Technical Indicators Efficacy in Forex Market, for the pairs EUR/USD and GBP/USD

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Abstract

Technical analysis is considered one of the oldest methods used to evaluate the financial market. The technical analysis distinguishes itself from the others by predicting possible market movements through studying past prices and patterns, using a graphical representation of data as the primary tool. This analysis has aroused considerable interest in the literature, with several articles favoring or against its effectiveness in forecasting the market. In this work, it is evaluated the performance of four indicators (Exponential Moving Average, Convergence/Divergence of Moving Averages, Relative Strength Index, and Bollinger Bands) when applied to the Foreign Exchange market in two of the main currency pairs currently traded (EUR/USD and GBP/USD). To improve the consistency of the study, the time frame was extended for the last five years. All opening and closing price values were obtained from a 30-minute interval. This work aims to understand if, by combining different indicators, the strategies have more efficient and profitable results than using a single indicator. Through the signals obtained from the tested indicators, buy and sell orders were simulated using a predefined capital to assess each indicator’s overall performance and profitability and their respective combinations. After extensive backtesting simulations, we show that using specific indicators combination as a financial strategy can be more effective and profitable than just a single indicator, although significantly fewer trades are triggered. The computational results presented shows that the efficiency of the combined strategies depends on the year’s market trend. Downtrend markets as experienced in 2016, 2018, and 2019, drastically reducing the strategies’ efficiency. While In 2020 and 2017, the market was in an uptrend, so the majority of the strategies have shown excellent efficiency.

Keywords: Foreign Exchange Market, Technical Analysis, Technical Indicators, Trading

1. Introduction

Due to the fast computational growth, electronic trading has become more accessible through different platforms, allowing an average person to access financial markets that generally would be only for financial companies. As a result, academic research in Foreign Exchange (Forex) trading has experienced exponential growth over the past few years. The Forex market is recognized as the largest and most liquid financial market in the world. The average daily transactions in this market are now estimated at around $5.3 trillion per day, according to the Bank for International Settlements triennial report of 2016 [5][6].

The primordial objective of this work is to investigate the efficiency of the technical analysis in the Forex market forecasting. By running extensive backtesting simulations, we expect to achieve the followings:

• Study the efficiency the four most popular technical indicators: EMA, MACD, RSI, and BB. The backtesting is performed through a financial package, Quantstrat, in R language.

• Understand if by combining different indicators, the strategies have more efficient and profitable results than using a single indicator.

• Run the strategies with different initial capitals.

2. Background

Forex analysis has been important to forecast future trading patterns, generate profit and minimize losses. However, forecasting in the Forex market is essential to consider several external factors, like economic events, political issues, tragedies (example: pandemic), social media posts, and many others. Therefore, several analysis methods are applied to Forex, but the most famous are the Random Walk Analysis, the Fundamental analysis, and
the Technical Analysis.

2.1. Technical Analysis
The technical analysis is the systematic evaluation of price, volume, breadth, and open interest for price forecasting [2]. In other words, technical analysis is the study of historical price movements to predict future price movements [1]. There are currently many technical analysis types and different ways to analyze current and past price and volume data into trading decisions. However, technical analysts traditionally employed two types of analysis to distinguish trends and identify reversals: charting and mechanical (or indicator) methods. Charting is the older method and consists of graphing the history of prices to predict future patterns from past patterns. Charting has the disadvantage of being a subjective system that requires the skills and judgment of the analyst to find and interpret patterns. On the other hand, technical indicators laid down on the analyst discipline and consistency to apply trading rules based on present and past exchange rates [3].

2.2. Technical Indicators
Technical indicators are mathematical tools applied to price time series data to produce another time-series data. Technical indicators are divided into three main groups: trend, momentum, and volatility. [4].

- **Trend Indicators** - this type of indicator helps to determine the overall direction of the trend and identify trending market conditions. They are based on an average value of the price, which helps trade in the trend direction. The most popular trend indicators are simple moving average, exponential moving average, average directional index.

- **Momentum Indicators** - this type of indicator provides information about the trend strength. The indicator’s value commonly oscillates around a baseline within a predefined range, but the oscillation may not be bounded within a range. As the momentum measures the rate of change, a swift increase in price will result in solid momentum, while small price changes will correspond to a weak momentum. The most popular momentum indicators are the RSI and MACD.

- **Volatility Indicators** - this type of indicator considers the price changes in a certain period. Knowing the volatility can help a trader make a profit with more volatile securities, and during higher volatility, a trend can be easily formed. Less volatility can indicate a low possibility for a trader have profitable trading because the price does not change. The most popular volatility indicators are Bollinger Bands, average directional movement, average true range.

3. Implementation
This study aimed to combine different technical indicators and analyze what combination could be more profitable for the currency pairs EUR/USD and GBP/USD. The indicators and their combination were tested for all year of 2020 in a 30 minutes timeframe. For backtesting the indicators strategies in R, we use the Quantstrat package. Typically, the last step of the backtesting is to perform in a live trade, but it would not be done since it is not intended to profit from this study.

<table>
<thead>
<tr>
<th>Currencies</th>
<th>EUR/USD</th>
<th>GBP/USD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Capital</td>
<td>$10,000</td>
<td>$100,000</td>
</tr>
<tr>
<td>Positions</td>
<td>Long</td>
<td>Short</td>
</tr>
<tr>
<td>Price applied</td>
<td>Close price</td>
<td></td>
</tr>
<tr>
<td>Time-frame</td>
<td>30min</td>
<td></td>
</tr>
<tr>
<td>Historical data</td>
<td>from 01/01/2020 to 01/01/2021</td>
<td></td>
</tr>
<tr>
<td>Indicators</td>
<td>EMA</td>
<td>MACD</td>
</tr>
</tbody>
</table>

In Table 1 shows the variables used for the technical trading. In this study, we did not apply any leverage or margin into considerations.

3.1. Quantstrat Package
Quantstrat package is a library for creating signal-based trading systems in a more simple code. Quantstrat provides the base functions to build our strategies, add indicators and signals, and create the rules of when to buy and sell. The first step is to define the instrument, which in this case is the two pairs of currencies. The second step identifies the indicators for testing the strategies. The third step specifies the buy and sells signals, followed by the fourth step where rules correspond to orders when entering or exit the market. The final step is to apply the strategy and analyze the results of the defined strategy.

4. Results
Figure 1 shows two charts with the profit factor results for all the strategies. It is possible to observe that the single indicators strategies had a profit factor lower than the combined strategies, which were less profitable than the strategies with two indicators combined.

Analyzing each currency pair individually, we can say that for the EUR/USD currency pair, the single indicator strategy with a high-profit factor was the EMA 50-day and EMA 12-day period crossover,
followed by the RSI strategy with wide parameters. While for the combined strategies, the most profitable was the combination of the EMA 12-day period and EMA 50-day period crossover with the MACD, with a profit factor of 1.78.

The most profitable single indicator strategy in the GBP/USD currency pair was the EMA 12-day period and 50-day period crossover. The preferred strategy was the only single strategy with profit, once all the other ones had a profit factor below one. Also, as for the EUR/USD pair, the combined strategy was the most profitable to GBP/USD was the EMA 12-day period and 50-day period crossover with MACD.

For both currency pairs, the strategy with the worst results was the Bollinger Bands, and the combined strategy was the EMA 12-day period and 26-day period crossover with MACD. Comparing the results with an initial capital of $100,000, they overcome the lower capital results. The less profitable strategies with the higher capital had a profit factor above or equal to 1. The reason why the profit factor increased is that the losses could be supported with higher capital. However, the results were very similar with both capitals in terms of strategy efficacy.

We can conclude that the combined indicators strategies were more profitable than the single strategies, which was the study’s objective. Although the number of trades realized was far less with the combined indicators, the strategies were more robust, leading to more winner trades and fewer losses.

4.1. Results for the EMA (12-50) crossover & MACD

The combined strategy with EMA 12-day and 50-day period crossover with MACD stood out from the others, with better results in both currencies. To evaluate the strategy efficiency, we re-ran the strategy for the last 5 years. However, the results were inconclusive. There were years when the strategy was successful, such as 2020 and 2017, but there were also years with negative results, as shown in Table 2.

Table 2: Profit Factor for EMA(12-50) AND MACD strategy for the last 5 years

<table>
<thead>
<tr>
<th></th>
<th>EUR/USD</th>
<th>GBP/USD</th>
</tr>
</thead>
<tbody>
<tr>
<td>2020</td>
<td>1.70</td>
<td>2.44</td>
</tr>
<tr>
<td>2019</td>
<td>0.43</td>
<td>1.15</td>
</tr>
<tr>
<td>2018</td>
<td>0.90</td>
<td>0.73</td>
</tr>
<tr>
<td>2017</td>
<td>2.63</td>
<td>2.48</td>
</tr>
<tr>
<td>2016</td>
<td>0.71</td>
<td>0.30</td>
</tr>
</tbody>
</table>

To understand the granularity effect on the strategy results, we ran the strategy using a shorter timeframe of 15 minutes. Still, there was no significant difference in the results obtained. These inconclusive results led us to analyze all the strategies for the last 5 years as well.

4.2. Results for the last 5 years

Once more, the results were inconclusive, there were good years, like 2020 and 2017, but the rest of the years had bad strategy performances. The EMA 12-day and 50-day period crossover with the MACD remained the best strategy, followed by the combined strategy of RSI (80-20) with the BB. There were combined strategies that had never triggered trades in all the 5 years tested, which was the case of the EMA (all parameters) crossover with the RSI (all parameters), the EMA (all parameters) crossover with the BB, the MACD with the RSI (all parameters), and the MACD with the BB. Comparing the results of 2020 and 2017, the latter year had better performance results than the former. In 2017 the profit factor was higher in almost all the strategies than in 2020. The worst years, 2016 and 2018, practically didn’t have any good strategy performance, with the profit below one.
5. Conclusions
There is no correct answer about which analysis is better for predicting the Forex market, and each one has its pros and cons. Regarding technical analysis, more specifically to technical indicators, it is possible to have good results with the right strategies; however, it is not reliable to beat the market in the long run. It is essential to consider other factors that may influence the market, such as macroeconomic aspects, news, understanding market behavior better, and making more well-informed decisions.

In the end, this work brings the following conclusions:

1. As purposed in the objectives, combining different indicators is more profitable than using a single indicator. Combining the EMA double crossover with the MACD and the RSI with the BB showed efficient strategies with good results.

2. The market trends it is related to the efficiency of the technical indicators. It was noticed that the years that we achieved better results, 2017 and 2020, were the years when the market was in uptrend. On the other hand, the years less profitable, 2016, 2018, and 2019 were when the market was on a downtrend.

3. Trading in the Forex market with initial higher capital has better outcomes than lower capital. A possible reason is that with higher capital, it is possible to recover from massive drawdowns.

The Forex market, as already stated, it is very unpredictable. Due to that, relay only in the technical analysis and therefore in technical indicators is unreliable. When the market is in a downtrend, it is not easy to have good results only with the technical indicators. Having good knowledge about economic factors and combining them with technical analysis tools is a more trustworthy strategy.

References