# The Quantitative Trading Strategy Based on CDP Indicators

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**Abstract:** Foreign exchange trading is a means of investment that becoming more and more popular all over the world. This strategy aims at the phenomenon that the persons who involved in foreign exchange follow the trend of investment blindly, relevant mathematical models are established instead of subjective judgment. It avoids the irrational investment decision-making of foreign exchange by accident incident according to large probability from historical data. This strategy uses CDP indicators to judge market conditions whose significance lies in predicting the next day's price. The CDP indicators is a way of envisioning enemy's combat which the five CDP values which can buy on the low price and sell on the high price. The Quantitative Trading Strategy Based on CDP indicators can largely avoid the risk and achieve profit benefit targets.

## 1. Introduction

Foreign exchange is the payment voucher for international settlement expressed in foreign currency. There is a certain conversion rate between different foreign currencies. However, the exchange rate of foreign exchange will not remain at a fixed value. A small number of people find that they can make profits by using the exchange rate difference of different periods in foreign exchange. With the passage of time, more and more people have joined the foreign exchange transaction, making the foreign exchange market gradually develop into another "stock market". The lure of high returns is accompanied by high risks. But foreign exchange transactions usually involve a variety of currency fluctuations. Many domestic investors are blindly deceived by its high profits, resulting in huge losses. In order to avoid this phenomenon, Project team decided to study a quantitative foreign exchange trading strategy based on CDP indicators to achieve simulated automatic trading. In the historical data, Project team simulate the transaction and statistics its profit and loss situation, improve and perfect the strategy and finally put it into practice.

## 2. Foreign exchange market

Quantitative trading [1] is a kind of trading method that uses computer technology to analyze huge historical data, and then through the analysis and summary of the data, defines and describes the operation mode of strategy. In a very clear way, formulates the trading procedure of strategy in line with the current market conditions, and then carries out automatic trading. This way of investment enables investors to keep track of the stock or foreign exchange market without having to keep an eye on the trend of the market every day, and carry out trading. In this way, the use of mathematical models instead of artificial subjective judgment can greatly reduce the impact of investors emotional fluctuations on judgment, thus avoiding investors blindly following the current investment decisions.

## 3. Knowledge of CDP Indicators

### 3.1 Basic Principles of CDP Indicators

CDP is a relatively rare index in the stock market. Unlike other indicators, it does not judge the trend of the market by means of the average line and trend. The basic strategic idea only needs to

rely on five values. AH (maximum), NH (near high), NL (near low), AL (minimum) CDP is a counter-trend system which judges and operates the market quotations of yesterday. It usually adopts the form of bought low and sold high. In the fluctuating market, it throws short from the highest point and absorbs more from the lowest point, so as to achieve high-selling and low-absorbing. When CDP encounters big fluctuations, it judges them according to the opening price. If the opening price of today's market is above or below the maximum value, then it is judged that this is the start of a big market, going long at the highest price and going short at the lowest price. This operation generally has a considerable profit, but at the same time it is prone to Short squeeze or Contrary to expectations. To prevent this phenomenon, it is necessary to set up a Reasonable stop-losses target-profit point. In theory, CDP can be applied to all kinds of markets, and it can adapt to all kinds of markets by constantly improving the optimization strategy and parameters. It is worth mentioning that it is especially suitable for the market which fluctuates frequently in one day.

It is worth mentioning that it is especially suitable for the market which fluctuates frequently in one day. CDP indicators are not set in the static dynamic counting column in many market technology analysis software, so today CDP indicators are still a strange indicator for many investors, but this does not mean that CDP technical indicators are not a profitable indicator. On the contrary, the rational use of CDP indicators can make investors profitable.

## 3.2 CDP Indicators

CDP indicators five values: AH (maximum), NH (near high), NL (near low), AL (minimum).The most important one is CDP. To calculate the value of CDP, Project team must first get the highest price of the previous day, expressed in H, the lowest price of the previous day, expressed in L, and the closing price of the previous day, expressed in C. The formula for calculating CDP is (the highest price on the previous day + the lowest price on the previous day + the closing price on the previous day*2)/4. That is CDP = (H+L+C*2)4. After calculating the CDP value, the AH and NH equivalents can be calculated. The concrete calculation formulas are as follows:

$$AH(maximum)= CDP+(H-L)$$

$$NH(near\ high)= CDP*2-L$$

$$AL(near\ low)= CDP-(H-L)$$

$$NL(minimum)= CDP*2-H$$

These five numbers can be used to judge the future market, using these five values to divide the high and low regions, and then use the high and low regions to judge the day's stock trend.

## 4. Quantitative Trading Strategy Based on CDP indicators

## 4.1 Strategic Trading Process

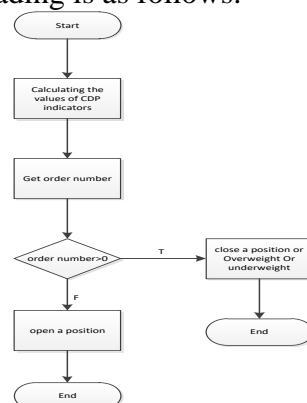A simple flow chart of strategic trading is as follows:



Figure 1 Simple Flow Chart of CDP Policy Transaction

After obtaining the five CDP-related indicators, the following processing is done in the quantification strategy: Firstly, Project team get the opening price of the day, and compare the opening price with the calculated CDP five indicators. If the opening price is above the AH value, take a position quickly is generally called going long; if the opening price is above the AL value, take a position quickly is called going short; Opening price is going short above NH under AH. when Opening price is higher than AL and lower than NL, going long. The above-mentioned trading process is called " hat-grabbing trade ". This means to quickly establish positions at the opening of the stock market or foreign exchange on the basis of CDP indicators. Then wait until the appropriate price clearance, in order to achieve the purpose of profitability. When the opening price of the day is between CDP and NH or between CDP and NL, it is usually only a wait-and-see, not a scalping transaction. At this time, Project team adopt the strategy of buy low or sell high, that is to say, open a position to buy when NH value is reached, or open a position and buy when NL value is close a position and sell. Above all, when the number of orders is 0, the purchase and sale operations of take a position are collectively referred to as close a position, and the simple flow chart of the exit transaction is as follows:
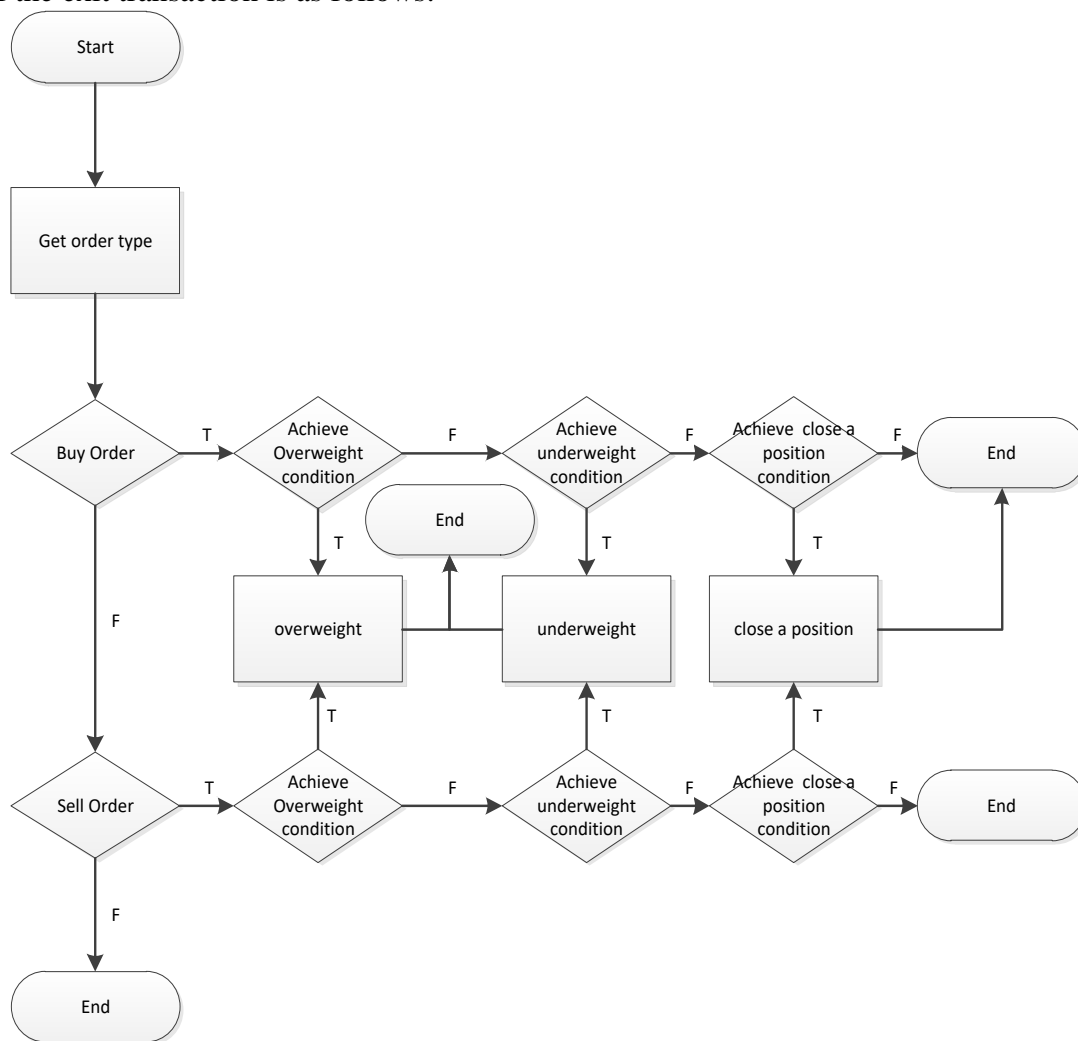


Figure 2 Simple Flow Chart of CDP Exit Trading.

When the number of orders for a position is greater than 0, find the right time to sell or buy-in. In the case of non- scalping transaction, when the order type is buy and the price is lower than AL, Carry out proper overweight (that is, new orders of the same type should be established). When the order type is sold and the price is higher than AH, the warehouse should be overweight. Whatever type of order, when the price reaches CDP, underweight (a certain number of orders will be thrown to profit). When the order type is buy and the price reaches NH, it close a position immediately (sell out all orders); when the order type is sell and the price reaches NL, it close a position immediately,

at this time, it can maximize the profit safest. For orders with entry conditions of "scalping", warehouse-opening orders under AH generally reach CDP value, while open a position orders under AL and NL generally reach CDP value. For the order above AH value and under NH value, it can be digested by the method of "eating less and eating more meals". "Eat less and eat more" specific methods are: first set up a more satisfactory profit point, profit after throwing out, and then open a position after throwing out, so that the cycle until the end of the rise or fall, with the most secure way to profit. The detailed flow charts of warehousing increase, overweight and underweight are as follows:
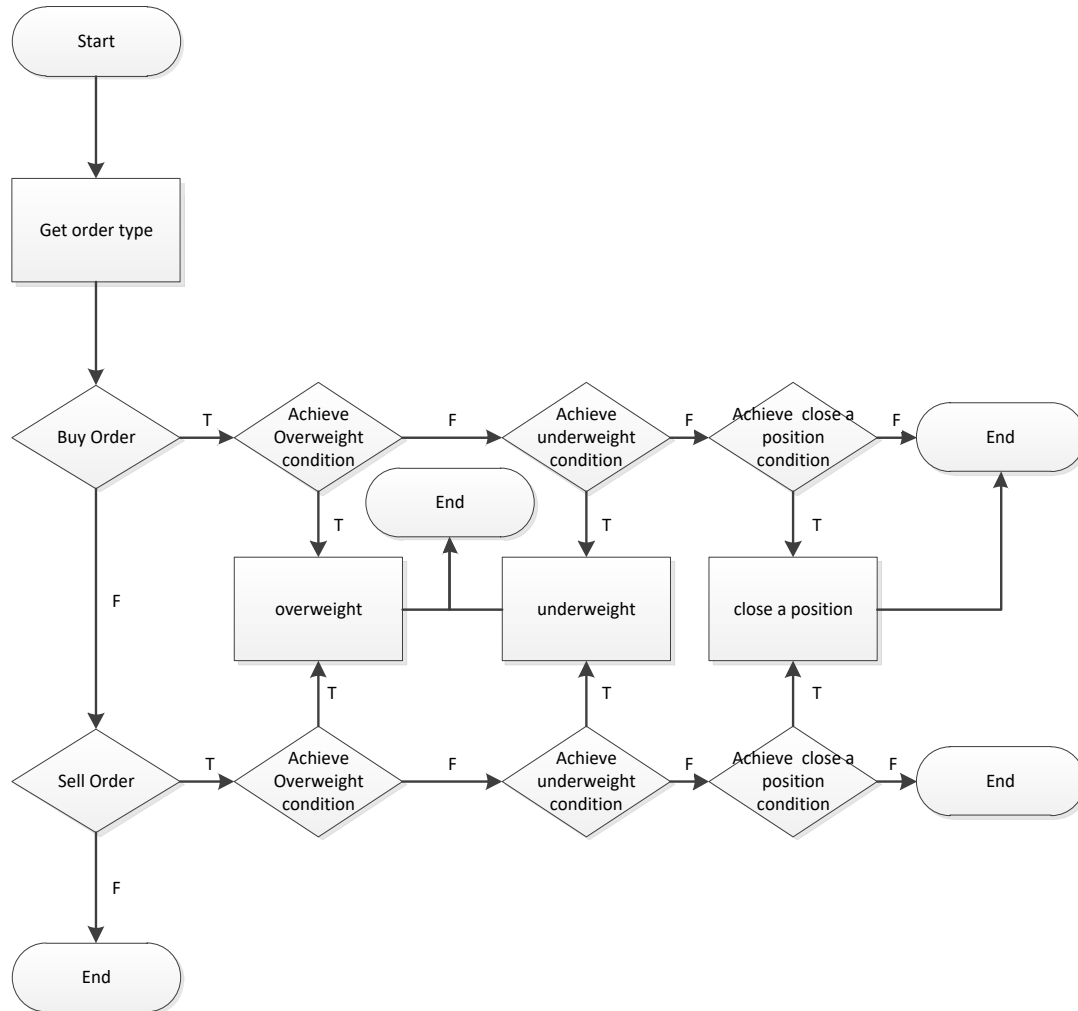


Figure 3 Flow charts of overweight, underweight and close a position in CDP.

It should be noted that for the stock exchange market which can not be directly sold and then replenished, the CDP should be used to guarantee that the position is half full, so as to simulate the buying and selling operation in the foreign exchange market.

## 4.2 Transaction Process Analysis

CDP value can be seen as the market average of the previous day. When the opening price of the day is between NL and AL, there is a certain difference between market price and CDP. Those who going short at CDP price yesterday have been able to make profits. Some people will buy at this time to underweight or close position, so as to make profits. Others who are ready to wait and see often, at this time the price is lower than the actual price of the person who open position yesterday, so they open position here in order to make more profits. In this way, the majority of the total number of these two groups of people joined the team of opening position, it is possible to push the price to CDP value or even near AH value. At this time, those who open position at the opening price should keep their positions until the appropriate time to sell them.

Under special circumstances, if the opening price is abnormally above the AH value, the market

outlook may be very good. There may be a huge wave of growth at that time. Project team should seize the time to open position and take position until the appropriate time sell, but at the same time, Project team should Setting reasonable stop-loss price in order to prevent the market and psychological expectations contrary and case huge losses.

In another special case, if the opening price of the day is abnormally below the AL value, the market outlook may be very frightening, and may usher in a huge drop. At this time, Project team should quickly sell the orders that have been profitable to ensure that Project team will not lose money, or Project team can open position at this price and buy to cover when appropriate. At the same time, Project team should Setting reasonable stop-loss price in order to prevent the market and psychological expectations contrary.

If there is no hat-snatching trade, it shows that the market situation is relatively stable, and there should be no greater fluctuation with the previous day. At this time, the market operating price should fluctuate between AH and AL. In this case, the strategy of buy low or sell high can perform well. Selling at NH value, buying at NL value, and underweight at CDP value can achieve short-term make profits accordingly.

However, market behavior is constrained by many factors, its changes are unpredictable at many ends, and there is no obvious rule to escape from the ups and downs, which is the so-called exception to everything. After the market opens, the situation that the low opens and then continues to fall or that the high opens and then continues to grow also occurs from time to time, so the risk can not be avoided. When the price trend is found to be contrary to the psychological expectations, it is necessary to stop-losses in time to reduce losses.

## 5. Simulation Experiment

### 5.1 Simulation Experiment

In order to verify the validity of this strategy, Project team are going to carry out a simulation experiment here. Because the trading rules of stock market are different from the idea of this strategy, Project team can't control the only variable completely. In order to ensure the rigor of this experiment, Project team choose the foreign exchange trading platform to carry out the simulation transaction with MetaTrader. Take a simulated account transaction process as an example, simulation experiment and comparative analysis.

### 5.2 Design Flow

In order to verify the validity of this strategy, Project team are going to carry out a simulation experiment here. Because the trading rules of stock market are different from the idea of this strategy, Project team can't control the only variable completely. In order to ensure the rigor of this experiment, Project team choose the foreign exchange trading platform to carry out the simulation transaction with MetaTrader. Take a simulated account transaction process as an example, simulation experiment and comparative analysis.

1) The initial capital of the account is $10,000.

2) target-profit point is 2000.

3) Trading varieties is US dollar to Japanese Yen.

4) Strategy operation cycle is one minute

Specifically, the formula for setting parameters of stop-losses condition in this experiment is as follows:

Sell order stop-losses

Sell Order Price + Point Value* Stop-Losses Points

Buy order stop-losses

Buy Order Price - Point Value* Stop-Losses Points

(Point value= number of trading * base point / current exchange rate)

## 5.3 Experimental Result
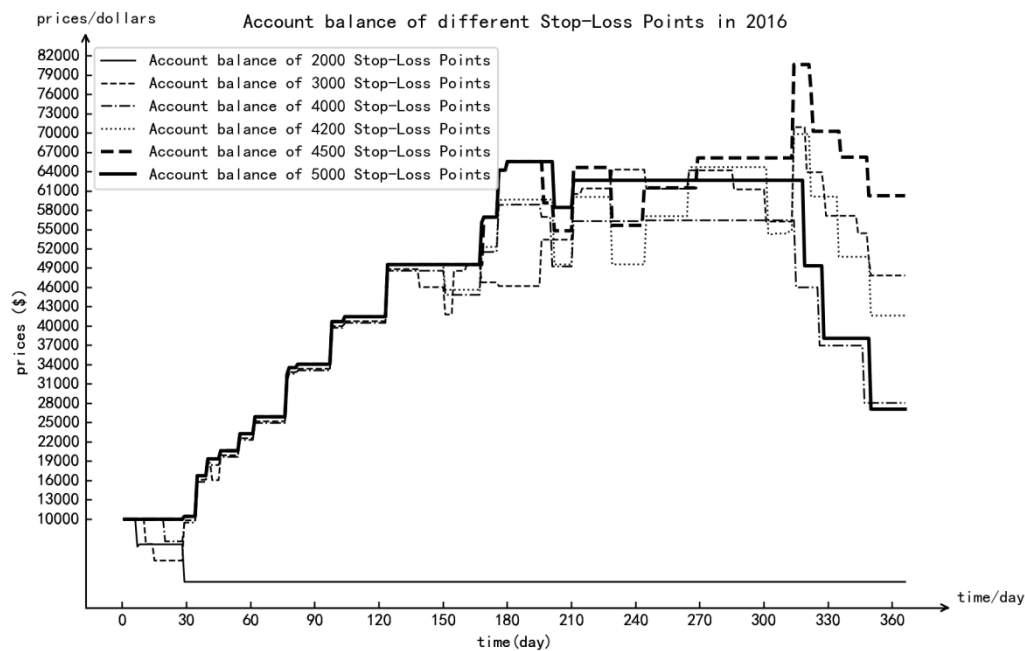
## 5.3.1 Same Year under Different Stop-Loss Point



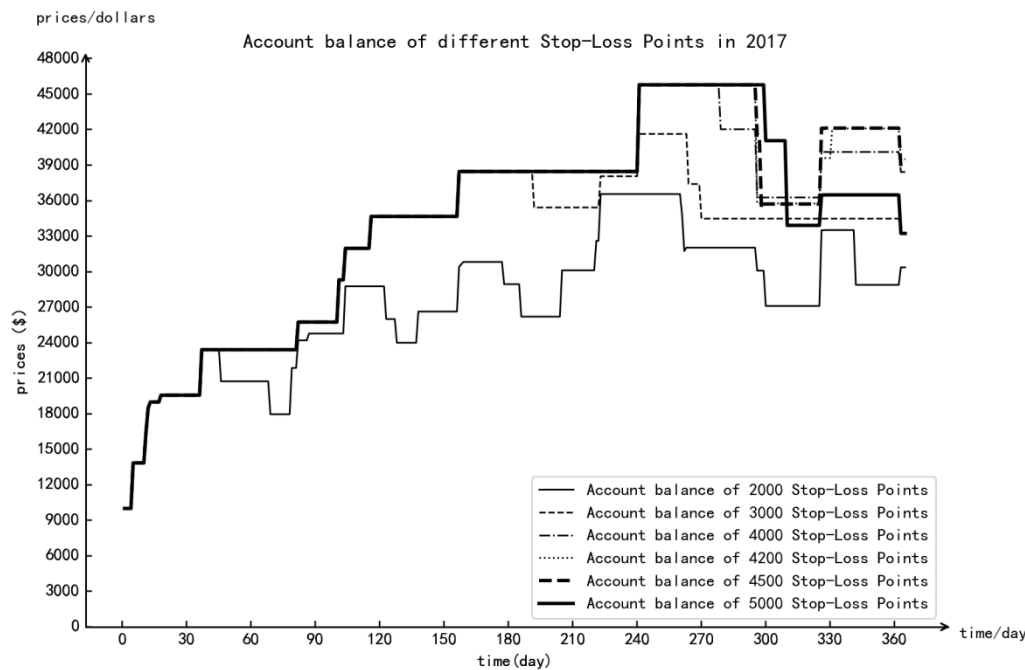Figure 4 Balance map of Stop Loss Points in 2016.



Figure 5 Balance map of Stop Loss Points in 2017.

prices/dollars

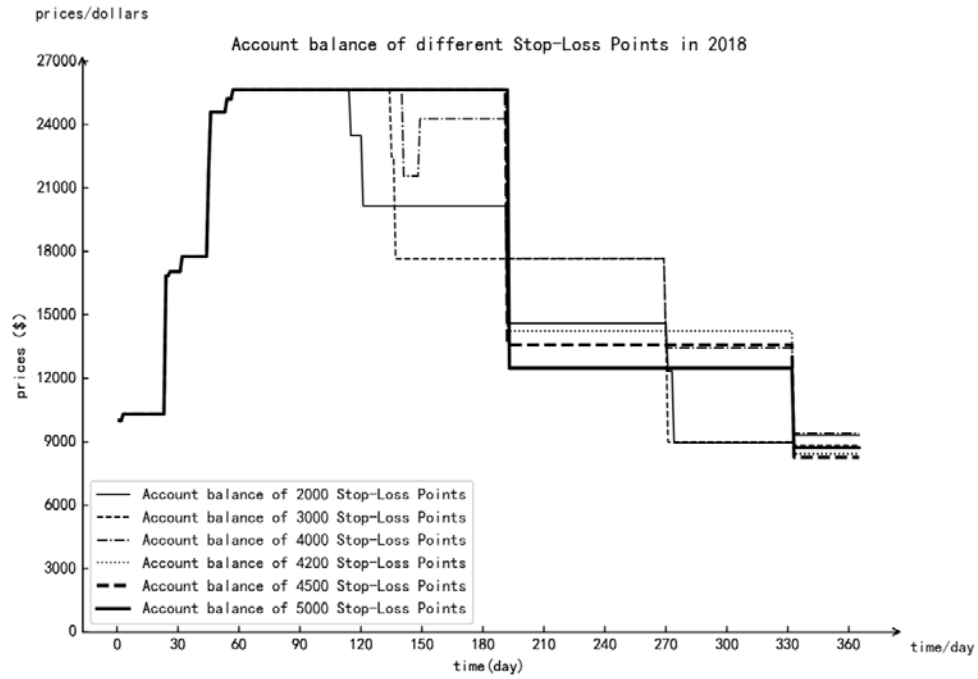Account balance of different Stop-Loss Points in 2018

Figure 6 Balance map of Stop Loss Points in 2018.

Table 1 Net Profit Statement of Stop Loss Points in 2016.

| Trading varieties | Particular year | Stop-loss point | Total number of orders | Profit odd | Account balance |
|---|---|---|---|---|---|
| USDJPY | 2016 | 2000 | 98 | 25 | -9723.58 |
| USDJPY | 2016 | 3000 | 845 | 620 | 38310.27 |
| USDJPY | 2016 | 4000 | 580 | 435 | 18076.24 |
| USDJPY | 2016 | 4200 | 800 | 640 | 33428.51 |
| USDJPY | 2016 | 4500 | 660 | 540 | 47283.27 |
| USDJPY | 2016 | 4600 | 630 | 520 | 36780.44 |
| USDJPY | 2016 | 5000 | 515 | 425 | 18709.39 |

Table 2 Net Profit Statement of Stop Loss Points in 2017.

| Trading varieties | Particular year | Stop-loss point | Total number of orders | Profit odd | Account balance |
|---|---|---|---|---|---|
| USDJPY | 2017 | 2000 | 515 | 360 | 20364.10 |
| USDJPY | 2017 | 3000 | 245 | 185 | 24477.65 |
| USDJPY | 2017 | 4000 | 275 | 235 | 30109.63 |
| USDJPY | 2017 | 4200 | 285 | 235 | 32099.58 |
| USDJPY | 2017 | 4500 | 330 | 280 | 32126.72 |
| USDJPY | 2017 | 4600 | 330 | 280 | 31916.37 |
| USDJPY | 2017 | 5000 | 295 | 245 | 26485.57 |

Table 3 Net Profit Statement of Stop Loss Points in 2018.

| Trading varieties | Particular year | Stop-loss point | Total number of orders | Profit odd | Account balance |
|---|---|---|---|---|---|
| USDJPY | 2018 | 2000 | 245 | 170 | -1049.79 |
| USDJPY | 2018 | 3000 | 220 | 160 | -1003.68 |
| USDJPY | 2018 | 4000 | 215 | 155 | 3428.49 |
| USDJPY | 2018 | 4200 | 195 | 145 | 5431.29 |
| USDJPY | 2018 | 4500 | 195 | 145 | 3583.74 |
| USDJPY | 2018 | 4600 | 195 | 145 | 3345.79 |
| USDJPY | 2018 | 5000 | 195 | 15 | 2475.35 |

## 5.3.2 Different Years under the Same Stop-Loss point

(Note: The last order of each year must be a loss because the system forcibly shuts down the order at the end of the year. It has no direct correlation with this strategy and can be neglected.)
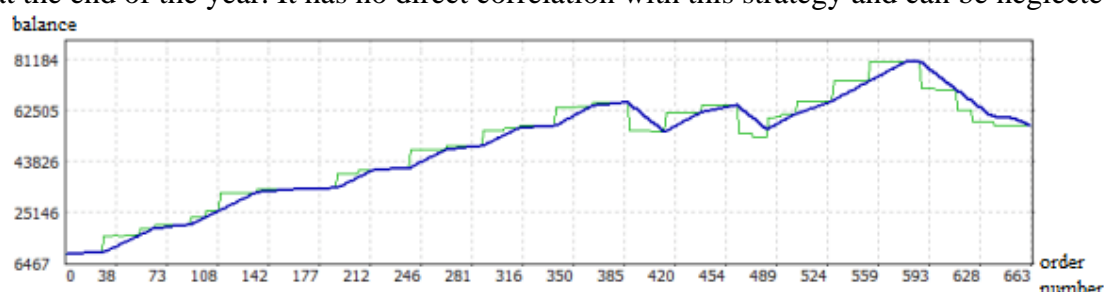


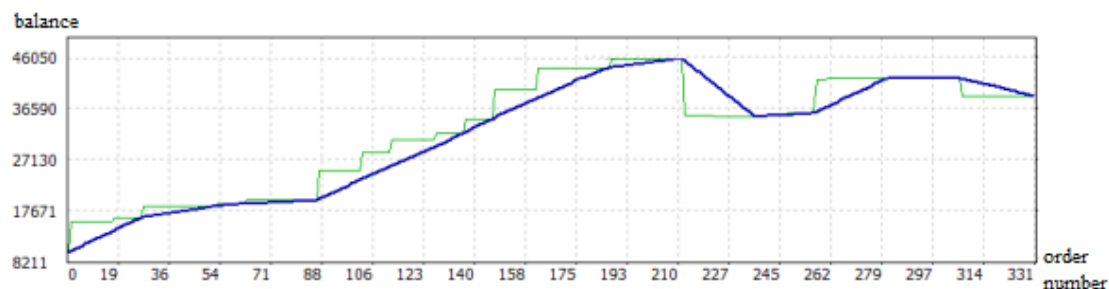Figure 7 Stop-Losses position of 4500 from 2016.
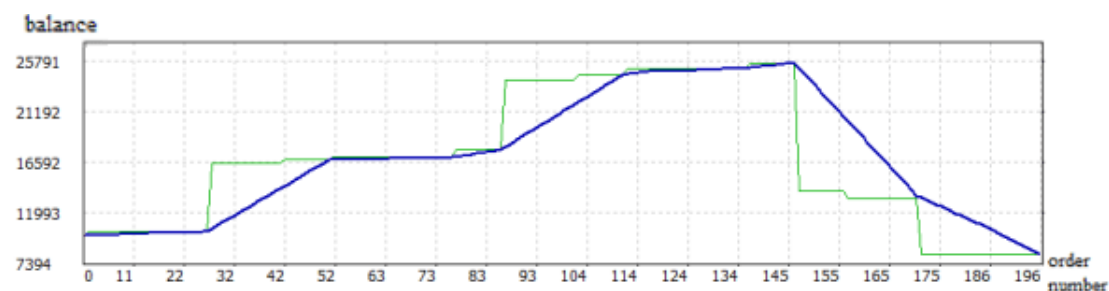


Figure 8 Stop-Losses position of 4500 from 2017.



Figure 9 Stop-Losses position of 4500 from 2018.

Table 4 Net Profit Statement for Different Years under the Same Stop-Loss Conditions.

| Trading varieties | Particular year | Stop-loss point | Total number of orders | Profit odd | Account balance |
|---|---|---|---|---|---|
| USDJPY | 2016 | 4500 | 660 | 540 | 50274.96 |
| USDJPY | 2017 | 4500 | 330 | 280 | 32126.72 |
| USDJPY | 2018 | 4500 | 195 | 145 | 3583.74 |

## 5.4 Comparative Analysis

Comparing tables 1, 2 and 3, it can be found that different stop-loss locations have a greater impact on the strategy. There is a big gap between 2000-point stop-loss and 5000-point stop-loss and 4200-point stop-loss and 4500-point-loss stop. The average difference was 16113.72. In the market, when the market fluctuations are frequent, setting lower stop-loss points will cause the original profit orders to be sold early, and when the psychological expected price is reached, no order can be profited, and Baibai suffers losses. When the market price shows a large one-way rise or decline, setting a higher stop loss may result in a huge loss if the market expectation is contrary to the strategic judgment expectation. For this strategy, choosing a suitable stop-loss position is very important.

The comparison of Table 4 shows that this strategy has a higher success rate in recent years. The highest profit is 50274.96, the lowest profit is 3583.74, and the profit margin is over 35%. The only significant loss occurred on July 11, 2018. The volatility of the market is shown in the following chart:



From the analysis of market fluctuations on the distance map, Project team can see that the market here is relatively considerable, showing a large upward trend, but this strategy has a big loss here. The proof strategy itself has its shortcomings, It need to continue to adjust strategic thinking. If Project team can make a correct judgment on such positive trend, more hidden orders can be excavated to achieve more profits.
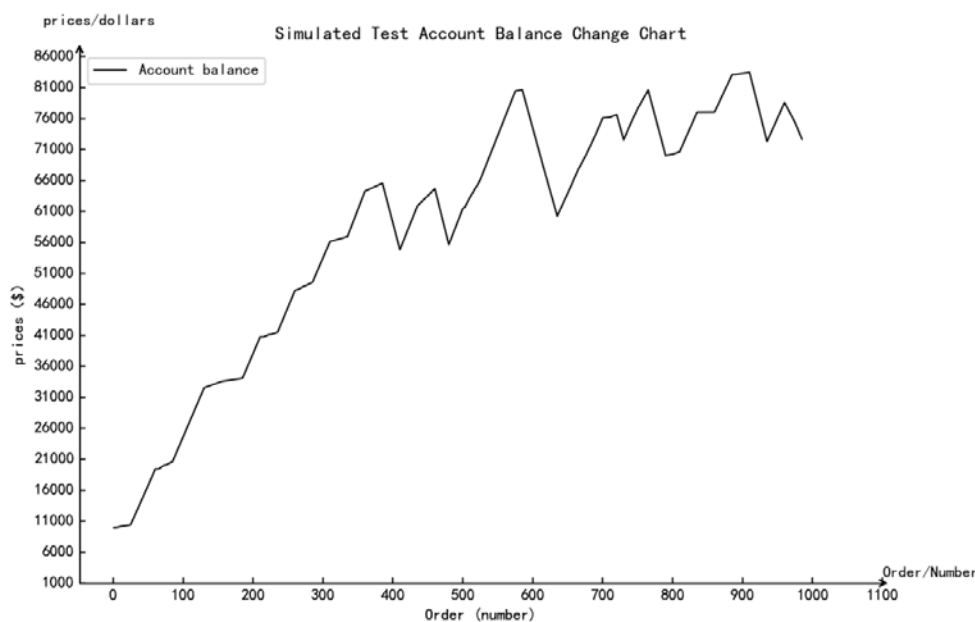
## 5.5 Experimental conclusion



Figure 10 Net asset graph that stop-losses position of 4500 from 2016 to 2018.

Table 5 Net gross assets table that stop-losses position of 4500 from 2016 to 2018.

| Trading varieties | Particular year | Stop-loss point | Total number of orders | Profit odd | Account balance |
|---|---|---|---|---|---|
| USDJPY | 2016-2018 | 4500 | 1185 | 965 | 40985.42 |

Figure 10 shows the total change of account balance of USDJPY stop-losses position of 4500 from 2015 to 2017. It can be seen that the benefit of this strategy in this experiment is relatively stable and considerable. In this experiment, the time variable has no significant impact on the experiment, and can maintain a steady upward trend. The size of stop-loss position has a vital impact on this strategy, so a large number of subsequent tests are needed to find a suitable stop-loss position to ensure that the strategy is in line with the stable operation of the market.

## 6. Conclusion

Quantitative trading strategy based on CDP index is feasible and effective. Quantitative trading strategies based on CDP indicators can effectively judge the future trend according to the five values of the previous day, allowing investors to obtain positive returns while obtaining higher returns on investment. By comparing the test of 2016-2018, Project team can see that some factors have no significant impact on investors' returns. From the simulation experiment, it is not difficult to see that the quantitative trading strategy based on CDP index has a good prospect in the foreign exchange market. The strategy is aimed at the dollar-yen foreign exchanges trading, and has a relatively stable profit in the simulation test of 2016-2018. Profit trading reached 81.73%, and total net profit reached 62651.07. However, the quantitative trading strategy is not omnipotent, or there is the possibility of loss. At present, the strategy model still has defects, and the total profit has not reached the peak yet. Further research and testing are needed to improve it.

## References

[1] Krauss C. Statistical arbitrage pairs trading strategies: review and outlook [J]. Journal of Economic Surveys, 2017, 31(2):33.

[2] Block Chain Small Real-time Transaction Strategy Based on DCPN [J]. Shewei, Liu Qi, Yang Xiaoyu. Engineering Science and Technology,2018(04)

[3] Multi-factor Quantitative Stock Selection Model and Timing Strategy [J].Wang Lichun, Liu Guang, Wang Qi. Journal of Northeast University of Finance and Economics,2018(05)

[4] Yang Shilin. Application of Multi-factor Strategy of Stock Based on Quantitative Broadening Investment Platform [D]. Zhejiang University, 2018.