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LUND UNIVERSITY FINANCE SOCIETY EST 1991

TRADING & QUANTITATIVE RESEARCH REPORT

DOUBLE TOPS & DOUBLE BOTTOMS

*Analysing the occurrence and after effect of
reversal chart patterns*

In collaboration with:

CENTURY
ANALYTICS

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2020-04-09

INTRODUCTION & THEORY

Introduction

In the field of technical analysis there are a variety of patterns, indicators, and other technical traits which together are combined to take positions. In combination with historical prices and other relevant market statistics, the technical analysis attempts to make different forecasts and predict price movement. The aim with this report is to analyze and measure whether there is any distinct and unequivocal movement or non-randomness regarding the price of exchanges on the forex market, after the occurrence of either one of the two reversal chart patterns *double tops* and *double bottoms*. Since the publication of *Technical Analysis of Stock Trends* in 1948 (Robert D. Edwards and John Magee), chart patterns have successively become an eminent and widely used component within the financial field of technical analysis. By combining the forces of supply and demand, chart patterns contribute to a concrete and broad view of previously made buy and sell positions and can in turn give a guidance of who is actually winning the battle between buyers and sellers. These are in other words providing information which can be used to make forecasts. Reversal chart patterns are formations which indicate a change of the ongoing trend. The specific reversal chart patterns which will be analyzed in this report are double tops and double bottoms, which indicate an upward respectively a downward trend. A double top is signaling on two different moments where the market has not been able to break a certain resistance level, upwards. On the opposite a double bottom signals two moments for a case where the market has not been able to break a level, downwards. The double top or bottom are thus representing two failed attempts of breaking certain resistance levels. In general, reversal chart patterns are solely not used to take a position, these are only indicators for potential forecasts. The post outcome will not always be identical to the theoretical, thus leaving space for analyzing the non-expected outcome.

Theory

The analysed technical patterns in this report are double tops and double bottoms. These patterns are so-called reversal chart patterns, which indicate a reversed course compared to the ongoing one. The double top indicates a downward trend, formed during an ongoing positive trend, which is characterized by its M-shaped pattern, thus motivating a short trade.

Contrary to the double top, the double bottom indicates an upward trend, formed during an ongoing negative trend, which is characterized by its W-shaped pattern. The most suitable position per definition, would be a long trade. The definition of a double bottoms is precisely the opposite to the double top.

The pattern definition and the criterias for both double top and double bottom were given by Century Analytics and can be divided into two main steps, separating the double formation as follows:

1. First top or bottom

- Must be a *local extrema* (local maxima or local minima) during the *first seven hours* before formation, as a minimum.
- The price movement during the 7-hour period, from the minimum low price to first top, must assume a value of *positive or negative 25 pips*, as a minimum.
- Must be a *local extrema* (local maxima or local minima) during the *first four hours* after formation, as a minimum.

2. Second top or bottom

- Must be formed *4 hours* after the first top or bottom, as a minimum, hence the last criteria in *step 1*.
- Must be formed maximum *48 hours* after the first top.
- Must reach at least *2 pips* below the first top in the timeframe of 4 hours to 48 hours after the first top.
- If the price reaches 2 pips below the first top, but not breaking it, within the first 4 hours, a double top is formed when the price breaks the first top between a minimum of 4 hours and a maximum of 48 hours after the first top.

Exhibit 1 is showing the idea behind how a double top is formed with a second top reaching the value of the first, between 4 and 48 hours after the first top.

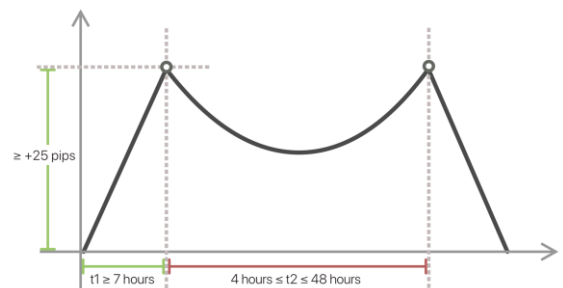


Exhibit 1: Simplified visualization of a double top formation.

Visualization

In *Exhibit 2*, a visualization of a double top is shown, which has been identified by the developed algorithm. As earlier mentioned, this reversal pattern is indicating an upcoming downward (bearish) trend, which partly is illustrated by the red-marked area in the graph.



Exhibit 2: Candlestick plot of an identified double top of a selection of the EUR/USD currency pair.

METHOD & STRATEGIES

Data

The data used in this paper was historical data received from Century analytics and is consisting of OHCL-values for the EUR/USD exchange rate traded between 2018-07-30 and 2019-02-01 in 5-minute intervals.

Something to keep in mind regarding the data is that since it is a currency pair we are looking at, we will have missing data during the weekends due to the forex market opening hours. The forex market is closed from 9:00 pm GMT on Fridays until 9:00 pm GMT on Sundays, and therefore, these times have been removed from our data set.

Method

The algorithm is initiated by detecting the first part of the chart reversal pattern - either the first top or the first bottom, which is performed in two main steps. First, it identifies a potential first top or bottom which must acquire a maximum or minimum value within a time-span of a minimum of 7 hours, reviewing it backwards. Furthermore, it also needs to be a local extrema for 4 following hours of the potential double top or bottom. In addition to the previously mentioned criteria, the unit of change in the exchange rate of the currency pair is calculated. This change has to be at least 25 pips from lowest point to the actual first local extrema.

When all potential first extremas have been identified, these data points are gathered and used as a prerequisite for the algorithm detecting the second part of the chart reversal pattern.

The existence of a second top or bottom is then defining whether a double top or double bottom has been found or not. In order for the second top to be valid, it has to arise at least four hours after the first top and can be met in one of two ways. The first way is if the exchange rate is breaking the threshold of 2 pips below the first top between 4 and 48 hours after the first top arose. The second way this could occur is if, within the first four hours, the exchange rate is breaking the threshold of 2 pips below the first top, but per definition of the first top, not breaking the first top. In order to then qualify as a double top, the exchange rate has to break the value of the first top in a time between 4 and 48 hours after the first top.

All in all, this takes only a couple of minutes to run for all the data tested for this project. Therefore, by only looking at the current time and the prior 48 hours this would be highly plausible to do during live trading to figure out whether to take a trade or not.

Strategy

In order to measure if any unequivocal movement or non-randomness occurs regarding the price, after the analysed reversal chart patterns, four strategies, defined by Century Analytics, were applied. The majority of the strategies were based on preset, static target and stop-loss levels. Since the theory of a double top is the exact inverse of a double bottom, only the strategy of the double bottom will be focused on as these are the most intuitive and the conventional way of trading. However, the strategies for a double top would work in the same way only a short position is taken when the second top is reached and sold at the desired target or stop-loss values. Basically, the strategies involve opening a position when a double top or double bottom occurs and close the trade when either target or stop-loss is reached. When a double bottom is found, a long position is opened by buying at the second bottom value.

After the formation of the second extrema one of two things will happen; either the price trend is moving up- or downwards and depending on what price level will be reached in the upcoming time, the stop-loss or target value will close the position.

Strategy 1:

For this strategy, the stop-loss value is 10 pip below the second bottom value, and the target value 10 pip above the second bottom value.

Strategy 2:

Here, the stop-loss value is 20 pip below the second bottom value.

Strategy 3:

For this strategy, the stop-loss is one pip below the highest value between the first and the second bottom, and the target 20 pip above the second bottom. For a double top, the stop-loss is the opposite, meaning one pip above the lowest point between the first and second top, and the target 20 pip below the second top.

Strategy 4:

For the last strategy, the stop-loss value was 20 pip below the second top and the target 80 pip above the second top.

Implementation

These strategies were tested by running each strategy for all the double tops as well as for all the double bottoms, found by previously described algorithm. Every trade was then saved into a CSV-file, showing the time when either the stop-loss or target was reached, the actual values of either the target or stop-loss as well as the result, win rate and win/loss ratio for the strategy, to later be used to analyze and display the different strategies' outcomes and how well they performed.

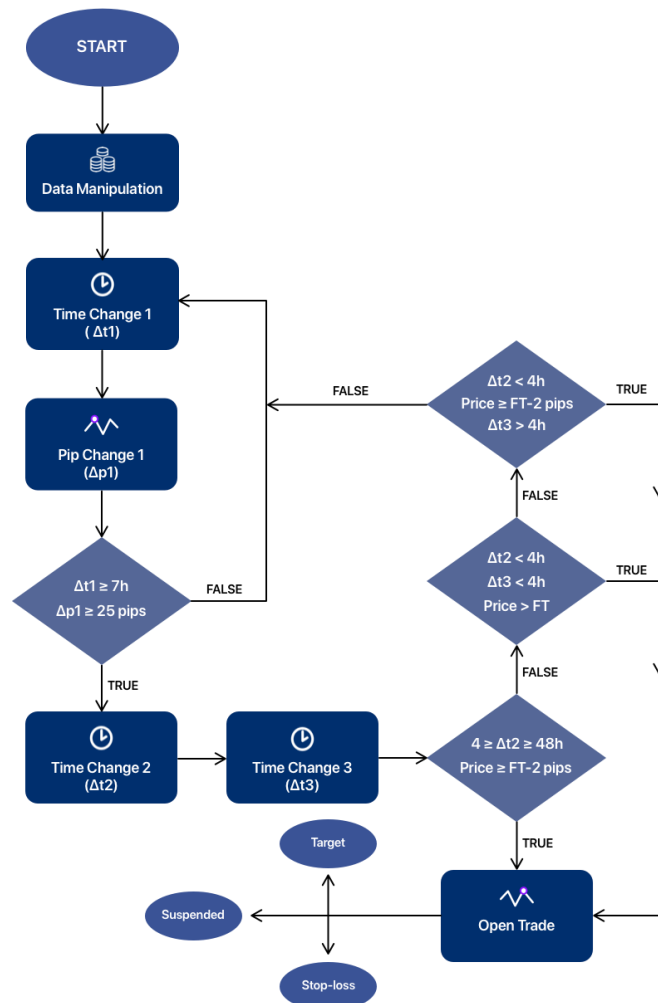


Exhibit 3: Simplified flow chart of the algorithm.

RESULT

Double bottom

This section presents the results for the algorithm testing all four strategies for all identified double bottoms. In total, 23 double bottoms were identified.

	Strategy 1	Strategy 2	Strategy 3	Strategy 4
Expected value of return	0.0000404	-0.0002413	0.0000457	-0.0193598
Standard deviation of return	0.0014467	0.0023036	0.0011797	0.0036565
Win rate*	52.17%	43.48%	78.26%	13.04%
Win/loss ratio**	1.091	0.7692	3.6	0.15
Average return	0.00329%	-0.0203%	0.0040%	-0.0729%
Result	0.0757%	-0.4661%	0.09%	-1.68%

Exhibit 4: Results of all four strategy implementations for double bottoms.

Double tops

This section presents the results for the algorithm testing all four strategies for all identified double tops. In total, 93 double tops were identified.

	Strategy 1	Strategy 2	Strategy 3	Strategy 4
Expected value of return	-0.0002733	-0.0000782	-0.0000504	-0.0266194
Standard deviation of return	0.0015489	0.0024664	0.0031879	0.0044134
Win rate*	48.39%	51.61%	40.86%	20,65%
Win/loss ratio**	0.9375	1.066	0.691	0.2603
Average return	-0.0235%	-0.0070%	-0.0050%	-0.0256%
Result	-2.19%	-0.65%	-0.46%	-2.38%

Exhibit 5: Results of all four strategy implementations for double bottoms.

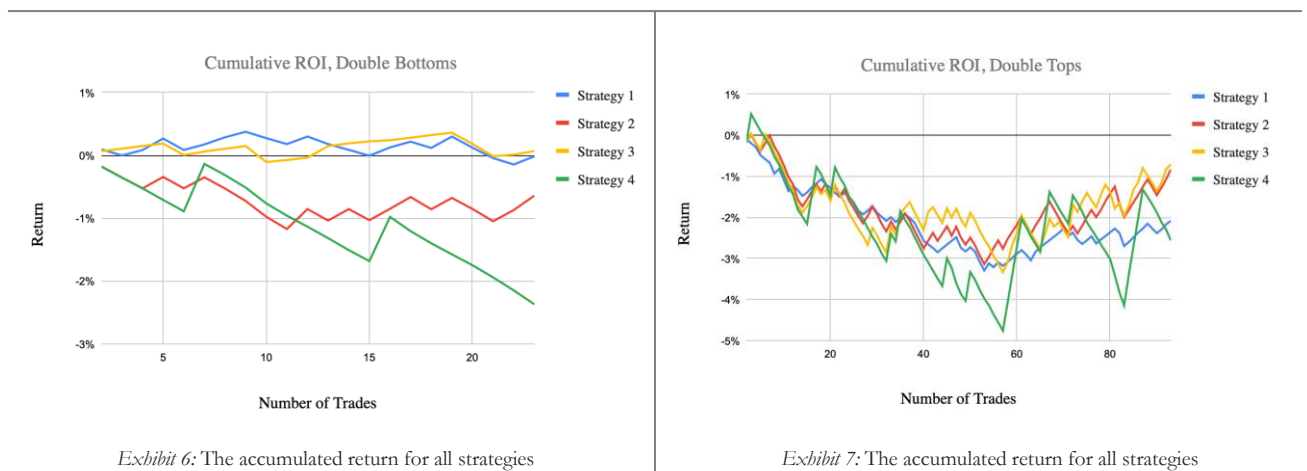


Exhibit 6: The accumulated return for all strategies applied on double bottoms.

Exhibit 7: The accumulated return for all strategies applied on double tops.

*Win rate = Number of wins / Total Trades
 **Win/loss ratio = Number of wins / Number of losses

DISCUSSION & CONCLUSION

By looking at the results from the strategies used when either a double top or double bottom is found, it becomes clear that this approach is not a useful method to find any significant trends between two currency pairs, and when to take a trade or not. Out of the eight scenarios presented above, only two would give a positive expected return on investment. However, due to the high variance of the return it becomes hard to draw any solid and thorough conclusions.

The theory behind double tops and double bottoms claim that the market is, after a double top, subject to a downward trend, a bearish market, whilst a market after the occurrence of a double bottom is in a prolonged period of increasing prices, bullish. The strategies have been implemented to utilize this expected behaviour, but as it can be seen, neither of them performed in a good manner. The strategies giving the best result has an average of not higher than 0.004% per trade, while the strategies performing the worst was giving an average return of -0.07% per trade. This makes it quite obvious that looking solely on the formation of double tops or double bottoms is not a viable option when it comes to take a position in the forex market.

In relation to the other strategies, Strategy 3 for double bottoms performed outstandingly the best. Although we believe that there was insufficient data to actually draw any acceptable and reasonable conclusions, this specific strategy outcome can be discussed. The reason for this being that the third strategy was the only one which included a trailing target, in the sense that it was directly dependent on the maximum value (+1 pip) between the two bottoms. The strategy delivered a win rate of 78.26% while the wins were 3.6 times higher than the losses (win-loss ratio). This can be compared with the second best strategy (Strategy 1) which delivered a win rate of 52.17% and a win rate of 1.091. Without drawing any incautious conclusions, this strategy could potentially be showing a distinct correlation between the highest price within a double bottom and the return on investment, if traded accordingly. This leaves scope for further examination.

Something to keep in mind that due to the short time frame, this analysis did not find a lot of interesting points, only 93 double tops and 23 double bottoms. To be able to draw any conclusions with high certainty these numbers should both be a lot higher which they most likely would be when running this algorithm with more data over a longer time period. Moreover, by looking at the cumulative return on investment for the double tops, they have a consistent downward trend for the first half of the trades, but after around 50 trades, the trend shifts to an upward trend for all the strategies. This raises some interesting ideas that the behaviour of the market during the analysed time period could have an irregular appearance from how it usually behaves. This point to future studies when this algorithm is tested for a longer time period as well as for different currency pairs to get even more test data.

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Other

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