



Designing and Creating Expert Advisor on Forex Based on Moving Average Indicator Moving Average Indicators Using Martingale System

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Abstract: The foreign exchange market is a form of a futures market where sellers and buyers of foreign exchange meet. Although it is not tangible like the market that is commonly found, although only online this market is a large capital market and has a physical office even though this market is online this market has problems that can interfere with the comfort and stability of profits when trading manually in the forex market, namely lack experience, psychological pressure, overconfidence, impatience, not being patient looking for opportunities, carried away emotions, and also traders who have to be constantly in front of the computer to maintain and always control the market situation. The creation of software contains a trading system using moving average indicators using the martingale system. This software is made in the Meta Editor application which uses the MQL language as its programming language which tends to be similar to the C++ language. Later this application can run on the MetaTrader4 application. The expert advisors applied are expected to help traders and be useful to facilitate trader performance to make it more effective and efficient to carry out trading activities on the forex market. The created Expert Advisor has been tested in 2021 in EURUSD currency in the M30 timeframe. The created application can make a profit of 57% of the value of the initial deposit.


1 INTRODUCTION


Forex investment is one of the lucrative business lands because the level of return is very high. In the forex market, the turnover of money reaches 3.8 trillion USD every day. Fluctuating price movements and high levels of liquidity make forex investment one of the commodities that have the potential to get profits or large and fast profits. However, just like the promised profits, this business also has the same risk of loss as the promised profit (Busman et al., 2017).

Large risks can be minimized by conducting an analysis of the market. Analysis is an activity that takes into account, weighs and measures past events or data until now to predict the direction of future price movements. There are two types of analysis known in the world of trading, namely technical analysis and fundamental analysis. Fundamental

analysis is an analysis based on economic, political and security situations and conditions globally, while technical analysis is more based on market movements.

Based on the problems in the description above, it can be concluded that a trader must have preparation in carrying out trading activities including psychology when trading where every current transaction can bring profits and losses, than management of the balance or money owned, time that cannot be taken into account when carrying out trading activities, as well as good analysis in determining selling or buying. For this reason, this thesis takes the title: "Designing and Making Expert Advisors on Forex Based on Moving Average Indicators Using the Martingale System". The research made will produce an application that can be used by forex traders, which can make it easier for

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traders to make transactions automatically which makes trading easier and more efficient.

2 RESEARCH METHODS

There are three main processes, namely the Initial, Ticking, and Close processes. The Initial process is the initial stage by which the trader gives orders of input values. While Ticking is a process where the Expert Advisor monitors the movement of price values, which causes floating loss or floating profit. According to the conditions that occur, ea will run the martingale method if there is a floating loss. And finally the Closing process, the EA will end the transaction according to the conditions reached where it stops at the point of profit or loss (Dinata, H., 2018).

Initial process, the input needed includes the period of the moving average indicator, stop loss point, profit take point, slippage, and martingale point lots. The ticking process is to let the EA run automatically so that the EA always observes price movements continuously. In this process, the EA will be ready to use the martingale system, depending on the ongoing price movement. The last stage of the process is close, this stage calculates the profit or loss of each completed transaction.

2.1 Moving Average

Average is an indicator that calculates the average price of an asset in a certain period, then connects in the form of a line. The average value can come from the opening price (Open), close (Close), high (high), lowest (Low), or mid (Median) of a chart candle for a certain period.

Average is part of the lagging indicator. This means that this calculation method is based on previous events and explains information about market history data. The use of the Moving Average indicator is as a predictive tool, but rather provides confirmation. The Simple Moving Average has the simplest protection pattern and is often used by traders. This method can be calculated by adding to the current price series of a period, and then limiting the number of periods.

Moving Averages can help traders recognize the prevailing trend of market price values. If the price currently occupies an area on the Moving Average line, it means that the price tends to fall or be bearish. Conversely, prices that are above the Moving Average line provide bullish trend information or tend to rise.

$$SMA = \frac{pM + pM - 1 + \dots + pM - (n - 1)}{n} \quad (1)$$

Information:

p = actual number

M = time or period

n = lots of actual data

2.2 Martingale Theory

Martingale is a strategy that existed since the 18th century in France. This strategy was used by gamblers at that time, where gamblers needed to double their bets every loss. the goal is to recover the previous losses coupled with the gains. Martingale is a sequence of random variables or rather processes at a given time in a realized order, the expectation of the next value in its order is equal to the observed value.

The martingale system is a fairly interesting probability system, which can be applied to various aspects of life. There are some situations where in order to be able to implement a martingale system, to increase the knowledge of application about to real situations not just theoretical propaganda. One of its areas of application is a brief prediction of market prices. The martingale concept can be known more about the opportunities and possible outcomes of future predictions. (Victor, O.O. 2015).

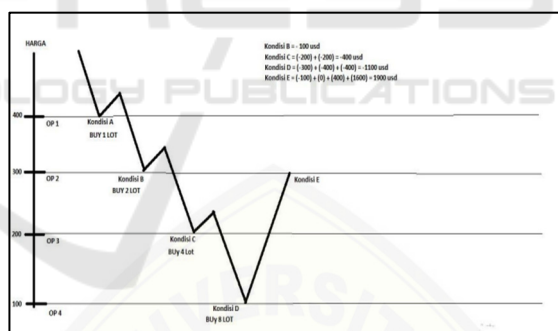


Figure 1: Martingale System.

Example:

It can be seen in figure 2.7 for example, a trader opened an Open Buy eur/USD with lots of 0.1 at a price of 2,100, but it turned out that the price moved down to the level of 2,050 so that it experienced a floating loss of -50. Then again open buy with lots of 0.2 at the price of 2,050 at that moment. That way, it now means that there are 2 open positions. The first position is a floating loss of -50 and the second position is 0. If the price then rises towards 2,100 then the first position rises to 0 (BEP) and the 2nd position becomes a profit of 100 (lots 0.2 x 50 pips = 100|lots 0.2 then 1 pips = \$2|).

2.3 Design of Expert Advisor

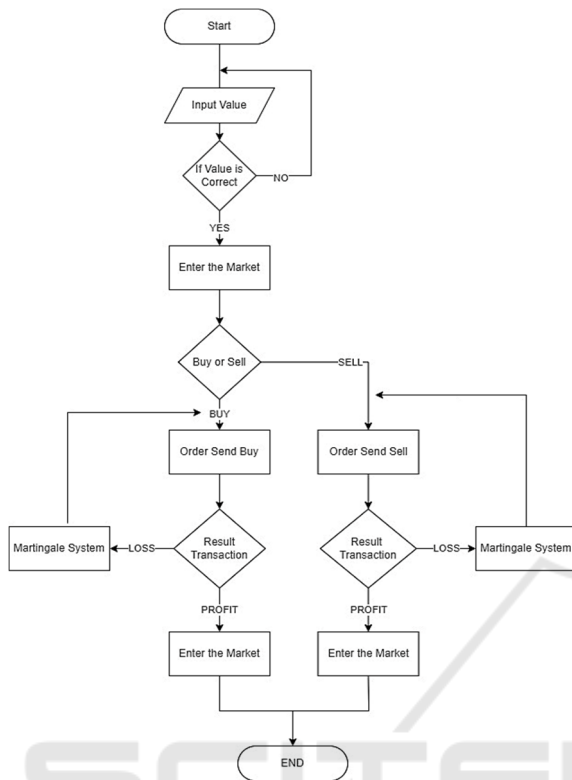


Figure 2: Flowchart Program Code.

Figure 2 illustrates the series of expert advisor programs starting from the user or trader who inputs the value in the parameters into the expert advisor, where the value inputted on the MetaEditor platform returns whether it is correct then the indicator is appropriate then it is ready to run. After the program is ready, the EA will wait where the parameters of the moving average indicator line inputted earlier will cut each other, then the EA will execute with an open order, namely opening a sell or buy transaction according to the intersection of the moving average indicator line.

After the transaction occurs, if you get a loss, the expert advisor will reopen a new transaction with a larger lot value, after getting a profit, the lot value will return to the initial lots value of 0.01 lots. In the Close section, it serves to delete all objects contained in the previous graphic chart when the expert advisor ran before, when the expert advisor is turned off, the objects that were previously will disappear into the default view or to the default view.

3 RESULT EVALUATION AND VALIDATION

3.1 Backtesting EA Martingale

Strategy Tester Report MA MARTINGALE Dollars/Markets-Live+UK-1 (Build 1356)		
Symbol	EURUSD (Euro vs US Dollar)	
Period	30 Minutes (M30) 2021.01.04 00:00 - 2021.12.30 23:30 (2021.01.01 - 2021.12.31)	
Model	Every tick (the most precise method based on all available least timeframes)	
Parameters	SellLots1=0.01; SellStopLoss1=50; SellTakeProfit1=50; MaxSellLots1=100; LotsSellOnLoss1=0; LotsSellOnProfit1=0; LotsSellOnLoss1=2; LotsSellOnProfit1=1; LotsResetOnLoss1=true; LotsResetOnProfit1=false; BuyLots1=0.01; BuyStopLoss1=50; BuyTakeProfit1=50; MaxBuyLots1=100; LotsBuyOnLoss1=5; LotsBuyOnProfit1=0; LotsBuyOnLoss1=2; LotsBuyOnProfit1=1; LotsResetOnProfit1=true; LotsResetOnLoss1=false;	
Bars in test	13415 Ticks modelled	11761722 Modeling quality 90.00%
Unwatched charts errors	0	
Initial deposit	1000.00	Spread Current (\$) 2657.06
Total net profit	570.68	Gross profit 3227.74
Profit factor	1.21	Expected payoff 2.45
Absolute drawdown	308.39	Maximal drawdown 714.41 (50.61%)
Relative drawdown		50.61% (714.41)
Total trades	233	Short positions (won %) 124 (52.42%)
Long positions (won %) 109 (46.28%)		
Profit trades (% of total) 110 (47.21%)		Loss trades (% of total) 123 (52.79%)
Largest profit trade	400.00	loss trade -206.68
Average profit trade	29.24	loss trade -21.60
Maximum consecutive wins (profit in money)	2 (37.34)	consecutive losses (loss in money) 3 (-25.60)
Maximum consecutive profit (count of wins)	400.00 (1)	consecutive loss (count of losses) -206.60 (1)
Average consecutive wins	1	consecutive losses 1

Figure 3: Report EA Martingale.

Figure 3 is a report from the results of the EA backtesting test martingale. That is done information about the EURUSD currency market. With a period of 30 minutes (M30) with data in 2021. It uses the every tick model which is an example of a test model that is closest to the original market. The candlestick chart bars that have been used in the test are as many as 13415. With an initial balance of \$1000, use the current spread. With such backtesting tests it yielded 570\$.

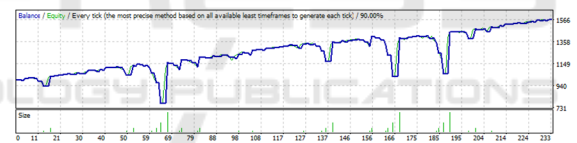


Figure 4: Graphic Account Balance.

Figure 4 is information about the movement of the user's balance since the beginning of the deposit. There is a chart that shows a fairly deep decrease in the balance and subsequently experienced a very drastic increase. Which shows that martingale theory can work according to the design of the program code.

Table 1: Transaction EA Martingale.

#	Time	Type	Lot	Price	Result	Balance
1	4/1/21 21:30	Sell	0.01	1.2248		1000
2	4/1/21 21:30	Modify	0.01	1.2248		
3	5/1/21 21:30	Buy	0.01	1.2251		
4	5/1/21 21:30	Modify	0.01	1.2251		
5	5/1/21 18:45	S/L	0.01	1.2298	-6.24	992.76
6	5/1/21 19:00	Sell	0.02	1.2294		
7	5/1/21 19:00	modify	0.02	1.2294		
8	5/1/21 19:07	T/P	0.01	1.2301	6.18	999.94

The results of the martingale expert advisor test that provides information about the current transaction date which includes date and time information. All tests had 699 transactions on the test. With the type of transaski sell, modify, or buy. Size is the amount of lots traded, price is the market price when the transaction is carried out with stop losses or takeprofit points that have been determined in writing the program code. The profit column provides information about losses or profits obtained, the balance column is the user's balance information after the transaction ends.

3.2 Backtesting EA Moving Average

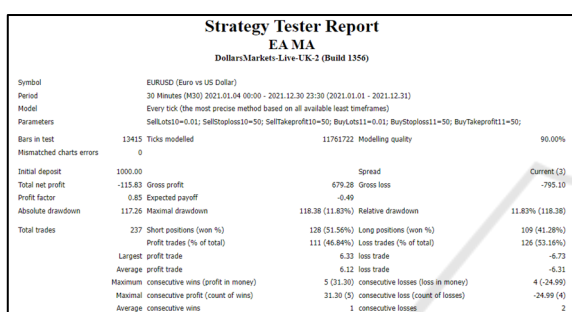


Figure 5: Report EA Moving Average.

In the results of backtesting testing with moving average expert advisors, it can be seen from the information in the figure 5. Providing test information was carried out on the EURUSD market, with a period of 30 minutes from January 1, 2021, to December 30, 2021. The test uses the every tick model, with parameters corresponding to the written program code.

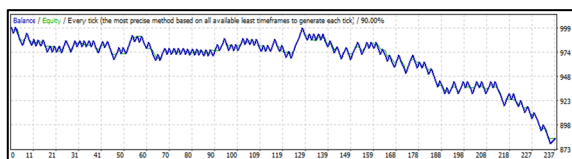


Figure 6: Graphic Account Balance.

Figure 6 is information about the movement of the user's balance from the beginning of the deposit. The graph shows a continuous decline. This is because it only uses moving averages as a reference for transactions, without using theory martingale in the program code flow. The difference in EA made without the use of martingale theory is very obvious in the movement of the user's balance in figure 6.

Table 2: Transaction EA Moving Average.

#	Time	Type	Lot	Price	Result	Balance
1	4/1/21 00:01	Sell	0.01	1.2280		1000
2	4/1/21 00:01	Modify	0.01	1.2280		
3	4/1/21 11:16	S/L	0.01	1.2290	-6.25	993.75
4	4/1/21 11:16	Sell	0.01	1.2287		
5	4/1/21 11:16	Modify	0.01	1.2287		
6	4/1/21 21:30	Buy	0.01	1.2251		
7	4/1/21 21:30	modify	0.01	1.2251		
8	5/1/21 19:07	T/P	0.01	1.2301	6.18	999.93
9	5/1/21 19:07	Buuy	0.01	1.2304		
10	5/1/21 19:07	Modify	0.01	1.2304		
11	6/1/21 09:10	S/L	0.01	1.2237	-6.24	992.7
12	6/1/21 09:10	S/L	0.01	1.2301	-6.53	987.17

The results of the moving average expert advisor test in table 2 provide information about the current transaction date which includes date and time information. All tests conducted using moving average expert advisors resulted in 711 transactions. With the type of transaction sell, modify, or buy. Size is the number of lots traded, price is the market price when the transaction is carried out with stop losses or take profit points that have been determined in writing the program code. The profit column provides information about losses or profits obtained, the balance column is the user's balance information after the transaction ends. Table 2 only shows 12 of the total transactions of 711

4 CONCLUSION

The conclusions that can be drawn after conducting this study. Comparing the results of an Expert Advisor who uses the Martingale system, it is more profitable, but must have enough capital or deposit in order to be able to run the program from the robot. For Expert Advisors who only use the Moving Average indicator, the results get a loss which can be seen from the backtest test results in figure 5. The results of the backtest test on the Expert Advisor using the Martingale system are found in figure 3 which gets a profit of 57% of the deposit value or initial capital.

The suggestions that the Expert Advisor made can be even better at carrying out transactions with additional features such as trailing stop, which is a modification of an ongoing transaction whose value

is based on a certain percentage of the asset price in the current market situation, to make losses more minimized and profits can be maximized. Furthermore, a feature can be added that can set the value of Lots so that it can change according to the balance or balance contained in the account of each trader so that the expert advisor can be used without the need for large capital.

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