / (0.015 x Mean Deviation)

Which Typical Price (TP) = (High + Low + Close)/3,

SMA or Simple Moving Average calculates the arithmetic mean over several periods,

Mean Deviation was computed by the following 4 steps.

1. subtract the most recent 20-period average of the typical price from each period's typical price.
2. take the absolute values of these numbers.
3. sum the absolute values.
4. divide by the total number of periods (such as 10, 15, 20).

The research aims to find the entry point in each timeframe that makes the best opportunity or the maximum net profit for trading SET50 Index Futures by CCI crosses the 0-level strategy and CCI overbought/oversold strategy.

In trading TFEX, there is two-ways trade. The first is to buy (denoted by Open Long) before selling (denoted by Close Short), this means we could buy at a low price and then sell at a high price later like trading in stocks. The second is to sell (denoted by Open Short) before buying (denoted by Close Long), which means we could sell at a high price first and then follow buy at a low price later, this way could trade in TFEX only not in the stocks market. This research will initiate both ways, the buy and sell signal depend on each strategy.

CCI crosses the 0-level strategy:

The 0-level can be used to generate signals as follows.

1. Buy before selling case:
   Opening a contract or a new buy at the opening price of the next period when the CCI crosses the zero-level from negative to positive.
2. Sell before buying case:
   Opening a contract or a new sell at the opening price of the next period when the CCI crosses the zero-level from positive to negative.

CCI overbought/oversold strategy:

CCI can be used to identify overbought and oversold levels. Security would be deemed oversold when the CCI dips below −100 and overbought when it exceeds +100.

The signal Buy or Sell is as follows.

1. Buy before selling case:
   Opening a contract or a new buy at the opening price of the next period when the CCI drops to the oversold zone (-100) or lower.
2. Sell before buying case:
   Opening a contract or a new sell at the opening price of the next period when the CCI reaches the overbought zone (100) or over.

The limitation in this research is the commission fee. Each time trading SET Index Futures the investors must pay the commission fee. This research doesn't include this fee because it differs between brokers.

4. Results and Discussion

Considering the closing prices in timeframe 1-day of SET50 Index Future from March 5, 2019, to February 24, 2021, the data were presented in the following candlestick chart, see Figure 1. The data and the candlestick chart illustrated that the SET50 Index Future trends were

- sideway: March 5, 2019 – January 20, 2020, and December 14, 2020 – February 24, 2021,
- downtrend: January 21, 2020 – March 13, 2020, and June 10, 2020 – October 30, 2020,
- uptrend: March 16, 2020 – June 8, 2020, and November 2, 2020 – December 9, 2020.

The maximum, minimum, and range of the closing prices in this period were 1,157.30, 672.00, and 485.3, respectively. The mean and median were 972.74 and 968.45. The net profit for buy and hold on the whole period was -146.40.

Figure 1 the closing prices in time frame 1-day of SET50 index future

Considering the backtest of whole data using CCI crosses the 0-level strategy that following the conditions in section 3 found that

- Timeframe 10 min: the 20 periods – CCI was the best parameter, which number of trades, %win, Net profit, and Maximum drawdown were 818, 29.83%, 310.50, and -34.30, respectively.
- Timeframe 30 min: the 10 periods – CCI was the best parameter, which number of trades, %win, Net profit, and Maximum drawdown were 585, 38.46%, 191.10, and -59.00, respectively.
- Timeframe 60 min: the 20 periods – CCI was the best parameter, which number of trades, %win, Net profit, and Maximum drawdown were 224, 33.93%, 570.70, and -36.30, respectively.
- Timeframe 1-Day: the 20 periods – CCI was the best parameter, which number of trades, %win, Net profit, and Maximum drawdown were 26, 42.31%, 302.20, and -55.50, respectively.

The details of backtesting results for CCI crosses the 0-level strategy are shown in Table 1.

Table 1: The backtest result for CCI crosses the 0-level strategy

Timeframe	Periods	#Trade	%Win	%Lose	Net Profit	Average	Max	MaxDD
10Min	10	1251	34.77	65.23	(151.70)	(0.12)	98.20	(73.00)
	15	977	33.06	66.94	105.20	0.11	97.60	(63.60)
	20	818	29.83	70.17	310.50	0.38	138.30	(34.30)
30Min	10	585	38.46	61.54	191.10	0.33	83.20	(59.00)
	15	437	38.90	61.10	31.30	0.07	88.40	(61.30)
	20	346	38.15	61.85	(56.10)	(0.16)	92.20	(117.50)
60Min	10	318	38.99	61.01	(36.90)	(0.12)	88.40	(117.50)
	15	269	34.20	65.80	3.60	0.01	122.00	(129.70)
	20	224	33.93	66.07	570.70	2.55	219.20	(36.30)
Day	10	40	30.00	70.00	(236.70)	(5.92)	134.90	(98.00)
	15	28	32.14	67.86	(270.80)	(9.67)	126.00	(173.00)
	20	26	42.31	57.69	302.20	11.62	297.90	(55.50)

Considering the backtest of whole data using CCI overbought/oversold strategy that following the conditions in section 3 found that

- Timeframe 10 min: the 20 periods – CCI was the best parameter, which the number of trades, %win, Net profit, and Maximum drawdown were 489, 61.76%, 102.80, and -96.70, respectively.
- Timeframe 30 min: the 10 periods – CCI was the best parameter, which the number of trades, %win, Net profit, and Maximum drawdown were 404, 63.37%, 109.30, and -148.70, respectively.
- Timeframe 60 min: the 10 periods – CCI was the best parameter, which the number of trades, %win, Net profit, and Maximum drawdown were 229, 66.38%, 55.70, and -209.80, respectively.
- Timeframe 1-Day: the 20 periods – CCI was the best parameter, which the number of trades, %win, Net profit, and Maximum drawdown were 15, 60.00%, -142.80, and -210.00, respectively.

The details of backtesting results for CCI overbought/oversold strategy are shown in Table 2.

Table 2: The backtest result for CCI overbought/oversold strategy

Timeframe	Periods	#Trade	%Win	%Lose	Net Profit	Average	Max	MaxDD
10Min	10	817	56.67	43.33	(444.90)	(0.54)	62.90	(80.50)
	15	611	56.46	43.54	(111.00)	(0.18)	70.10	(100.30)
	20	489	61.76	38.24	102.80	0.21	68.00	(96.70)
30Min	10	404	63.37	36.63	109.30	0.27	37.10	(148.70)
	15	269	63.94	36.06	34.90	0.13	39.30	(210.70)
	20	204	70.59	29.41	6.60	0.03	36.10	(209.40)
60Min	10	229	66.38	33.62	55.70	0.24	39.70	(209.80)
	15	163	66.87	33.13	(82.00)	(0.50)	34.40	(194.60)
	20	131	68.70	31.30	(247.20)	(1.89)	42.90	(222.40)
Day	10	30	66.67	33.33	(263.50)	(8.78)	99.90	(285.20)
	15	17	47.06	52.94	(256.30)	(15.08)	58.90	(198.00)
	20	15	60.00	40.00	(142.80)	(9.52)	58.90	(210.00)

Comparing the backtest result between CCI crosses the 0-level strategy and CCI overbought/ oversold strategy in every timeframes and period that considering with Net profit, %Win, Average Net Profit, and Max Drawdown are shown as Tables 3-5, respectively.

Table 3 illustrates that most of the top five maximums net profit were 20 periods - CCI crosses the 0-level strategy. The first rank net profit consisted of 20 periods – CCI in timeframe 60 minutes using CCI crosses the 0-level strategy, which %win was 33.93%, net profit of 570.70, and max drawdown at -36.30.

Table 4 illustrates that all of the top five %Win backtest was CCI overbought/oversold strategy in which the range of %Win was 66.38%-70.59%. Although the %Win in these cases was higher more than the others, the net profit was low returns. The detail of the Top 5 %Win backtest result is shown in Table 4.

Table 5 illustrates that the top 5 Average net profit backtest result. The first three average net profit per trade was 20 periods-CCI crosses the 0-level strategy that ranged between 0.27-11.62. The CCI crosses the 0-level strategy using 20 periods in timeframe 1-day made the best average net profit with %win of 42.31, net profit of 302.20, and max drawdown of -55.50, and 11.62 points per trade, which the average net profit is better than trading with Money Flow Index that the average net profit per trade was only 8.61 (Julruksa & Liemmanee, 2018), as shown in Table 5.

Table 3: The Top 5 Net profit backtest result

Strategy	Timeframe	Period	#Trade	%Win	%Lose	Net Profit	Average	Max	MaxDD
Cross Zero*	60Min	20	224	33.93	66.07	570.70	2.55	219.20	(36.30)
Cross Zero	10Min	20	818	29.83	70.17	310.50	0.38	138.30	(34.30)
Cross Zero	Day	20	26	42.31	57.69	302.20	11.62	297.90	(55.50)
Cross Zero	30Min	10	585	38.46	61.54	191.10	0.33	83.20	(59.00)
OBOS*	30Min	10	404	63.37	36.63	109.30	0.27	37.10	(148.70)

Note: Cross Zero stands for CCI crosses the 0-level strategy and OBOS stands for CCI overbought/ oversold strategy

Table 4: The Top 5 %Win backtest result

Strategy	**Timeframe**	**Period**	**#Trade**	**%Win**	**%Lose**	**Net Profit**	**Average**	**Max**	**MaxDD**
OBOS	30Min	20	204	70.59	29.41	6.60	0.03	36.10	(209.40)
OBOS	60Min	20	131	68.70	31.30	(247.20)	(1.89)	42.90	(222.40)
OBOS	60Min	15	163	66.87	33.13	(82.00)	(0.50)	34.40	(194.60)
OBOS	Day	10	30	66.67	33.33	(263.50)	(8.78)	99.90	(285.20)
OBOS	60Min	10	229	66.38	33.62	55.70	0.24	39.70	(209.80)

Table 5: The Top 5 Average Net Profit backtest result

Strategy	**Timeframe**	**Period**	**#Trade**	**%Win**	**%Lose**	**Net Profit**	**Average**	**Max**	**MaxDD**
Cross Zero	Day	20	26	42.31	57.69	302.20	11.62	297.90	(55.50)
Cross Zero	60Min	20	224	33.93	66.07	570.70	2.55	219.20	(36.30)
Cross Zero	10Min	20	818	29.83	70.17	310.50	0.38	138.30	(34.30)
Cross Zero	30Min	10	585	38.46	61.54	191.10	0.33	83.20	(59.00)
OBOS	30Min	10	404	63.37	36.63	109.30	0.27	37.10	(148.70)

Table 6: Summary of Net Profit classify by Strategies, Periods and Time Frames

	CCI crosses the 0-level strategy				**CCI overbought/ oversold strategy**			
Periods \ Timeframe	**10Min**	**30Min**	**60Min**	**Day**	**10Min**	**30Min**	**60Min**	**Day**
10	-151.7	191.1	-36.9	-236.7	-444.9	109.3	55.7	-263.5
15	105.2	31.3	3.6	-270.8	-111	34.9	-82	-256.3
20	310.5	-56.1	570.7	302.2	102.8	6.6	-247.2	-142.8

Table7: The Statistics of Net Profit and Max Drawdown classify by Strategies, Periods, Time Frames

	Net Profit		Max Drawdown	
Detail	**Mean**	**SD**	**Mean**	**SD**
Strategy				
Cross Zero	63.53	246.88	(84.89)	42.29
OBOS	(103.20)	173.91	(180.53)	61.17
Total	(19.83)	225.54	(132.71)	70.93
Periods				
10.00	(97.20)	215.06	(133.96)	78.01
15.00	(68.14)	138.46	(141.40)	61.10
20.00	105.84	272.31	(122.76)	80.69
Total	(19.83)	225.54	(132.71)	70.93
Time Frame				
10 min	(31.52)	262.81	(74.73)	24.21
30 min	52.85	86.13	(134.43)	67.77
60 min	43.98	277.99	(151.72)	70.97
1-Day	(144.65)	223.90	(169.95)	82.41
Total	(19.83)	225.54	(132.71)	70.93

From Tables 6 and 7, the summary of net profit, statistics of net profit, and max drawdown classify by Strategies, Periods, Time Frames illustrated that if we compared both strategies, which considered only net profit and max drawdown, the overall result of CCI crosses the 0-level strategy was better than CCI overbought/oversold strategy. While comparing the overall results of 10, 15, and 20 periods, it was found that the 20 periods – CCI was the best parameter, which the average net profit was 105.84 whereas the other periods made a negative average net profit. Moreover, considering the overall results in each timeframe, it was found that only 30 and 60 minutes had a positive average net profit.

This result was consistent with Mitchell's study that the different strategies can use the CCI in different ways, and some trading strategies based on CCI can produce multiple false signals or losing trades when conditions turn choppy. The example is shown in Figure 2.

Figure 2 Example of SET50 index future closing prices in time frame 60 min. and 20 periods - CCI

In summary, the results from Tables 1–7 found that

- The average net profit of the CCI crosses the 0-level strategy was higher than the CCI overbought (100) /oversold (-100) strategy.
- The average Max drawdown of the CCI crosses the 0-level strategy was lower than the CCI overbought (100) /oversold (-100) strategy
- The CCI crosses the 0-level strategy was better than the CCI overbought (100)/oversold (-100) strategy.
- The overall result of 20 periods – CCI was better than 10 and 15 periods.
- Using CCI to trade SET50 Index futures, timeframe 30 and 60 minutes appropriated
- The best combination of CCI periods, time frame, and strategy for trading SET50 Index Futures was 20 periods – CCI crosses the 0-level strategy in time frame 60 min., were shown in Figure 2.
- Although the net profit for buy and hold on whole period was -146.40, the 20 periods-CCI crosses the 0-level strategy in 60 min time frame get a net profit of 570.70, %win of 33.93%, and max drawdown of -36.30.

From the best result, the %win is 33.93% or about one time winning from three times trade, which is corresponding to Mitchell, C. (2020) who showed that some trading strategies based on CCI can produce multiple false signals or losing trades when conditions turn choppy. Suggestions for the next research, it would have been better to reduce the false signal or solve this problem by using CCI with the others indicators (such as moving averages, etc.) and then backtest again. After that, it is important to evaluate the system to determine its viability, and continuing the out-of-sample testing with forwarding performance testing provides another layer of safety before putting a system in the market risking real cash.

5. Conclusion

There are several indicators in technical analysis for the investors to makes decisions for trading in the market. The backtest allows the investors to simulate a trading strategy using historical data to generate results and analyze risk and profitability before risking any actual capital. The main objective of this research was to study the Commodity Channel Index (CCI) that has grown in popularity for trading SET50 Index Futures. There were two strategies to trade with CCI. The first was CCI crosses the 0-level strategy that generates signals when the CCI value crosses zero-line. The second was CCI overbought/oversold strategy that generates signals when CCI reaches the overbought (100) or oversold zone (-100).

The results that compared both strategies using 10, 15, and 20 periods of CCI in time frame 10 minutes, 30 minutes, 60 minutes, and 1-day for trading found that the CCI crosses the 0-level strategy was better than the CCI overbought/oversold strategy. The overall of 20 periods CCI was better than 10 and 15 periods. The best combination of CCI periods, time frame, and strategy for trading SET50 Index Futures was 20 periods CCI crosses the 0-level strategy in 60 minutes time frame to get a net profit of 570.70, the chance for winning of 33.93%, and the maximum drawdown of -36.30, while the net profit for buy and hold on whole period was -146.40. Although the percentage of winning do not high, the net profit is more than the buy and hold method. For the next research, it would have been better to combine CCI with the others indicators to reduce the false signal and then backtest again. After that, the system should be evaluated to determine its viability and forward test with the out-of-sample data before putting a system in the market risking real cash. According to the low chances of winning, the signals provided by the CCI in real-time trading may be multiple losses that cause a lack of confidence. To apply or implement this research in real life, the investors must be disciplined, patiently wait for the trading signal, and trade following the system without feeling. Because of disciplined and following the system, the final result will have a chance to gain the net profit.

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