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How to use Fibonacci retracement to predict forex market

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Abstract: *In the material below I have tried to explain how can be used Fibonacci Retracement as an important tool to predict forex market. In this article I have included some graphic formats such as Fibonacci arcs, fan, channel, expansion, wich are created also with Fibonacci retracement and also rules to perfect chart plotting. I have analyzed some examples of Fibonacci retracements pattern in a downtrend and in an uptrend. In this article I have used and combine material from different sources trying to create a start point for those one of you that are interested.*

"Fib numbers" (as they are often referred to) also appear in many aspects of nature such as the arrangement of leaves on a stem and the branching of trees. Some day traders, swing traders and investors therefore say that the nature of the financial markets also manifest themselves in the structure of Fibonacci numbers.
Now the big question: Do Fibonacci numbers have a dramatic influence on the financial markets? Should you use Fibonacci trading in your trading system to help with your stock market analysis? Therefore Fib numbers are indeed significant in trading if for no other reason than they become a self-fulfilling prophecy through their use by a massive number of Fibonacci Forex, stock and futures traders. And those numbers can be used to calculate Fibonacci retracement levels. How? we will find together in the material below.

History and mathematics

Fibonacci(1175-1240) was one of the greatest mathematicians of the Middle Ages. He was born in Italy in Pisa town. In 1202 after a trip to Egypt, he come back in Italy where it publishes a treatise on arithmetic and algebra named *"Incipit Liber Abacci"*(compositus a *Leonardo filius Bonacci Pisano*). In this treaty introduces for the first time Arabic numeral system in Europe, and the numbers we use today: 0,1, 2, 3,…,9.
Leonardo da Pisa, is rightly considered the first great original mathematician of Europe.
In his many trips (Egypt, Syria, Greece, Sicily) he takes contact with Greek and Arabic culture. The story of numbers appears in Italy in 1202, with the advent of the book Liber Abaci, written by Leonardo Pisano, by then 27 years old. The book has 15 sheets heads, and are written entirely by hand, the pattern appeared 300 years later. Fibonacci book begins with notions about the identification numbers of the units digit of tens, hundreds, of thousands, etc. In the last chapters we find calculations with integer numbers and fractions, proportions rules, extraction of square roots and higher order, then presents the solutions of linear and quadratic equations. *Liber Abaci* was filled with practical examples: calculation of financial accounting, corporate income, money exchange, conversion of weights, and the calculation of loan with interest.

In terms of mathematic, Fibonacci numbers f_n are given by the following recurrence:
$f_0 = 0$, $f_1 = 1$, $f_{n+1} = f_{n-1} + f_n$, n≥1.
Theorem 1. If $\chi^2 = \chi + 1$, then we have: $\chi^n = f_n\chi + f_{n-1}$,   n ≥2.

Argument: We will prove by induction after n.

For n = 2 the relationship is trivial. We suppose that $\forall n > 2$ we have $\chi^{n-1} = f_{n-1}\chi + f_{n-2}$. Then $\chi^n = \chi^{n-1} \cdot \chi = f_{n-1}(\chi + 1) + f_{n-2}\chi = (f_{n-1} + f_{n-2})\chi + f_{n-1} = f_n\chi + f_{n-1}$.

Theorema 2. (Binet formula). The n-th term of the Fibonacci sequence is given by:

$$f_n = \frac{1}{\sqrt{5}}\left[\left(\frac{1+\sqrt{5}}{2}\right)^n - \left(\frac{1-\sqrt{5}}{2}\right)^n\right], \; n \geq 0.$$

Argument: Equation roots $\chi^2 = x + 1$ are $\varphi = \dfrac{1+\sqrt{5}}{2}$ and $1 - \varphi = \dfrac{1-\sqrt{5}}{2}$

From theorem 1., we have: $\varphi^n = \varphi f_n + f_{n-1}$ and $(1 - \varphi^n) = (1 - \varphi)f_n + f_{n-1}$

Forward $\varphi^n - (1 - \varphi)^n = \sqrt{5}f_n$, from where result the Binet formula.

Fibonacci sequence in forex market

Fibonacci retracement is a very popular tool used by many technical traders to help identify strategic places for transactions to be placed, target prices or stop losses. The notion of retracement is used in many indicators such as Tirone levels, Gartley patterns, Elliott Wave theory and more. After a significant price movement up or down, the new support and resistance levels are often at or near these lines.

The Fibonacci sequence is simply beginning with the numbers 0 and 1, and then each number after that is the sum of the previous two.

So …

0 + **1** = **1**

Then you take the sum of the last 2 numbers of the above equation and add them:

1 + **1** = **2**

Then you take the sum of the last 2 numbers of the above equation and add them:

1 + **2** = **3**

Then you take the sum of the last 2 numbers of the above equation and add them:

2 + **3** = **5**

Then you take the sum of the last 2 numbers of the above equation and add them:

3 + **5** = **8**

Then you take the sum of the last 2 numbers of the above equation and add them:

5 + **8** = **13**

Then you take the sum of the last 2 numbers of the above equation and add them:

8 + **13** = **21**

… and on it goes to infiinity!

The Fibonacci sequence of numbers is as follows: 0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, etc.

Each term in this sequence is simply the sum of the two preceding terms and sequence continues infinitely. One of the remarkable characteristics of this numerical sequence is that each number is approximately 1.618 times greater than the preceding number. This common relationship between every number in the series is the foundation of the common ratios used in retracement studies.

Fibonacci ratios

Fibonacci ratios are mathematical relationships, expressed as ratios, derived from the Fibonacci sequences.

The key Fibonacci ratios are 0%, 23.6%, 38.2%, 50%, 61.8% and 100%.

$$F_{100\%} = \left(\frac{1+\sqrt{5}}{2}\right)^{0} = 1$$

The key Fibonacci ratio of 0.618% - also referred to as "the golden ratio" or "the golden mean" - is found by dividing any number in the sequence by the number that immediately follows it. For example: 8/13 is approximately 0.6154, and 55/89 is approximately 0.6180.

$$F_{61,8\%} = \left(\frac{1+\sqrt{5}}{2}\right)^{-1} \approx 0,6180$$

The 0.382 ratio is found by dividing any number in the sequence by the number that is found two places to the right. For example: 34/89 is approximately 0.3820.

$$F_{38,2\%} = \left(\frac{1+\sqrt{5}}{2}\right)^{-2} \approx 0,381966$$

The 0.236 ratio is found by dividing any number in the sequence by the number that is three places to the right. For example: 55/233 is approximately 0.2361.

$$F_{23,6\%} = \left(\frac{1+\sqrt{5}}{2}\right)^{-3} \approx 0,236068$$

The 0 ratio is :

$$F_{0\%} = \left(\frac{1+\sqrt{5}}{2}\right)^{-\infty} = 0$$

The 0.500 ratio is derived from dividing the number 1 (third number in the sequence) by the number 2 (forth number in the sequence).

$$F_{50\%} = \frac{1}{2} = 0,500000$$

The 50% retracement level is not really a Fibonacci ratio, but it is used because of the overwhelming tendency for an asset to continue in a certain direction once it completes a 50% retracement.

Fibonacci retracement is created by taking two extreme points on a chart and dividing the vertical distance by the key Fibonacci ratios. 0.0% is considered to be the start of the retracement, while 100.0% is a complete reversal to the original part of the move. Once these levels are identified, horizontal lines are drawn and used to identify possible support and resistance.

Other ratios
The 0.764 ratio is the result of subtracting 0.236 from the number 1.

$$F_{76,4\%} = 1 - \left(\frac{1+\sqrt{5}}{2}\right)^{-3} \approx 0,763932$$

The 0.786 ratio is:

$$F_{78,6\%} = \left(\frac{1+\sqrt{5}}{2}\right)^{-\frac{1}{2}} \approx 0,786151$$

Fig. 1. Fibonacci ratios. Graphic representation

For reasons that are unclear, these ratios seem to play an important role in the stock market, just as they do in nature, and can be used to determine critical points that cause an asset's price to reverse. The direction of the prior trend is likely to continue once the price of the asset has retraced to one of the ratios listed above.

The following chart illustrates how Fibonacci retracement can be used. Notice how the price changes direction as it approaches the support/resistance levels.

Fig. 2. Fibonacci retracement to the 23.6% level on the EURUSD

Fibonacci Retracements Pattern

Stocks will often pull back or retrace a percentage of the previous move before reversing. These Fibonacci retracements often occur at three levels – 38.2%, 50%, and 61.8%.

The use of Fibonacci retracement levels in online stock trading, stock market analysis (as well as futures, Forex, etc.) serves to help determine how far one expects a market to retrace before continuing in the direction of the trend.

It is often used with other technical analysis indicators such as a moving average, stochastics, RSI, candlestick patterns, etc. When using Fibonacci Forex, stocks, futures and commodities can all be traded using the Fibonacci retracement of a trend.

The first thing you should know about the Fibonacci tool is that it works best when the market is trending.

The idea is to go long (or buy) on a retracement at a Fibonacci support level when the market is trending up, and to go short (or sell) on a retracement at a Fibonacci resistance level when the market is trending down. In order to find these retracement levels, you have to find the recent significant Swing Highs and Swings Lows.

Then, for downtrends, click on the Swing High and drag the cursor to the most recent Swing Low. For uptrends, do the opposite. Click on the Swing Low and drag the cursor to the most recent Swing High.
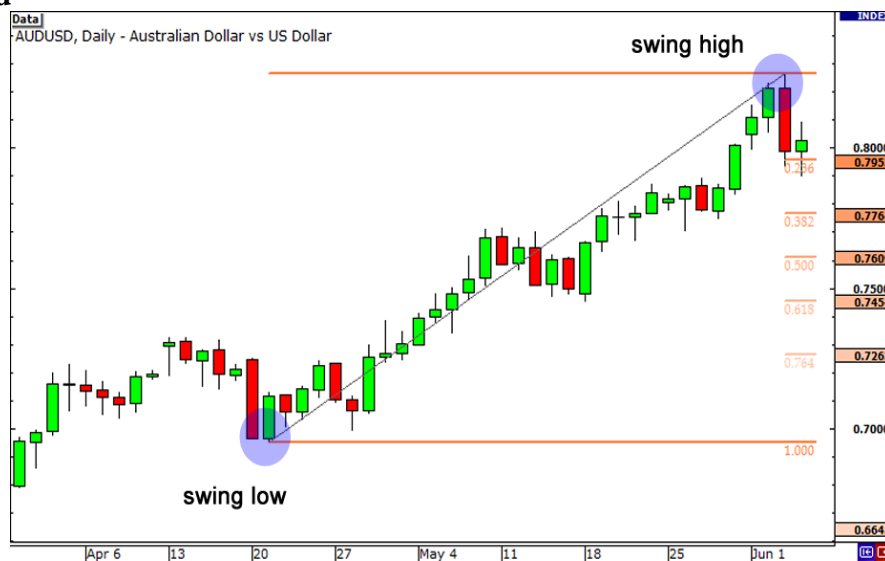
Uptrend

Fig. 3. A daily chart of AUD/USD

Here we plotted the Fibonacci retracement Levels by clicking on the Swing Low at .6955 on April 20 and dragging the cursor to the Swing High at .8264 on June 3. Tada! The software magically shows you the retracement levels.

As you can see from the chart, the retracement levels were .7955 (23.6%), .7764 (38.2%), 7609 (50.0%), .7454 (61.8%), and .7263 (76.4%).

Now, the expectation is that if AUD/USD retraces from the recent high, it will find support at one of those Fibonacci levels because traders will be placing buy orders at these levels as price pulls back.

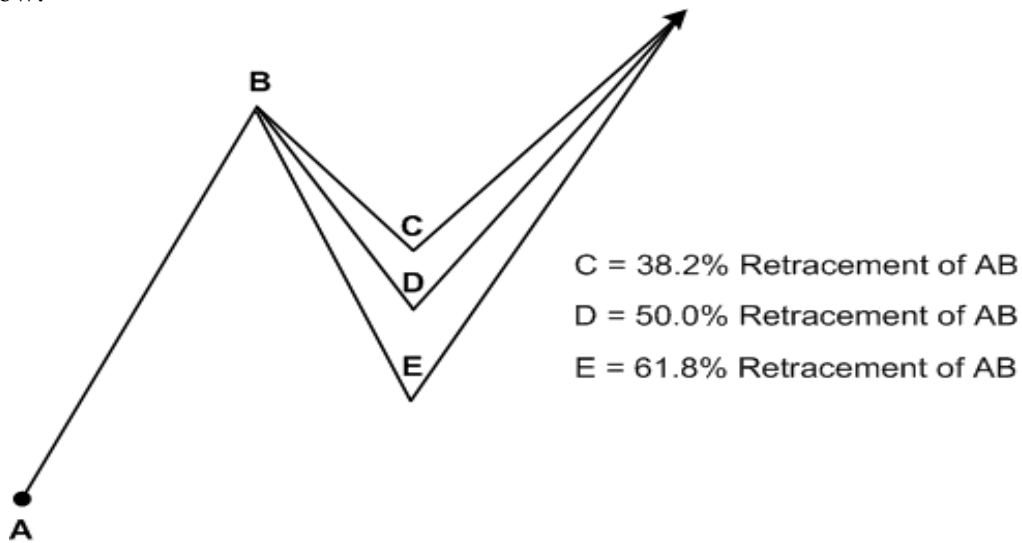In theory Fibonacci retracement in an uptrend can also be represented as in the picture below:

B

C

D

E

A

C = 38.2% Retracement of AB

D = 50.0% Retracement of AB

E = 61.8% Retracement of AB

Fig. 4. Representation of an uptrend in theory

Now, let's look at what happened after the Swing High occurred

Fig. 5. A daily chart of AUD/USD

Price pulled back right through the 23.6% level and continued to shoot down over the next couple of weeks. It even tested the 38.2% level but was unable to close below it. Later on, around July 14, the market resumed its upward move and eventually broke through the swing high. Clearly, buying at the 38.2% Fibonacci level would have been a profitable long term trade!

Downtrend
Now, let's see how we would use the Fibonacci retracement tool during a downtrend. Below is a 4-hour chart of EUR/USD.

Fig. 6. A daily chart of EUR/USD

As you can see, we found our Swing High at 1.4195 on January 26 and our Swing Low at 1.3854 a few days later on February 2. The retracement levels are 1.3933 (23.6%), 1.3983 (38.2%), 1.4023 (50.0%), 1.4064 (61.8%) and 1.4114 (76.4%).

The expectation for a downtrend is that if price retraces from this low, it will encounter resistance at one of the Fibonacci levels because traders will be ready with sell orders there.

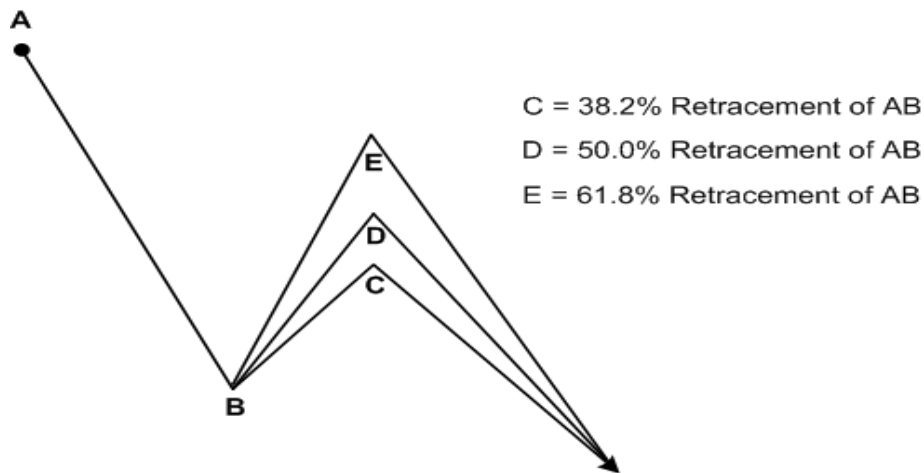In theory Fibonacci retracement in an downtrend can also be represented as in the picture below:

C = 38.2% Retracement of AB

D = 50.0% Retracement of AB

E = 61.8% Retracement of AB

Fig. 7. Representation of an downtrend in theory

Let's take a look at what happened next.

Fig. 8. A daily chart of EUR/USD

The market did try to rally, stalled below the 38.2% level for a bit before testing the 50.0% level. If you had some orders either at the 38.2% or 50.0% levels, you would've made some mad pips on that trade.

In these two examples, we see that price *found* some temporary support or resistance at Fibonacci retracement levels.

Fibonacci Arcs

Fibonacci Arcs are built as follows: first, the trend line is drawn between two extreme points, for example, from the trough to the opposing peak. Then three arcs are built having their centers in the second extreme point and intersecting the trend line at Fibonacci levels of 38.2, 50, and 61.8 per cent.
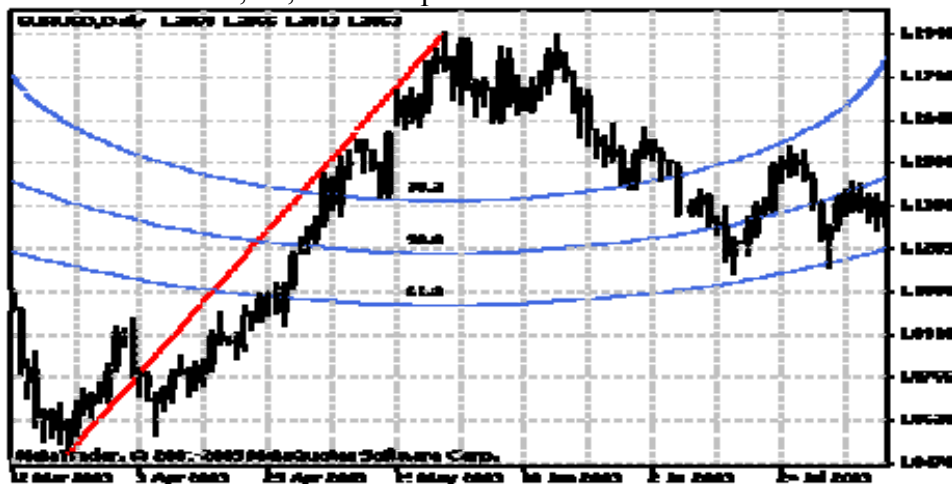

Fig. 9. Fibonacci arcs

Fibonacci arcs are considered to be potential support and resistance levels. Fibonacci Arcs and Fibonacci Fans are usually plotted together on the chart, and support and resistance levels are determined by the points of intersection of these lines.

It should be noted that the points of intersection of Arcs and the price curve can change depending on the chart scale since an arc is a part of a circumference, and its form is always the same.

Fibonacci Fan

Fibonacci Fan as a line instrument is built as follows: a trend line — for example from a trough to the opposing peak is drawn between two extreme points. Then, an "invisible" vertical line is automatically drawn through the second extreme point. After that, three trend lines intersecting this invisible vertical line at Fibonacci levels of 38.2, 50, and 61.8 percent are drawn from the first extreme point.

These lines are considered to represent support and resistance levels. For getting a more precise forecast, it is recommended to use other Fibonacci instruments along with the Fan.

Fig. 10. Fibonacci Fan

Fibonacci Time Zones

Is a sequence of vertical lines having Fibonacci intervals of 1, 2, 3, 5, 8, 13, 21, 34, etc. Significant price changes are considered to be expected near these lines.

To build this instrument, it is necessary to specify two points to determine the length of a unit interval. All other lines are built on base of this unit interval according to Fibonacci Numbers.
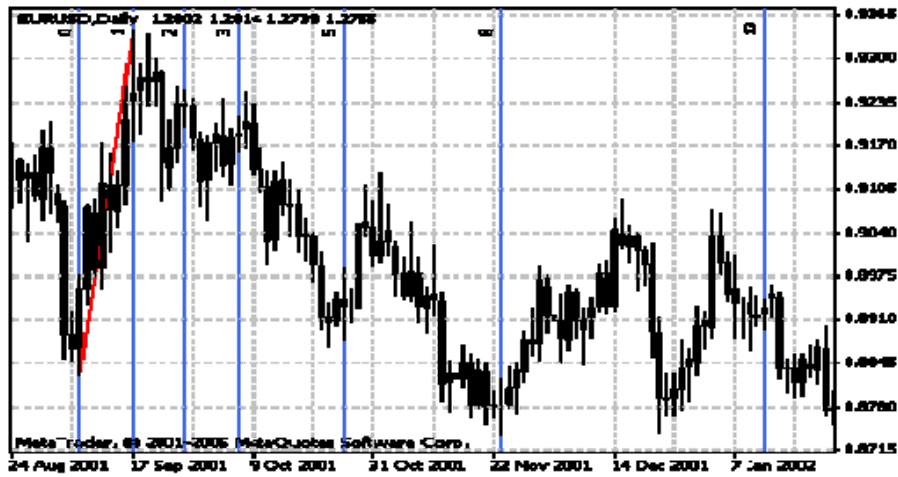
Fig. 11. Fibonacci time zones

Fibonacci Expansion

Fibonacci Expansion is largely similar to Fibonacci Retracement and intended for determining of the end of the third wave. Unlike Fibonacci Retracement, this instrument is built not on the only one trend line, but on two waves.

First, the line of the first wave is drawn, its height will be considered as a unit interval later on. The end of the second wave serves as a reference point for building an invisible vertical line. The corresponding lines are drawn from the reference point on the interval equal to 61.8, 100%, and 161.8 per cent of the unit interval. The third wave is considered to finish near these levels.
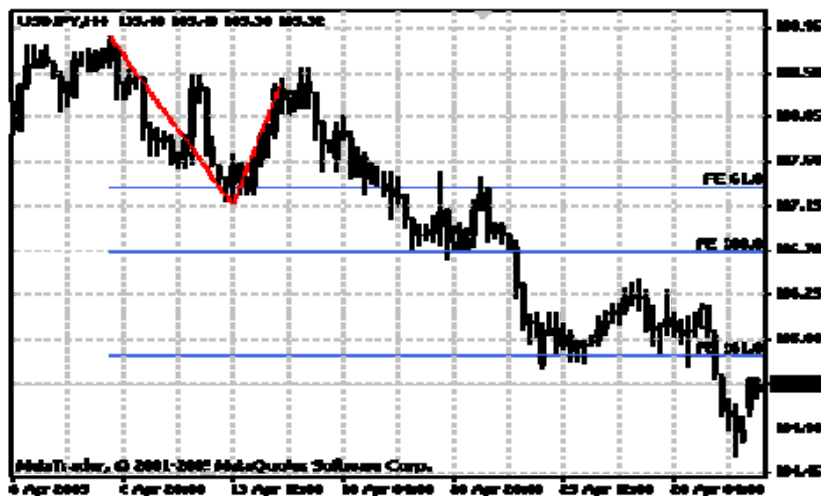

Fig. 12. Fibonacci expansion

Fibonacci Channel

Fibonacci Channels are built using several parallel trend lines. To build this instrument, the channel having the width taken as a unit width is used. Then, parallel lines are drawn at the values equal to the Fibonacci Numbers, beginning with 0.618-fold size of the channel, then 1.000-fold, 1.618-fold, 2.618-fold, 4.236-fold, etc. As soon as the fifth wave finishes, correction in the direction opposite to the trend can be expected.

It is necessary to remember for a correct Fibonacci Channel building: base line limits the upper part of the channel when trend is ascending, and the lower part of it when trend is descending.

Fig. 13. Fibonacci channel

Rules to Perfect Fibonacci Chart Plotting

Fibonacci retracements represent an excellent tool for investors, identifying reversal points on a historical price chart. Anyone can see that on any historical price chart, trading prices will inherently pull back or retrace a percentage of the previous movement before reversing again and then proceeding in the direction of the overall long-term trend.

Historical observations demonstrate that these retracement percentages seem to follow a Fibonacci ratio pattern. By carefully plotting these retracement possibilities on a historical price chart, a trader improves his or her probability towards successful investing. Certain rules are recommended to improve the likelihood of identifying successful entry and exit points.

Rule 1: Identify the High and Low

In order to use Fibonacci retracements, it is important to identify relative high and low prices on a historical chart. The longer the term that is utilized, the more likely the Fibonacci retracement lines plotted will identify significant levels demonstrated support and resistance.

Rule 2: Plot the Fibonacci Retracement Levels

Once a high and low for a time period has been chosen, it will be possible to draw the Fibonacci retracement percentage levels onto the chart. The low point would represent 0%, and the high point represents 100%.

Between these two extremes, one can plot the most significant Fibonacci percentage plot lines of 38.2%, 50%, and 61.8%. It is also beneficial to plot these percentages below and above the high and low. In other words, plot lines that would be 138.2%, 150%, and 200% on the up side above the high, and -30.2%, -50%, and -61.8% on the down side below the low. It should be noted that software exists that will allow you to automatically plot these Fibonacci levels.

Rule 3: Observe Historical Behavior
Once the plot lines have been placed on the chart, it is important to observe at which Fibonacci levels in the historical period under consideration has demonstrated support and resistance. These areas will be objectively seen to show that when approached, retracement clearly resulted.

Rule 4: Forecast Future Movement
The appropriate Fibonacci retracements will vary from investment market to investment market and be a function also of the trading character at any particular time. Consequently, successful use of Fibonacci techniques will be highly dependent on the accurate interpretation of previous price movement activity within the range identified. When the proper Fibonacci retracements have been observed, entry and exit points can be forecasted for position-taking based upon the clearly demonstrated historical record.

Rule 5: Always Have Confirmation
Through study and observation, many successful traders have mastered the techniques necessary for the use of Fibonacci retracement ratios. As anyone can see, however, the support and resistance represented by these levels do not automatically appear at all times. In other words, after the 38.2% retracement, the price may continue in that direction and not stop or reverse itself until perhaps it reaches 61.8%. What is clear, however, at a certain Fibonacci point, a retracement will occur. As a result of this, the use of Fibonacci techniques is most successful when used in conjunction with other technical analysis tools that confirm what has been identified.

Conclusions
Fibonacci Retracement trading is used in all markets – online stock trading, Fibonacci Forex trading and also in the futures markets.

Whether or not one believes the Fibonacci trading numbers have any special significance, the fact that they are so pervasively used creates a self-fulfilling prophecy to the levels. Thus, for whatever reason you choose to believe, Fibonacci retracement levels are an important part of technical analysis and should be incorporated into your trading system.

Using Fibonacci retracements in your trading will not make you a professional swing trader, day trader or investor overnight. But used in conjunction with other technical analysis tools such as stochastics, RSI, MACD, moving averages, candlestick patterns, etc., they can be a very valuable addition to any traders tool box. , Fibonacci retracement levels are the basis for Fibonacci trading and an important part of technical analysis and stock market analysis.

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