



## Trading Gold Online Futures with Simple Moving Average and Money Flow Index

Oranush Poonyakanok<sup>1\*</sup>, Nisakorn Julruksa<sup>1</sup>, Wongsakorn Charoenpanitseri<sup>1</sup>,  
Hataichanok Wangvongcharoen<sup>1</sup>, Nipaporn Panyayong<sup>1</sup> and Puangrat Chanthaweeroaj<sup>1</sup>

<sup>1</sup>College of Digital Innovation and Information Technology, Rangsit University, Pathum Thani, Thailand

\*Corresponding author, E-mail: Oranushpoon@gmail.com

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### Abstract

This research combines two indicators, Simple Moving Average or SMA (trend indicator) and Money Flow Index or MFI (momentum indicator) to use together for making the maximum net profit in TFEX Gold Online Futures market. The main objective of this research is to find the optimum parameters, periods of SMA, periods, oversold and overbought zone of MFI for trading. The Opening, High, Low, Closing prices and Volume from February 8 2019, to February 7 2020, of TFEX Gold Online Future in timeframe 15 minutes are analyzed in this research. The buy signal occurs when the MFI drop in oversold zone and the gold price crosses above SMA. The sell signal occurs when the MFI drop in overbought zone and the gold price crosses below SMA. The backtest results found that the best parameters to trade TFEX Gold Online Futures in timeframe 15 minutes are SMA 100 period, MFI 150 periods with oversold less than 50 and overbought greater than 55.

Although the main idea of this research indicates how to make a profit from Gold Online Futures. By using only technical analysis which does not concern the factor that influences physical gold prices, although this can be risky. Many factors can affect the gold prices before the technical analysis for example signal such as monetary policy, economic data, supply and demand, inflation, currency movements, uncertainty, etc. Therefore, it is better to consider these factors combines with the technical analysis to increase the probability of gaining profits.

**Keywords:** *Trading, Gold Online Futures, Simple Moving Average, Money Flow Index*

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### 1. Introduction

Human history indicates that gold is one of the world's most sought-after minerals, prized for its value and unique qualities, especially in high society. Gold is the oldest precious metal for thousands of years and it has been valued as a global currency, a commodity, an investment and simply an object of beauty (TFEX, n.d.). Nowadays, people purchase gold for their collections as gold is a popular physical asset and jewelry. In term of economy, gold is considered as a major economic driver for all countries and it has an ability to secure a nation's wealth. Since the country's economy has a direct relationship with gold, trading on gold and its derivatives become a more interesting investment option.

Thailand Futures Exchange-TFEX was established on May 17 2004, as a derivatives exchange (TFEX, 2005). It's a subsidiary of the Stock Exchange of Thailand (SET). TFEX is allowed to trade Futures, Options and Options on Futures where the permitted underlying assets are equities, debt, commodities and others (i.e., exchange rate and other as may be announced by the SEC).

TFEX Gold Online Futures, one of the popular TFEX product, is a Futures contract that is one types of a financial derivative with gold as an underlying asset. Some investors believe that gold is a safe haven, because the characteristic of gold price movement does not correlate with the equity market, makes gold futures a very interesting investment option. Holding precious metals such as gold in a portfolio can give apparent benefits in the form of speculative gains, investment gains, hedging against macroeconomic and geopolitical risk and or wealth preservation. Experienced and educated investors have long known that gold and related investments can be strong investment choices (TFEX, n.d.).

Investors who want to invest in TFEX Gold Online Futures must be necessary to know about security analysis which is the analysis of tradable financial instruments typically divided into fundamental and technical analysis. Technical analysis has become extensive in recent years. There are many categories of technical analysis such as Price indicators, Support and Resistance levels, Momentum indicators, Volume indicators, Oscillators indicators, and so on (Liemmanee, Wangvongcharoen, Poonyakanok, Arjritth



and Charoenpanitseri, 2019). The main object of this research is to focus on using a basic concept of a Simple Moving Average (SMA) and Money Flow Index (MFI) to trade Gold Online Futures.

The moving average (MA) is a simple technical analysis tool that smooths out price data by creating a constantly update of the average price. This method helps reduce the amount of "noise" on a price chart. Look at the direction of the moving average to get a basic idea of which direction the price is moving. A moving average can also act as support or resistance. In an uptrend, a 50-day, 100-day or 200-day moving average may act as a support level (Investopedia, n.d.).

The Relative Strength Index (RSI) is one of the most popular technical indicators. The researchers believe that RSI's failure to account for volume is a serious deficiency because volume can vary widely in market tops and bottoms. In an effort to improve the RSI the researchers have devised a unique short-term technical indicator called Money Flow Index (MFI). This indicator attempts to measure the strength of money entering and leaving the market." (Quong & Soudack, 1989)

The Money Flow Index is a momentum indicator that tells us how much money is flowing in and out in any security over time or is also known as volume-weighted RSI that starts with the typical price for each period that uses both price and volume to measure buying and selling pressure. It oscillates between the 0 and 100 values. MFI is a unique indicator, which combines volume and momentum with an RSI formula. This indicator also helps you to find the overbought and oversold conditions, and also predicts the major trend changes ahead of time. MFI is positive when the typical price rises (buying pressure) and negative when the typical price declines (selling pressure). The main difference between MFI and RSI is that MFI also accounts for volume, whereas the RSI does not account for volume. Many traders watch for opportunities that arise when the MFI moves in the opposite direction as the price. This divergence can often be a leading indicator of a change in the current trend. MFI is one of the more reliable indicators of overbought and oversold conditions because it uses the higher readings of 80 and 20 as compared to the RSI's overbought/oversold readings of 70 and 30 (Investopedia, n.d.). Many traders commonly seek to buy and sell a stock in accordance with the movement of this indicator.

In this paper, the MFI indicator and simple moving averages are paired to generate signals for buying and selling. The default setting of the MFI indicator and the moving averages of 5, 20, 50, 100 and 200 periods are taken into experimental design. The main aim is to figure out the pair of MFI indicator and moving average with the highest return. The specific research methodology is described in Section 3. The numerical results and discussion are presented in Section 4. Finally, the conclusion is given in Section 5.

## 2. Objectives

The main objective of this research is to find the optimum parameters, periods of SMA, periods, oversold and overbought zone of MFI for trading TFXE Gold Online Futures.

## 3. Materials and Methods

The one-year data (Opening, High, Low, Closing prices and Volume) from February 8 2019, to February 7 2020, of TFXE Gold Online Future in timeframe 15 minutes that analyzed in this research were imported from software eFin stock pickup. It constituted the database of 10,226 observations to study.

These data computed Simple Moving Average (SMA) of 5, 20, 50, 100 and 200 periods and Money Flow Index (MFI) from 5 to 200 periods increasing by 5 to measure the trend and momentum in the global gold market.

The value of SMA calculates the arithmetic mean of gold prices over a number (n) of periods. The formulas for simple moving averages was  $SMA = (C_1 + C_2 + C_3 + \dots + C_n)/n$ , where n denoted number of periods and  $C_i$  denoted closing gold price in period n.

The value of the MFI is always between 0 and 100, and calculating it requires several steps. Step one is to calculate the typical price. Second, the raw money flow is calculated. The next step is to calculate the money flow ratio using the positive and negative money flows for the last n periods. Finally, using the money flow ratio, the MFI is calculated (Quong and Soudack, 1989; Dormeier, 2011; Money Flow Index – MFI, online). Formulas for each of these items are as follows:

[1248]



1. Compute the Typical Price equal to:  $\text{Typical Price} = (\text{High} + \text{Low} + \text{Close}) / 3$
2. Compute Raw Money Flow equal to  $\text{Raw Money Flow} = \text{Typical Price} * \text{volume}$
3. Calculate the Positive Money Flow and Negative Money Flow over the past  $n$  periods by:  
Positive money flow is calculated by summing up all of the money flow on the last  $n$  periods where the typical price is higher than the previous period typical price. This same logic applies to the negative money flow.
4. Compute the Money Flow Ratio over a specified period ( $n$  periods) equal to:  
 $\text{Money Flow Ratio} = (\text{Positive Money Flow}) / (\text{Negative Money Flow})$
5. Calculate the Money Flow Index as follows:  
 $\text{Money Flow Index} = 100 - (100 / (1 + \text{Money Flow Ratio}))$

This research aims to find the optimum parameters, periods of SMA, periods, oversold and overbought zone of MFI for trading TFEX Gold Futures Online. The SMA must configure a number ( $n$ ) of periods which  $n$  equals 5, 20, 50, 100 and 200 periods. While the MFI must configure 3 parameters together, the first parameter is a number of periods vary from 5 to 200 increasing by 5. The second parameter is the oversold zone which varies from 0 to 50 increasing by 5. Last is the overbought zone which varies from 50 to 100 increasing by 5. All parameters will adjust in order to find the entry point that makes the best opportunity or the maximum net profit.

In trading TFEX, there is two-ways trade. The first is buying (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 selling (denoted by Open Short) before buying (denoted by Close Long) that means we could sell at a high price first and then follow by buying at a low price, this method is trading in TFEX only, and not in the stocks market. This research will initiate both ways, the buy and sell signal by the following rules:

1. Buy before selling case: Opening a contract or a new buy when the MFI indicator drops to the oversold zone or lower and the gold prices greater than the SMA.

Closing a contract or sell when the MFI indicator reaches the overbought zone or over and the gold prices less than the SMA.

2. Sell before buying case: Opening a contract or a new sell when the MFI indicator reaches the overbought zone or over and the gold prices less than the SMA.

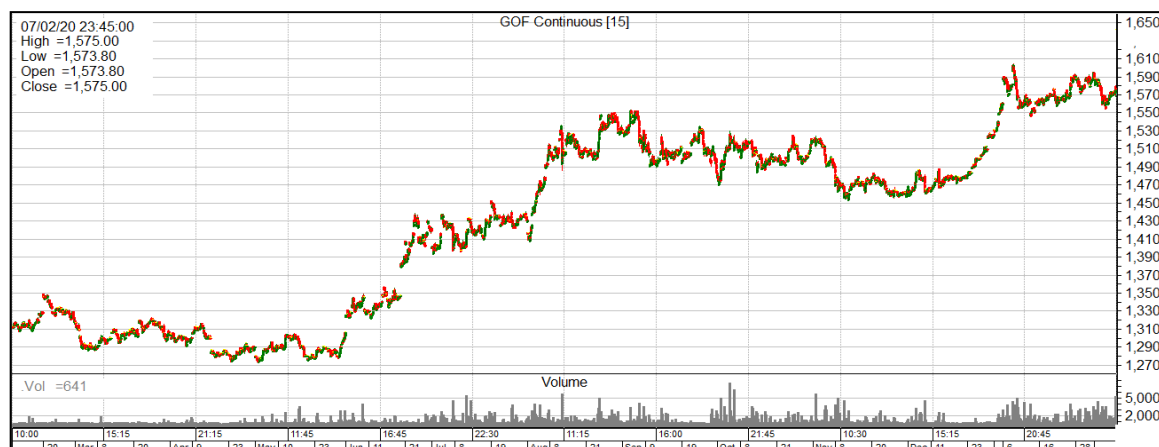
Closing a contract or buy when the MFI indicator drops to the oversold zone or lower and the gold prices greater than the SMA.

The limitation of this research is the commission fee. Each time trading TFEX Gold Online Future investors must pay the commission fee. This research doesn't include this fee because it differs between the brokers.

## 4. Results and Discussion

### 4.1 Results

Considering the closing prices in timeframe 15 minutes of TFEX Gold Online Future for one-year, the data were presented in the following candlestick chart, as Figure1. From the data and the candlestick chart (Figure1) illustrated that the TFEX Gold Online Future trend was sideways or sideways down on February-May 2019, September-November 2019 and January-February 2020. The gold prices were uptrend on June-August 2019 and December 2019. The maximum, minimum, range and standard deviation of the closing gold prices per ounce in this period were \$1,603.10, \$1,273.20, \$329.90 and \$99.58 respectively. The mean, median and mode were \$1,428.81, \$1,462.90 and \$1,288.50 respectively. The net profit for buying and hold on whole period was \$261.00.



**Figure 1:** the closing prices in timeframe 15 minutes of TFXE Gold Online Future for one-year

Considering the backtest of whole data following the conditions in section 3, all possible results that generate from adjusting 4 parameters (periods of SMA, period, Overbought and Oversold of MFI) were calculated and found that:

Buy before Selling case:

- The average of times to trade was 6.56 times.
- The average of opportunity to win was 53.95%.
- The average profit and loss per trade were \$50.18 and \$27.43 respectively.
- The average net profit per trade was \$22.75.
- The average maximum drawdown per trade was -\$5.0.

Sell before Buying case:

- The average of times to trade was 6.97 times.
- The average of opportunity to win was 45.04%.
- The average profit and loss per trade were \$27.06 and \$64.16 respectively.
- The average net profit per trade was \$-37.11.
- The average maximum drawdown per trade was \$-24.78.

Both case: (Buy before Selling & Buy before Selling)

- The average net profit per trade was \$-14.35
- The maximum and minimum of net profit per trade were \$581.90 and \$-669.70 respectively.

The descriptive statistics of all case were shown in Table 1 and 1.1.

Backtesting allows the trader to simulate a trading strategy using historical data to generate results and analyze risk and profitability before risking any actual capital. From all possible results of the backtests, we concluded the comparing net profit result for both cases between the top five maximum parameters were shown as Table 2. In detail, the descriptive statistics of the parameters that made the top five maximum net profit for Buy before Selling and Sell before Buying cases as shown in Table 3 and 4, respectively.

Table 2, 3 and 4 illustrated that the top five maximums net profit for Buy before Selling and Sell before Buying and both cases were the same parameters. The first rank net profit consisted of SMA 100 periods, MFI 150 periods with oversold less than 50 and overbought greater than 55 which made a net profit for Buy before Selling and Sell before Buying and both cases were 419.40, 162.50 and 581.90 respectively.

Considering this first rank net profit found that the number of times for trading Buy before Selling was 20 times which the percent of winning was 85.00% and the number of times for trading Sell before Buying



was 21 times which the percent of winning was 57.40%. The details for the other rank were shown in Table 2, 3 and 4.

The default parameters shown that the most popular using for MFI was 14 periods of time, oversold less than 20% and overbought more than 80% (Stockcharts, n.d.). Which in this research use the notation MFI (14,20,80). In order to confirm the result, we append popular oversold and overbought for MFI from MFI (14,20,80) to MFI (14,40,60), MFI (14,30,70) and MFI (14,10,90). Afterwards, we compare the descriptive statistics between the first rank parameters and the default parameters for Buying before Selling and Selling before Buying cases respectively. The results are shown in Table 5 and 6. It's obvious that the number of times to trade and a maximum drawdown of the first rank was less than the default parameters, but the first rank made more net profit. These results confirm that using SMA&MFI together got more net profits than using only MFI.

**Table 1** The descriptive statistics of all possible results that generate form adjust 4 parameters

Trade	Buy before Selling				Sell before Buying			
	Mean	SD	Max	Min	Mean	SD	Max	Min
Number of Trade	6.56	23.51	585.00	0.00	6.97	23.55	586.00	0.00
% Win	53.95	25.41	100.00	0.00	45.04	37.71	100.00	0.00
% Loss	45.66	25.39	100.00	0.00	54.28	37.74	100.00	0.00
% Draw	0.39	2.56	100.00	0.00	0.68	6.63	100.00	0.00
Profit (\$)	50.18	111.58	933.30	0.00	27.06	65.76	750.50	0.00
Loss (\$)	-27.43	71.08	0.00	-783.50	-64.16	125.37	0.00	-872.30
Net Profit (\$)	22.75	58.75	419.40	-204.80	-37.11	79.64	162.50	-464.90
Max. Drawdown (\$)	-5.00	23.59		-74.90	-24.78	53.21		-284.80

**Table 1.1** The descriptive statistics of all possible results that generate form adjust 4 parameters

Trade	Buy before Selling & Sell before Buying			
	Mean	SD	Max	Min
Net Profit	-14.35	93.05	581.90	-669.70

**Table 2** The result of comparing net profit for both cases between the top five maximums parameters

Ranking	1	2	3	4	5
SMA (periods)	100	100	100	100	20
MFI (periods)	150	140	135	125	5
Oversold (%)	50	50	50	50	50
Overbought (%)	55	55	55	55	65
Net Profit: Buy before Selling (\$)	419.4	413.8	384.2	385.9	361.2
Net Profit: Sell before Buying (\$)	162.5	156.9	127.3	114.8	99.3
Net Profit: Both case (\$)	581.9	570.7	511.5	500.7	460.5

**Table 3** The descriptive statistics of the top five maximums net profit for Buy before Selling cases

Buy before Selling Ranking	1st	2nd	3rd	4th	5th
SMA (periods)	100	100	100	100	20
MFI (periods)	150	140	135	125	5
Oversold (%)	50	50	50	50	50
Overbought (%)	55	55	55	55	65
Number of Trade (times)	20	20	22	23	172
Win (times)	17	15	14	15	81
Loss (times)	3	5	8	8	90
Draw (times)	0	0	0	0	1
% Win	85.00	75.00	63.64	65.22	47.09
% Loss	15.00	25.00	36.36	34.78	52.33
% Draw	0.00	0.00	0.00	0.00	0.58
Profit (\$)	444.30	447.50	427.20	443.70	786.80
Loss (\$)	-24.90	-33.70	-43.00	-57.80	-425.60
Net Profit (\$)	419.40	413.80	384.20	385.90	361.20
Max. Drawdown (\$)	-22.40	-22.40	-22.40	-22.40	-22.30
Mean Profit (\$)	26.14	29.83	30.51	29.58	9.71
Mean Loss (\$)	-8.30	-6.74	-5.38	-7.23	-4.73

**Table 4** The descriptive statistics of the top five maximums net profit for Sell before Buying cases

Sell before Buying Ranking	1st	2nd	3rd	4th	5th
SMA (periods)	100	100	100	100	20
MFI (periods)	150	140	135	125	5
Oversold (%)	50	50	50	50	50
Overbought (%)	55	55	55	55	65
Number of Trade (times)	21	21	23	24	173
Win (times)	12	11	11	12	65
Loss (times)	9	10	12	12	106
Draw (times)	0	0	0	0	2
% Win	57.14	52.38	47.83	50.00	37.57
% Loss	42.86	47.62	52.17	50.00	61.27
% Draw	0.00	0.00	0.00	0.00	1.16
Profit (\$)	205.00	199.30	205.60	197.00	418.00
Loss (\$)	-42.50	-42.40	-78.30	-82.20	-318.70
Net Profit (\$)	162.50	156.90	127.30	114.80	99.30
Max. Drawdown (\$)	-11.40	-13.00	-19.30	-19.90	-20.90
Mean Profit (\$)	17.08	18.12	18.69	16.42	6.43
Mean Loss (\$)	-4.72	-4.24	-6.52	-6.85	-3.01

**Table 5** Comparing descriptive statistics between the first rank and default for Buy before Selling cases

Buy before Selling	1 <sup>st</sup> Rank	MFI(14,10,90)	MFI(14,20,80)	MFI(14,30,70)	MFI(14,40,60)
SMA (periods)	100				
MFI (periods)	150	14	14	14	14
Oversold (%)	50	10	20	30	40
Overbought (%)	55	90	80	70	60
Number of Trade (times)	20	24	84	162	239
Win (times)	17	17	54	109	158
Loss (times)	3	7	30	53	80
Draw (times)	0	0	0	0	1
% Win	85.00	70.83	64.29	67.28	66.11
% Loss	15.00	29.17	35.71	32.72	33.47
% Draw	0.00	0.00	0.00	0.00	0.42
Profit (\$)	444.30	253.40	477.90	589.50	572.20
Loss (\$)	-24.90	-115.10	-259.40	-389.40	-557.60
Net Profit (\$)	419.40	138.30	218.50	200.10	14.60
Max. Drawdown (\$)	-22.40	-29.40	-35.90	-28.40	-30.90
Mean Profit (\$)	26.14	14.91	8.85	5.41	3.62
Mean Loss (\$)	-8.30	-16.44	-8.65	-7.35	-6.97

**Table 6** Comparing descriptive statistics between the first rank and default for Sell before Buying cases

Sell before Buying	1 <sup>st</sup> Rank	MFI(14,10,90)	MFI(14,20,80)	MFI(14,30,70)	MFI(14,40,60)
SMA (periods)	100				
MFI (periods)	150	14	14	14	14
Oversold (%)	50	10	20	30	40
Overbought (%)	55	90	80	70	60
Number of Trade (times)	21	25	84	162	238
Win (times)	12	17	51	99	138
Loss (times)	9	8	32	60	95
Draw (times)	0	0	1	3	5
% Win	57.14	68.00	60.71	61.11	57.98
% Loss	42.86	32.00	38.10	37.04	39.92
% Draw	0.00	0.00	1.19	1.85	2.10
Profit (\$)	205.00	121.50	401.50	512.90	533.80
Loss (\$)	-42.50	-222.30	-458.60	-583.60	-756.90
Net Profit (\$)	162.50	-100.80	-57.10	-70.70	-223.10
Max. Drawdown (\$)	-11.40	-74.00	-59.40	-53.80	-57.50
Mean Profit (\$)	17.08	7.15	7.87	5.18	3.87
Mean Loss (\$)	-4.72	-27.79	-14.33	-9.73	-7.97



#### 4.2 Discussion

The default parameters that are most popular which many investors used for MFI to trade stocks is 14 periods of time, oversold less than 20% and overbought more than 80%.

From the case study using the Money Flow Index for trading derivatives in timeframe day, found that there are two groups of parameters to maximize net profit. The first is the number of days which equal to 3, oversold zone about 24-28 and overbought zone about 63-67. It will get a chance of winning about 80.00%-85.71%. The second is the number of days about 20-21, oversold zone about 28-35 and overbought zone about 81-82 (Julruksa & Liemmanee, 2018).

This research indicates that the first rank net profit consisted of SMA 100 periods, MFI 150 periods with oversold less than 50 and overbought greater than 55. It's obvious that there were many differences such as the type of Future, timeframe, indicators and the rule to buy or sell. Consequently, the maximum profit and efficiency indicators for trading may depend on the type of security, indicators, timeframe and the rule for trading. We find the optimum parameters by backtesting which can be an important step in optimizing trading strategy. Despite the fact that there is some caution such as the backtest use of the historical data, the real-life trade the real-time data which the future is uncertain.

From the above result, if we implement the best backtest result with TFEX Gold Online Future, the candlesticks chart of the closing price in timeframe 15 minutes with SMA and MFI indicators using the first rank parameters (SMA 100 periods, MFI 150 periods with oversold less than 50 and overbought greater than 55) were shown as Figure 2. And then if we zoomed in some part of Figure 2 and found out some example of the buy & sell signal, the example signals were presented as Figure 3.

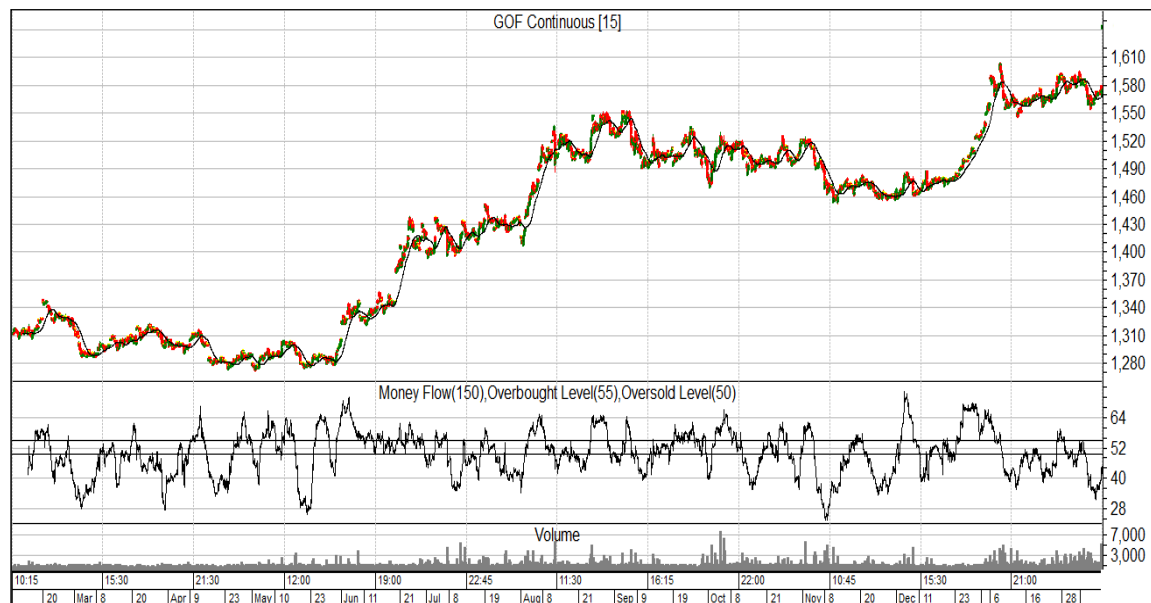


Figure 2 The closing gold price chart with SMA 100 periods and MFI 150 periods indicators.





Figure 3 Example Buy and Sell signal for trading Gold online Future with SMA 100 and MFI 150 periods indicators

## 5. Conclusion

This research combines two indicators, SMA (trend indicator) and MFI (momentum indicator), to use together for making the maximum net profit in Gold Online Future market. Although the percentage of winning is not high, the net profit is greater than using only MFI and greater than the buy and hold method. The best parameters to trade TFEX Gold Online Futures in timeframe 15 minutes is SMA 100 period, MFI 150 periods with oversold less than 50 and overbought greater than 55. The buy signal occurs when the MFI drop in oversold zone and the gold price crosses above SMA. The sell signal occurs when the MFI drop in overbought zone and the gold price crosses below SMA.

The main idea of this research is to trade Gold Online Futures using only technical analysis which does not concern the factor that relates to the gold price. Although this research shows the method of making a profit from Gold Online Future, in real-world the fundamental and psychological factors that move gold prices are largely unknown or overlooked. With that being said, let's have a look at the most common factors that influence physical gold prices such as monetary policy, economic data, supply and demand, inflation, currency movements, uncertainty, etc (Williams, 2018).

That mean, if the investors use only technical analysis, sometimes the risk is high because many factors can suddenly affect the prices before the technical analysis can give away any signal whether to buy or sell. This thing will indicate if the investors make any profit or loss. Therefore, it is necessary for investors who want to invest in Gold Online Futures to carefully study the factors that influence gold prices, and combine everything into increasing the likelihood of gaining more profit.

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