**COMP3183 Financial Computing**

Group Project

On

New Trading Strategy

Using

MA & [Bollinger](javascript:;) [Band](javascript:;)s

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# ABSTRACT

This project is to build a new strategy that can find the trading signal based on the combination of Moving Average and Bollinger Band. In the whole project, we establish a strategy that include functions like sell, buy, stop profit, stop loss. The purpose is to avoid the risk in the trading, especially for the new investor. All the operation in the trading must keep in a low risk, or the operation won’t be done. The project is fit for those investor who chase the high returns in a short period, the suggesting period is during 3 months to 6 months. We update the strategy after discussion and move some idea into these strategy which can help it perform better.

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# Introduction

## 1.1 Background

Technical analysis refers to the summation of methods that take market behavior as the research object, judge the market trend and follow the cyclical change of the trend to make trading decisions of stocks and all financial derivatives. Technical analysis suggests that market behavior embraces all information, prices fluctuate in a trend, and history repeats itself. Since the emergence of the stock market, people began to explore the theory of stock investment, and formed a variety of theoretical results. As a matter of fact, technical analysis is the Stock Investment Theory, which was founded more than 100 years ago during the period of ignorance. It is a series of so-called "laws" about Stock market fluctuations that are gradually summarized by astute investors through long-term observation and accumulation of experience on Stock price changes.

## 1.2 Literature Review

In technical analysis, the market cost principle is very important, it is the basis of the trend, the trend in the market can be maintained, because the market cost driving force. For example, in an upward trend, the cost of the market is gradually rising, while in a downward trend, the cost of the market is gradually moving down. The change in cost led to the continuation of the trend. Moving averages represent changes in the average cost of the market over a period of time. Moving average is an important technical analysis basis. Gold cross diagram refers to the stock market index of the short-term line up through the intersection of the long-term line, known as the gold cross, on the contrary, the index of the short-term line down through the intersection of the long-term line, known as the dead fork.

Bollinger Band is a very practical technical indicator designed according to the principle of standard deviation in statistics. It is composed of three track lines, of which the upper and lower two lines can be regarded as the pressure line and the support line of price respectively, and a price average line is between the two lines. Generally, the price line travels in the belt interval composed of the upper and lower tracks, and automatically adjusts the position of the track with the change of price. When the band Narrows, drastic price fluctuations are likely to occur. If the high and low points cross the edge line of the band and immediately return to the wave band, there will be a backlash.

# 2 Methodology

## 2.1 Proposed Trading Strategy #1 (3MA BOLL CROSS)

3MA BOLL CROSS trading strategy is based on three Moving Average lines and [Bollinger](javascript:;) Bands which can generate buy and sell signals. After a lot of data analysis and parameter adjustment, 3MA BOLL CROSS trading strategy is able to trade in some products within 3 months period and achieve a profitability ratio of up to 684%. In the process of strategy attempt, Xavi originally used 4 MA lines for trading, but the effect was not good. Because there are very few signals that trigger a trade. After adding [Bollinger](javascript:;) Bands, the profit rate gradually stabilized but it was difficult to make profit. So, it subtracted one MA. Finally, it can be trading in the market by using one MA as a benchmark, two MA as a reference and in a [Bollinger](javascript:;) Bands.

The ticket will be bought When the ticket receive signal that MA1 higher than MA3 and MA2, the latest lowest price not higher than the Bollinger down line and the latest highest price not lower than MA3. Sell situation is similar but not opposite, the ticket will be sold When the ticket receive signal that MA1 lower than MA3 and MA2, the latest highest price not lower than the Bollinger up line and the latest highest price not higher than MA3.

## 2.2 Proposed Trading Strategy #2 (Low risk with Bollinger and MA)

Trading strategy is based on Moving Average and Bollinger Band. After finished the previous lab tasks, I find the Fibonacci Moving Average is more accurate comparing with others. At the same time, the system combine 2 MA line is not that accurate sometimes, so I choose 3 lines together to get the better result. The MA1 is MA (13), MA2 is MA (34), MA3 is MA (55). As I mentioned before, the project is mean to reduce the risk, so I also add Bollinger Band as another indicator. The upper bound and lower bound is from 2 stand deviation far. The center line is MA (13). The main idea of the strategy is that:

* When MA1>MA2 & MA1>MA3, judge the price if is higher than the upper bound of Bollinger Band. If is higher, sell all.
* When MA1<MA2 & MA1<MA3, judge the price if is lower than the lower bound of Bollinger Band. If is lower, buy.
* When the all profit is over 100%, sell them all to avoid the risk
* When the loss is over 15%, stop loss as soon as possible.
* In this project, I use iMA( ) functions. If the shift is one (the last digit in the function is 1), it means the value of yesterday. If the shift is zero (the last digit in the function is 0), it means the value of today. In my program, a MA use this concept to judge whether the cross occur. Because the cross happens when the price of a MA raises up, another one decreases and the smaller one will be larger, the larger one will be the smaller one.

## 2.3 Proposed Trading Strategy #3 (Strategy Name)

MA is a very important Trading indicators in trading strategy analysis, when you use three different MA in one strategy, it will have some rules: If the three moving averages converge at one point, divergence upward is bullish, unilateral rise, divergence downward is bearish, unilateral fall. And I think is a very good signal, also I combine two more MA with large range to look at the long-term trend, at last I use Bollinger band to decide if is a good chance to order buy or is a good chance to order sell. And my proposed trading strategy is 3 MA and 2 large range MA and combine Bollinger band. When the MA is on the rise in large period time, and the MA in small period turns upward, is a buy signal, and if the MA in large period time is falling and the MA in small period turns down. Bollinger band is used to mark sure the trend is right.

# 3 System Implementation

## 3.1 System Architecture

# Init ()

In order to reach our propose, we design a unique Architecture for our EA system, we define 3 different Moving averages and a Bollinger Band for our Trading Strategy, each Moving average have different parameter.

**TotalSellOrders () <MaxBuyOrders**

**TotalBuyOrders () <MaxBuyOrders**

Flag=0x1 and in the trading time

Flag=0x4 and in the trading time

**↓**

**Get the Ask**

**TRADETicket()**

**Get the Ticket**

**Order Sell**

**↓**

**Get the Bid**

**TRADETicket()**

**Get the Ticket**

**Order Buy**

## Buy/Sell condition ()

Repetition this function every 1 hour

# Start ()

When we start our program, first we run though the Init( ) function for program initialization, after we finish program initialization, the program begin to run in Start( ) and continuously looping to monitoring until the program end, on the top of the Start( ) function has two if ( ) function to give the buy order or sell order or do nothing, the judgement function is Buysellcondition ( ) function to judge the order accounting to our own trading strategy, If it satisfy the buy condition in the trading strategy ,it with get a buy flag as a signal and let the program start Orderbuy( ), as same as the Ordersell( ). Before execute each order operation it will check if is already have an order.

## 3.2 MT4 Platform and Trading Products

MT4 Platform:

**MTRADING Meta Trading 4**

Trading Products:

**NZDCAD,** [**New Zealand Dollar Canadian Dollar**](https://www.baidu.com/link?url=qhRUGbJGTQMYd2nl0ZbEisMwwUUK9Q4Qt9TwcYn4CYOB5b0m7bSmw6e1DDsOHVWrFCQ-V6QlDDaSxVEJV6DJE_&wd=&eqid=8853193d0002edda000000065c114d91)

**EURUSD, Euro vs US Dollar**

**GBPUSD, Great Britain Pound vs US Dollar**

**USDCHF, US Dollar vs Swiss Franc**

**CADCHF, Canadian Dollar vs Swiss Franc**

In this report we just show the trading Products we already tested, those worked very well, it actually has many trading products we didn’t tested.

# 4 System Comparison and Analysis

## 4.1 System Performance Comparison

Before our group makes a strategy, it is a good way to discuss how to implement our marketing strategy by combining Bollinger band and MA. So, we implemented our strategy with three different combinations of brindle and MA.

**Strategy #1**: Xavi use 3 line of MAs and Bollinger bands to check the buy or sell signal. The ticket will be bought When the ticket receive signal that MA1 higher than MA3 and MA2, the latest lowest price not higher than the Bollinger down line and the latest highest price not lower than MA3. Sell situation is similar but not opposite, the ticket will be sold When the ticket receive signal that MA1 lower than MA3 and MA2, the latest highest price not lower than the Bollinger up line and the latest highest price not higher than MA3.

**Strategy #1** The best parameter after historical testing is following:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Products | MA1 | MA2 | MA3 | BB period | Return |
| EURUSD | 5 | 8 | 70 | 15 | 6.84 |
| NZDCAD | 5 | 7 | 16 | 15 | 5.03 |
| GBPUSD | 5 | 7 | 50 | 12 | 4.70 |
| USDCHF | 5 | 7 | 25 | 20 | 4.26 |
| CADCHF | 5 | 15 | 30 | 15 | 3.24 |
| GBPNZD | 5 | 7 | 19 | 15 | 2.41 |
| GBPAUD | 5 | 9 | 30 | 15 | 2.24 |
| GBPCHF | 5 | 15 | 25 | 10 | 2.09 |
| AUDCAD | 5 | 20 | 60 | 5 | 1.52 |
| AUDNZD | 23 | 34 | 44 | 15 | 1.50 |

**Strategy #2**: Jerry use 3 line of Mas and Bollinger bands. The most different thing between Xavi and Jerry is Jerry’ s MA have 2 situations- the previous point and the present point. In this project, if the shift is one (the last digit in the function is 1), it means the value of yesterday. If the shift is zero (the last digit in the function is 0), it means the value of today. In my program, a MA use this concept to judge whether the cross occur. Because the cross happens when the price of a MA raises up, another one decreases and the smaller one will be larger, the larger one will be the smaller one. When MA1>MA2 & MA1>MA3, judge the price if is higher than the upper bound of Bollinger Band. If is higher, sell all. When MA1<MA2 & MA1<MA3, judge the price if is lower than the lower bound of Bollinger Band. If is lower, buy. When the all profit is over 100%, sell them all to avoid the risk. When the loss is over 15%, stop loss as soon as possible.

**Strategy #2** The best parameter after historical testing is following:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Name | MA1 | MA2 | MA3 | Center line of BOLLINGER | EARNING | PROFIT |
| AUDNZD | 13 | 21 | 89 | 13 | 100/0 | 3491 |
| NZDJPY | 13 | 34 | 55 | 89 | 100/0 | 1123 |
| GBPUSD | 5 | 8 | 89 | 13 | 100/0 | 2959 |
| EURCAD | 13 | 55 | 89 | 13 | 2.18 | 2387 |
| USDSGD | 5 | 34 | 55 | 13 | 100/0 | 1819 |
| GBPAUD | 13 | 34 | 55 | 55 | 100/0 | 2970 |
| EURCHF | 5 | 8 | 13 | 13 | 100/0 | 4471 |
| NZDUSD | 5 | 8 | 34 | 13 | 100/0 | 5461 |
| EURJPY | 21 | 34 | 55 | 13 | 1.7 | 2396 |
| USDCAD | 21 | 34 | 55 | 55 | 100/0 | 3548 |

**Strategy #3**: Mark use 3 MA and Bollinger lines. If the three moving averages converge at one point, divergence upward is bullish, unilateral rise, divergence downward is bearish, unilateral fall. And Mark thinks is a very good signal, also he combines two more MA with large range to look at the long-term trend, at last he uses Bollinger band to decide if is a good chance to order buy or is a good chance to order sell. And his proposed trading strategy is 3 MA and 2 large range MA and combine Bollinger band. When the MA is on the rise in large period time, and the MA in small period turns upward, is a buy signal, and if the MA in large period time is falling and the MA in small period turns down. Bollinger band is used to mark sure the trend is right.

**Strategy #3** The best parameter after historical testing is following:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Name | MA1 | MA2 | MA3 | LMA1 | LMA2 | BB period | BB variance | return |
| EURUSD | 10 | 10 | 10 | 53 | 53 | 1.2 | 1.8 | 1.98 |
| GBPUSD | 45 | 45 | 45 | 85 | 85 | 1.2 | 1.8 | 2.81 |
| USDCAD | 45 | 45 | 45 | 80 | 80 | 1.2 | 1.8 | 4.81 |
| AUDUSD | 15 | 15 | 20 | 75 | 75 | 1.2 | 1.8 | 5.12 |
| AUDNZD | 25 | 25 | 25 | 70 | 70 | 1.2 | 1.8 | 0.71 |
| EURCHF | 45 | 5 | 45 | 77 | 77 | 1.2 | 1.8 | 3.27 |
| EURJPY | 45 | 45 | 5 | 80 | 80 | 1.2 | 1.8 | 6.96 |
| USDJPY | 10 | 10 | 10 | 85 | 85 | 1.2 | 1.8 | 1.43 |
| GBPNZD | 35 | 5 | 35 | 76 | 76 | 1.2 | 1.8 | 3.22 |
| NZDJPY | 10 | 20 | 10 | 65 | 65 | 1.2 | 1.8 | 4.37 |

All three of our strategies use the two indicators of moving average and Bollinger band, and we believe that the combination of moving average and Bollinger bands can bring us more stable returns and lower risks.

## 4.2 Performance Analysis

In the performance respect, each of our three EA strategies has its own strengths and weaknesses. The common disadvantage is that they only for a few products but not the most products in the market. Many products cannot use this EA or lose money in the last. Some products only get profit and no losses or only losses and no profit. **Strategy #2** make few orders in 6 months trading days although it give a highest return. Not suitable for short-term trading. **Strategy #1** have the large fluctuations when the trading time lengthen over more than 3 months. Comparedwith the others strategy, **Strategy #3** structure lack of a complete structure, functional deficiency. 3 strategies can get a stable profit in a particular period after analyze the program by adjusting the parameter. Buy and Sell signal appear strictly because of our algorithm all make a strict condition.

## 4.3 Recommendation

Compared with 3 strategy by real-time tests data, we found that the **strategy#1** has the best performance because the return is effective, more stable and logical. In the short-tern trading, strategy#1 can get 14.3 return in 2 months at best and get 6.84 return in 3 months during the 15th, August ,2018 to 15th, November, 2018.So, our group decide to recommend strategy#1 be the group project.

# 5 Conclusion and Future Works

In our project, we use 3 MA lines and Bollinger Band to get the trading signal and we set stop loss and profit to avoid risk. It is a trading strategy which have ability to make profit and put the loss into minimal. However, it still has something to modify and improve. First, the test is not that perfect due to the small sample size. We will create the analytical program and test the product as much as possible because it can help us get better parameters. Then we will apply these parameters into current strategy to improve its reliability. Second, we may add some useful indicator to enhance our ability of avoiding risks because every indicator has their own weakness and blind point. The more we choose, the lower risk we will have. In addition, we may update our algorithm, because it is a little bit complicated to check and modify. From the aspect of programming, it is not a good program in fact.

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