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TRIANGLE HEDGING TRADING ROBOT WITH CURRENCY PAIR CORRELATION FOR THE FOREX MARKET

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ABSTRACT

Research on trading robots that apply the Triangle Hedging strategy in the context of currency trading on the forex market aims to optimize profit opportunities while managing risk by exploiting the correlation between currency pairs. The initial steps involve an in-depth review of forex literature, hedging strategies, and currency correlation concepts. This research explores the selection of appropriate currency pairs to be implemented in the Triangle Hedging strategy. This process is carried out by careful analysis of currency pair correlations, focusing on stable positive or negative relationships between them. The results of this correlation analysis show that several currency pairs have a correlation that can be utilized together with the Triangle Hedging strategy. The currency pairs are EURUSD and USDCHF; AUDUSD and USDCAD; GBPUSD and USDJPY. The trial was carried out using the forward testing method. The trial was carried out on four demo accounts with the following results: demo account 1-gain 205.07% and drawdown 43.52%; demo account 2 – gain 91.57% and drawdown 61.42%; demo account 3 – gain 263.54% and drawdown 60.12%; as well as demo account 4 – 170% gain and drawdown 91.81%. This test shows that for gain, the robot has shown good performance, but for drawdown, it still requires optimization. The triangle hedging method and the selection of correlation between currency pairs have not shown optimization in risk control. This is proven by 4 demo accounts showing drawdown levels above 50%; there are even 2 accounts with drawdowns above 90%.

Keywords: *Currency, Forex, Trading Robot, Triangle Hedging.*

1. REFACE

Introduction

In the global financial market, currency trading (foreign exchange trading) has become a form of investment that attracts the attention of many market participants. In an effort to maximize profits and minimize risks, traders often look for complex and automated trading strategies. An interesting strategy is the triangle hedging strategy, where three related currency pairs are used to create arbitrage opportunities [1]. This triangular arbitrage takes advantage of temporary exchange rate imbalances to generate risk-free profits. Manually implementing a triangular hedging strategy requires complex analysis and rapid response to market fluctuations [2].

Therefore, the use of trading robot technology or Expert Advisors (EAs) will be able to overcome this obstacle by automating trade execution according to predetermined parameters [3]. This research focuses on designing a trading robot and identifying correlated currency pairs that are suitable for a triangle hedging strategy. Choosing the right currency pair is important because strong correlation can increase the likelihood of success of this strategy [4]. Trading robots have become popular in Forex trading due to their ability to consistently execute trading strategies without human intervention. In the literature, trading robots are said to help eliminate the emotional factor in trading decision making, which is often the cause of losses [5].

Correlations between currency pairs can provide insight into how the price movements of one currency pair may affect other currency pairs in a triangle hedging strategy. According to research [6], a positive correlation between two currency pairs showed that their price movements were trending in the same direction, while a negative correlation showed that their price movements were in the opposite direction. Selecting negatively correlated currency pairs in a triangle hedging strategy can help minimize risks associated with market volatility. In this regard, it is important to analyze historical correlations between currency pairs before deciding which pair is suitable for a triangle hedging strategy [7]. This trading robot will be designed to automatically analyze market data based on the correlations between currency pairs and make instant trading decisions to maximize arbitrage opportunities.

Based on the background of the problem, the problem identification in this research is as follows:

1. The importance of accurately determining the correlation: how to identify accurate correlation between currency pairs involved in a triangle hedging strategy. Strong correlations can influence the success or failure of a strategy, and accuracy in measuring these correlations is critical to minimizing risk and maximizing potential profits.
2. Choose the appropriate algorithm: Trading robot design includes choosing the right algorithm for correlation analysis and trading decision making. The problem is how to choose the appropriate algorithm to ensure accuracy in analysis and execution efficiency.
3. Risk management: Although the triangle hedging strategy offers profit potential with limited risk, the risks are still primarily related to rapid market movements and trade execution errors. The problem that needs to be overcome is how to design a trading robot that can manage risks well and avoid errors.

Problem Formulation

Based on the above problem identification, the problem formulation in this study is as follows:

1. Design an algorithm capable of identifying and measuring the exact correlation between different currency pairs in the context of a triangular hedging strategy.
2. Algorithms suitable for analyzing correlations and identifying arbitrage opportunities in triangle hedging strategies.
3. Effective risk management mechanism in trading robots to minimize the risk of market fluctuations and trade execution errors.

2. RESEARCH METHOD

The operational objectives of this research are:

1. Collect currency pair data to identify currency pairs for correlation analysis to be used in the triangle hedging strategy.
2. Calculate the correlation between currency pairs using statistical methods. This correlation calculation aims to identify currency pairs with strong negative correlations.
3. Develop trading robot algorithms.
4. Testing with real-time data (forward testing).

The research method carried out is as follows:

1. Determine the conceptual framework: the study will begin by formulating the basic concepts of trading robots, triangle hedging strategies, and the importance of correlations between currency pairs in the context of forex trading.
2. Identify sources of data and information: the requested data includes historical data on the price movements of the currency pairs that will be used in the correlation analysis. The source of information comes from the trading platform.
3. Analyze the correlation between currency pairs.
4. Select currency pairs.
5. Developing trading robots: at this stage, a trading robot will be developed based on an algorithm that allows to implement a triangular hedging strategy on the selected currency pair.
6. Test and optimize.
7. Check with real-time data: the trading robot will be tested with current market data (real-time data). The robot's performance will be monitored to see if the results are as expected.

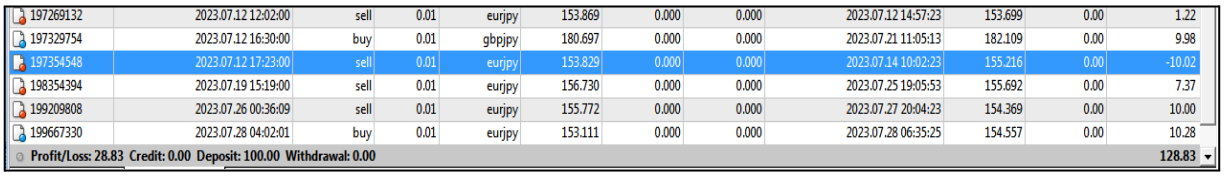
3. RESULT AND DISCUSSION

The research was carried out according to the planned research steps. The first stage is a literature study. The results of the literature study are as follows:

1. An explanation of the application of the Average Triangle Hedging strategy in the foreign exchange market and analyze its effectiveness in managing risks and potential returns [8].
2. Hedging strategies in the foreign exchange market and provide information related to the median triangle hedging concept [9].
3. Aspects of hedging in forex and the possibility of using the Mean Triangle Hedging method as part of a risk prevention strategy [10].
4. Arbitrage trading on forex trading strategies involving the combination of Middle Triangle Hedging method average to reduce arising transaction risks [11].
5. Risk analysis in the foreign exchange market and the concept of hedging strategies, provide perspective on risk and the need to protect against risk in an investment strategy [12].

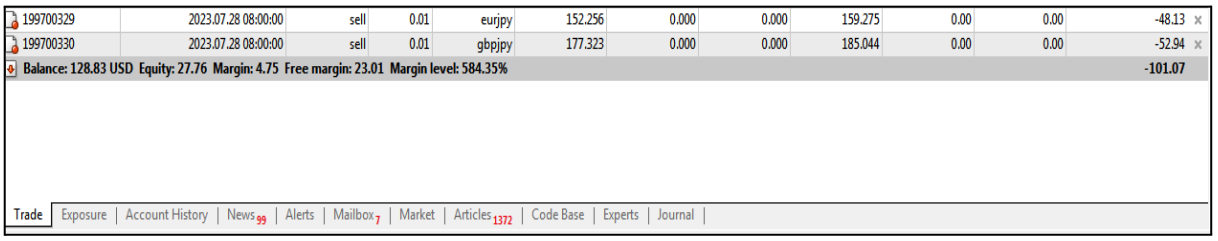
The analysis of these literature studies are in the form of the strengths and weaknesses of the Triangle Hedging strategy in relation to potential profits in markets with high volatility. The method has good profit potential in its application, but is accompanied by risks regarding certain market conditions. Literature analysis also explains the factors that influence the performance of the Triangle Hedging method. Factors that influence the performance of the method include market conditions, profit taking and loss prevention in ongoing transactions. Figure 1 and Figure

2 show these influencing factors, where in trending market conditions, risks can arise if methods of taking profits and preventing losses are not designed well.



197269132	2023.07.12 12:02:00	sell	0.01	eurjpy	153.869	0.000	0.000	2023.07.12 14:57:23	153.699	0.00	1.22
197329754	2023.07.12 16:30:00	buy	0.01	gbpjpy	180.697	0.000	0.000	2023.07.21 11:05:13	182.109	0.00	9.98
197354548	2023.07.12 17:23:00	sell	0.01	eurjpy	153.829	0.000	0.000	2023.07.14 10:02:23	155.216	0.00	-10.02
198354394	2023.07.19 15:19:00	sell	0.01	eurjpy	156.730	0.000	0.000	2023.07.25 19:05:53	155.692	0.00	7.37
199209808	2023.07.26 00:36:09	sell	0.01	eurjpy	155.772	0.000	0.000	2023.07.27 20:04:23	154.369	0.00	10.00
199667330	2023.07.28 04:02:01	buy	0.01	eurjpy	153.111	0.000	0.000	2023.07.28 06:35:25	154.557	0.00	10.28
Profit/Loss: 28.83 Credit: 0.00 Deposit: 100.00 Withdrawal: 0.00											128.83

Figure 1. Limited Profit Taking



199700329	2023.07.28 08:00:00	sell	0.01	eurjpy	152.256	0.000	0.000	159.275	0.00	0.00	-48.13
199700330	2023.07.28 08:00:00	sell	0.01	gbpjpy	177.323	0.000	0.000	185.044	0.00	0.00	-52.94
Balance: 128.83 USD Equity: 27.76 Margin: 4.75 Free margin: 23.01 Margin level: 584.35%											-101.07

Trade | Exposure | Account History | News 99 | Alerts | Mailbox 7 | Market | Articles 1372 | Code Base | Experts | Journal

Figure 2. Uncontrolled Loss Prevention

The design begins with designing the open and close position sending module, algorithm design, date and account delimiter design and user interface (UI) design. The algorithm allows the robot to track position. Figure 3 shows the UI designed for the trading robot.

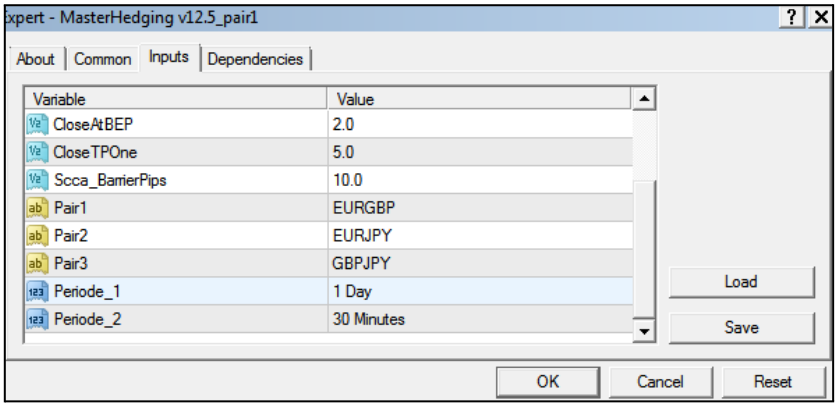


Figure 3. Robot UI

Testing of trading robot prototypes has also been carried out and is still being carried out in accordance with changes that occur. Test results statistics can be seen in Figure 4, Figure 5, Figure 6 and Figure 7. The accounts used in testing the trading robot are as follows:

1. 205680912,
2. 205680927,
3. 205681090,
4. 205681092.

The demo account statistical results in Figures 4 to Figure 7 show quite good results, i.e. demo account 1-gain 205.07% and drawdown 43.52%; demo account 2 – gain 91.57% and drawdown 61.42%; demo account 3 – gain 263.54% and drawdown 60.12%; as well as demo account 4 – 170% gain and drawdown 91.81%, but have a poor drawdown. Trading robots are able to open positions and close positions well. Likewise, robots are able to perform hedging to hedge open losing positions. The robot is also able to perform averaging to open positions so that it is hoped that it can cover the losses that arise.

Figure 4. Demo Account Statistics Results 1

Figure 5. Demo Account Statistics Results 2

Figure 6. Demo Account Statistics Results 3

Figure 7. Demo Account Statistics Results 4

4. CONCLUSIONS AND RECOMMENDATIONS

Some of the findings can be summarized as follows:

1. Exploiting currency pair correlation: the robot is able to identify and exploit correlated price movements, increasing profit opportunities. This can be seen from the forward test results which provide significant gain values from the four demo accounts (205.07%; 91.57%; 263.54% and 160.07%)
2. Risk management is still less effective: this robot has a well-integrated risk management system, which is expected to be able to protect capital and minimize potential losses. However, in the forward tests carried out, this management has not shown optimal results with a drawdown level above 60%.
3. Consistent results: testing shows that the robot has the potential to generate consistent profits over the long term, with a level of risk that still requires tighter control.

Thus, this research shows that the application of trading robots with a triangular hedging approach and currency pair correlation analysis can be one of the promising solutions for Forex traders to optimize trading results. However, the use of trading robots in practice still requires a deep understanding of the Forex market and careful monitoring to maximize its potential.

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