Win Rate Evaluation of Fibonacci Retracement in Gold (XAUUSD) Market Trading

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Chapter 1
Introduction

1.1 Background

Many individuals engage in trading without a comprehensive understanding of financial markets, often likened to gambling due to insufficient knowledge, which influences decision making and increases the likelihood of losses; Of 324 traders observed over a twenty-month period, only 36% made a profit, while 64% made a loss (Jordan & Diltz, 2003). For instance, the largest recorded profit during this period was approximately $197,000, whereas the largest loss reached -$748,000.

This paper utilizes binomial testing in order to compare the winning rate of trading by Fibonacci retracement strategy against break-even profits. The data that will be used in this research is a trading journal of short-term trading in the foreign exchange (Forex) market with focus on the XAUUSD pair conducted from January 6, 2023 to March 24, 2023. Therefore, the title of this research is "Win Rate Evaluation of Fibonacci Retracement in Gold Market Trading Using Statistical Thinking."

1.2 Purpose of Research

This research evaluates the effectiveness of Fibonacci retracement trading strategies using a 79-day record of short-term XAUUSD trading by comparing the win rate of trades using Fibonacci retracement strategy against the win rate where the expected profit is zero.

Chapter 2

Literature Review

2.1 Technical Analysis

Technical analysis is a tool to make investing or trading decisions based on the study of past market data, primarily its price and volume. It is based on basic economic theory, which assumes that prices are determined solely by the interaction between demand and supply, with all factors influencing demand already incorporated into. Technical analysis relies on the assumption that prices tend to move in trends, with shifts in demand and supply that can cause trend reversals, such that it can be detected in charts that are likely to repeat themselves (Kirkpatrick & Dahlquist, 2007, p. 3).

2.2 Trends

Trends describe a direction in prices that lasts long enough to be recognized and still be playable. An uptrend happens when prices reach higher peaks and higher troughs. A downtrend is the opposite, while a sideways trend occurs when the prices stay in a range without an underlying upward or downward movement (Kirkpatrick & Dahlquist, 2007, p. 11).

2.2 Support and Resistance

When prices are rising but then reverse downward, the highest point or peak is called a “resistance level”. It may be caused when sellers (supply) become as aggresive and powerful as the buyers (demand) and stop the rise in prices. When the sellers become more powerful, the prices drop from the peak. A “support level” is the opposite of a resistance level as it is a single trough with opposite reasoning (Kirkpatrick & Dahlquist, 2007, p. 222).

2.3 Stop Orders

Stop orders, or “stops”, are used to enter or exit a position. A stop order is placed in advance to purchase the security once its price has risen or declined to a certain point. Entry stop is placed to purchase a security once its price has reached a determined level. Exit stop is a stop order placed either to protect capital from further losses (called “protective stops”), or to secure the profits gained from a trade from deterioration (called “trailing stops”. It is a defensive strategy that is essential to employ during a trade (Kirkpatrick & Dahlquist, 2007, p. 256).

2.4 Retracements

Retracements are reversals that occur within the principal trend. In an uptrend, it always begins with a resistance point and ends with a support point. In this case, the amount of retracement can be measured as a percentage of the earlier rising amount. A retracement is an opportunity for a trader to follow a trend; it provides a low enough level to get potential profit, while also being close enough to identify a protective stop. Some sources have hypothesized that prices tend to retrace a certain percentage, while Kirkpatrick & Dahlquist (2007) argue the opposing hypothesis (Kirkpatrick & Dahlquist, 2007, pp. 238, 240).

2.5 Fibonacci Sequences

The Fibonacci sequence begins 1, 1, 2, 3, 5, 8, 13, 21, …,

In mathematical terms, Fibonacci numbers u_n are defined by the recurrence relation:

$u_1 = 0,\ u_2 = 1,\ u_n = u_{n-1} + u_{n-2}\ (n >= 3)$ (Ball, 2003, pp. 153-154)

2.5.1 Fibonacci Retracement Level

Fibonacci retracement levels are a set of percentages derived from the golden ratio: 0%, 23.6%, 38.2%, 50%, 61.8%, 78.6%, and 100%. (Ramlall, 2016, p.166)

Any given term of Fibonacci sequence is about 1.618 times the preceding number and 0.618 times the following number. Fibonacci retracement levels can be expressed using these numbers (Ramlall, 2016, p.171):

$\frac{1}{1.618} \times 100\% = 61.8\%$

$(1 - 0.618) \times 100\% = 38.2\%$

$(0.618)(0.618) \times 100\% = 38.2\%$

$\sqrt{0.618} \times 100\% = 78.6\%$

$(0.618 - 0.382) \times 100\% = 23.6\%$

2.6 Risk/Return Ratio

The return represents the difference between the entry price and the price objective, while the risk is the difference between the entry price and the protective stop. Using these values, a risk/return ratio can be calculated. Kirkpatrick & Dahlquist (2007) suggests that the risk/return ratio should be set to a minimum of one to three, as anything

less than that increases the likelihood to lose an unacceptable amount of money. (Kirkpatrick & Dahlquist, 2007, pp. 265).

2.7 XAUUSD Pair

XAU/USD is a financial symbol representing the price of gold (XAU) in US dollars (USD). It's a currency pair used in forex and commodities trading that indicates how many US dollars are required to purchase one troy ounce of gold.

2.8 Binomial Test

Binomial test is a statistical hypothesis test used to compare the probability p in a normal distribution B(n, p). There are two outcomes from the binomial test: the assumed hypothesis, H_0 (null hypothesis), is accepted, or it is rejected and H_1 (alternative hypothesis) is used instead.

In a one-tailed test, with p_0 be the proposed value of probability,

H_1: $p > p_0$ or H_1: $p < p_0$(Hypothesis is rejected).

If the likelihood of the experiment result to occur assuming the null hypothesis is true is less than the significance level, the null hypothesis (H_0) is rejected. A significant level is a threshold typically set to be either 10%, 5%, or 1% depending on the situation used (Attwood et al., 2019, pp. 113-119).

Chapter 3

Data and Methodology

3.1 Experimental Controls

Controlled variables are applied to maintain focus and simplify the research.

a) Profit is set constant to $200 and loss is set constant to -$100.
b) Entry stop is placed at the 78.6% Fibonacci retracement level.
c) Protective stop is placed at the 100% Fibonacci retracement level.
d) Trailing stop is placed at a relative point where the amount of profit is taken at a 1:2 risk/return ratio.
e) Significance level is set at 5% as it is the most commonly used threshold.

3.2 Hypothesis

Prices tend to retrace at the 76.8% Fibonacci retracement levels, such that the winning rate increases until a considerable expected profit is made, hence

H_1: $p > p_0$, where p_0 is set to a value such that the expected profit is 0.

3.3 Raw Data

Date	Status	Profit / Loss ($)
1/23/2023, 09:13 AM	Closed	200
1/20/2023, 08:36 PM	Closed	-100
1/20/2023, 02:52 PM	Closed	-100
1/19/2023, 12:38 AM	Closed	201.15
1/18/2023, 12:46 AM	Closed	-100
1/13/2023, 12:34 AM	Closed	-100
1/12/2023, 09:33 AM	Closed	-100
1/11/2023, 03:36 AM	Closed	199.5
1/10/2023, 11:56 PM	Closed	200.45
1/10/2023, 11:47 PM	Closed	200.45
1/10/2023, 11:46 PM	Closed	200.45
1/9/2023, 09:02 PM	Closed	200.45

1/6/2023, 07:03 AM	Closed	200.21
2/3/2023, 12:24 AM	Closed	-100
1/25/2023, 08:59 PM	Closed	200.25
1/23/2023, 11:21 PM	Closed	-100
3/24/2023, 02:28 AM	Closed	199.24
3/23/2023, 11:27 PM	Closed	199.24
3/23/2023, 03:12 AM	Closed	-100
3/23/2023, 12:20 AM	Closed	197.95
3/22/2023, 10:02 AM	Closed	197.95
3/21/2023, 01:46 AM	Closed	-100
3/20/2023, 07:13 PM	Closed	203.34
3/20/2023, 04:40 PM	Closed	-100
3/20/2023, 05:38 AM	Closed	-100
3/17/2023, 11:05 PM	Closed	200.2
3/17/2023, 05:16 PM	Closed	200.2
3/16/2023, 07:26 PM	Closed	-100
3/13/2023, 05:26 PM	Closed	-100
3/13/2023, 01:12 PM	Closed	-100
3/10/2023, 09:35 AM	Closed	203.97
3/8/2023, 11:52 AM	Closed	203.97
3/3/2023, 01:18 PM	Closed	-100
2/28/2023, 09:01 PM	Closed	-100
2/24/2023, 12:00 AM	Closed	200.75
2/22/2023, 09:42 PM	Closed	-100
2/17/2023, 07:28 AM	Closed	-100
2/14/2023, 11:29 PM	Closed	199.78
2/14/2023, 08:04 PM	Closed	200.46

2/14/2023, 07:25 AM	Closed	-100

3.4 Calculation

The experiment only results in two outcomes: profit, or loss, and as such it can be modelled using a binomial distribution. The amount of independent experiments, n, is calculated with the formula:

$n = Total\ Trades = 40$

Let the test statistic X represents the number of profitable trades, where p is the probability of trades being profitable for each trades. So,

$X \sim B(40,\ p)$.

Then, to calculate p_0, it must be satisfied that

$E(Profit) = 0$.

$p_0(Profit) + (1 - p_0)(Loss) = 0$.

As the risk/return ratio is 1:2, the profit gained is twice the loss (without minus sign), so

$p_0(-\ 2(Loss)) + (1 - p_0)(Loss) = 0$

$(1 - 3p_0)(Loss) = 0$. Assuming that the loss is not \$0,

$1 - 3p_0 = 0$

$p_0 \approx 0.333$

Let H_0: $p = p_0$, where Fibonacci retracement does not significantly increase win rate beyond p_0 , and

let H_1: $p > p_0$, where Fibonacci retracement significantly increase win rate beyond p_0.

Assume that H_0 is true. Then $X \sim B(40,\ 0.333)$.

$P(X \geq Total\ Profitable\ Trades) = P(X \geq 21)$

Using a calculator,

$P(X \geq 21) = 1 - P(X \leq 20) = 1 - 0.99057 = 0.00943 = 0.943\%$

As $0.943\% < Significance\ Level = 5\%$, H_0 is rejected.

Hence, there is sufficient evidence to suggest that Fibonacci retracement significantly increase win rate beyond p_0.

Chapter 4
Conclusion

4.1 Conclusion

The hypothesis is proven true that prices tend to retrace at the 76.8% Fibonacci retracement levels, increasing the winning rate until it is significantly more than the amount of win rate required to break-even in a 1:2 risk-to-reward ratio. This means that Fibonacci retracement is an effective tool used in technical analysis to increase traders profit, and thus is recommended to use.

4.2 Strengths

The use of binomial testing is very effective as gold prices are very stable compared to other securities, providing a constant and reliable win rate to be tested without being significantly affected by external factors, such as companies policy or hyperinflation. Additionally, the research team has also confirmed that throughout the timeframe of the experiment, there are no important external factors causing extreme changes to gold prices.

Financially, Fibonacci retracement is a simple and effective indicator for technical analysis, providing clear support and resistance areas and values and a guide for making decisions. It is already widely tested across markets, not only for gold but also for stocks and cryptocurrency. Fibonacci is often used to forecast the future price of the trading pairs we trade. Lastly, Fibonacci retracement is flexible because it allows integration with other indicators like RSI, MACD, or the Volume Order Book for bigger probability of winning the trade.

4.3 Weaknesses

The value of p_0 is not entirely precise in reflecting the probability of traders gaining profit without the use of Fibonacci retracement, which should be a better comparison and contrast against the win rate from using Fibonacci retracement.

Financially, Fibonacci retracement needs to be adjusted every time the market breaks 100% retracement levels or the swing lows or highs, whether it breaks going up or down, requiring traders to adjust the retracement frequently. When the 100% level is breached by the current market condition, traders need to wait for another market moment that

clearly shows a reversal trend to establish a new retracement. Different types of traders have different ways of using the retracement. Usually, traders use swing lows as the 100% level for buying positions and swing highs as the 100% level for selling positions. However, there are also several traders who use alternative methods of applying the retracement, which makes this win rate accurate only for traders using the swing low and swing high method of retracement.

4.4 Further Improvements

Other hypothesis testing or other statistical methods can be used to strengthen the argument used to prove the hypothesis. Also, the experiment data can be made more reliable by using data from different time frames which are not affected much by extreme changes, to further confirm the result of the analysis.

Financially, enhancing Fibonacci retracement for evaluating its win rate in XAUUSD pair trading could include integrating machine learning to optimize predictive accuracy by analyzing historical data and adjusting to current market conditions, both macro and micro. Then, real-time updates ensure traders use relevant support and resistance levels. Also, simulating trades using Fibonacci in XAUUSD trade performance and comparing its effectiveness to other indicators like MACD or RSI can provide valuable insights. Lastly, combining Fibonacci with other indicators could also improve its winning rate by enabling traders to identify high-probability trade setups.

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