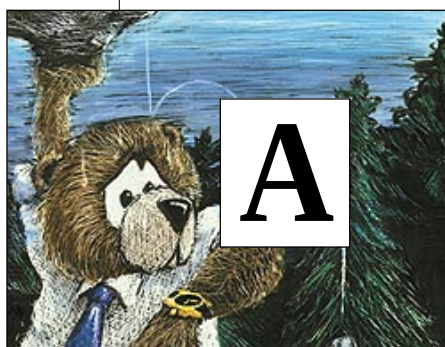


Long-Term Fibonacci Support And Resistance

Here's a historical review of the major swings in the stock market and the Fibonacci relationships.

by Kevin W. Murphy



According to long-term Fibonacci support and resistance levels in the Dow Jones Industrial Average (DJIA), we are approaching a notable resistance level in the stock market. Many books have been written on the Fibonacci sequence and its many mathematical relationships; this article will not delve into those

in any great detail. For those who are unfamiliar with the Fibonacci sequence, however, I will briefly discuss its basis and a few of its mathematical relationships and how they are relevant to investors.

Leonardo of Pisa, a 13th-century mathematician, illustrated what would later be known as the Fibonacci sequence in his work *Liber Abacci*, although its mathematical relationships were not detailed until much later. The Fibonacci sequence is an additive sequence in which each number is the sum of the two numbers preceding it. Beginning the sequence with 1, it progresses thus: 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, 233, 377, 610, 987, 1597...on to infinity.

As the sequence continues to infinity, the ratio of each number to its preceding number approaches 1.61803398 (also known as the *golden ratio*). Because it is an additive sequence, any two numbers can be used to begin the sequence and added together to produce a third and so on. Whatever two numbers are used to begin the sequence, the resulting ratio between each preceding number will ultimately approach 1.61803398. Within the sequence, the mathematical relationships of Fibonacci numbers are depicted: the ratio of any number to the following number in the sequence is 0.618, which is the inverse of 1.618. The ratio between alternate numbers is 3.618 or its inverse, 0.382. Moreover, 0.382 plus 0.618 equal 1 and $(0.618)(0.618)$ equals 0.382.

The mathematics of the Fibonacci sequence are well-documented and you may want to test out a few numbers for yourself. For the purpose of our analysis, we are now going to apply the mathematics of Fibonacci to the Dow Jones Industrial Average (DJIA) dating back to the 1930s. Before

we do, however, we must introduce the first person to apply Fibonacci mathematics to the stock market, Ralph Nelson Elliott, who devised the Elliott wave theory. Elliott described how markets moved in his wave theory, and he showed how Fibonacci mathematics can be applied to these moves. Although I will not discuss Elliott's wave theory in detail, there are two key tenets of his theory that I will apply in this article, price and time.

PRICE

In looking at the long-term price movement of the DJIA since the depression of the 1930s, it is clear that there have been several distinct price advances or periods of growth. Many of these have a strong correlation to the mathematics found in the Fibonacci sequence. Although most of the print lows or highs of the DJIA are unavailable before the 1970s, for the purposes of this analysis, I will work with the print lows or highs of the DJIA that are available. If not available, I will rely on theoretical or hourly data to interpolate or approximate.

PRINT VS. THEORETICAL

Within each trading day in the DJIA, each of the industrial stocks reach their price highs and price lows at different times during the day. The print low or high is the actual level the DJIA reaches at some specific time during the trading day. The theoretical level in the DJIA is the cumulative print lows and highs of all the DJIA stocks during the trading day. The average almost never reaches its theoretical high or low for the trading day because it would require all stocks in the average to top or bottom at the exact same time. For most data from the 1930s through the 1960s, the intraday print highs or lows are either unknown or unavailable and will have to be approximated or interpolated with theoretical or closing levels. In cases after the 1960s, hourly data can also be used to approximate price.

A LOOK BACK

At the bottom of the market on July 8, 1932, the theoretical low on the DJIA was 40.56, with a closing low of 41.22. From this point, the DJIA advanced to a theoretical high of 195.59 and a closing high of 194.40 on March 10, 1937. Somewhere between 40.56 and 41.22 on July 8, 1932, was the actual print low in the market, and somewhere between 194.40 and 195.59 on March 10, 1937, was the actual print high.

Calculating the percentage increase, or the growth in the price of the average from July 1932 to March 1937, an

increase of 382% can be seen on a theoretical basis and 372% can be seen on a closing basis. For this analysis, I am going to average these two figures into a 377% increase to approximate its percentage advance on a print basis. This percentage increase matches the 14th number in the Fibonacci sequence, 377. (You can try different methods of interpolating to achieve the print figures or averaging combinations of theoretical and closing, but the result will be the same: 377% +/-2%.) This percentage increase is graphically represented in Figure 1.

After the 1937 high, the DJIA corrected more than 50% in value during the next five years to a low in April 1942. From there, another advance began that lasted almost 24 years, finally ending in 1966. In the same graph, you can also see the percentage increase from April 28, 1942, to February 9, 1966.

Using the same techniques as before, this period saw an increase of approximately 987% in the price of DJIA stocks. The theoretical and closing lows at the bottom of April 1942 were 92.69 and 92.92, respectively, and the theoretical and closing highs at the February 1966 high were 1001.11 and 995.15, respectively. Thus, the maximum and minimum increases possible on a print basis were 971% to 980%. Figure 1 shows an increase of 987% between 1942 and 1966. Although we know the increase in the price of the Dow industrials was somewhere between 971% and 980% on a print basis, in the case of the 1932 to 1937 advance, we can only approximate the exact print level.

I labeled the 1942 to 1966 advance in Figure 1 as 987%, which represents the 16th num-



ber in the Fibonacci sequence and is 1% above the 971-980% level advance on a print basis that we just calculated. The significance of this is not that it matches the exact Fibonacci number but that it is representative of the growth rate found in the additive process of the sequence. The number 987 is an alternate to that of 377 in the Fibonacci sequence and represents two stages of growth, or 2.618 times the growth seen from 1932 to 1937. Remember that each number in the Fibonacci sequence is 1.618 greater than the previous number, and alternate numbers are 2.618 greater: $(1.618)(1.618) = 2.618$.

Although the 1942 to 1996 advance is about a percent shorter than it should be, based on the Fibonacci numbers, another approach would be to take the actual closing low of 1932, calculate the percentage advance to 1937, and then apply it to the 1942 low. Using the closing low of 41.22 in 1932 and the closing high of 194.4 in 1937, a percentage increase of 371.6% can be calculated. Multiplying a 371.6% increase by 2.618 projects an increase of 972.8%. This percentage increase calculated off the 1942 closing low of 92.92 projects a closing high of 996.8.

As mentioned before, the closing high in February 1966 was 995.15, just 1.65 points away from the 2.618 closing projection. It is impossible to know the exact numbers without exact print data, but for the purpose of further analysis, it is clear that there is a very strong and significant Fibonacci relationship between the advances of 1932-37 and 1942-66.

A LOOK AHEAD

Now to the future. After the DJIA peaked in 1966, it tested the 1000 level in 1968 and again in 1973. (In 1973, the DJIA reached a theoretical high of 1076.2 and a closing high of 1051.70. To some, this may more closely represent the 987% increase in price from 1942.) The DJIA then saw one of its worst bear markets in history, declining 45% from January 1973 to December 1974. From here, we can begin to look at the next stage of growth.

The DJIA theoretical low on December 9, 1974, was 570.01, with a closing low of 579.94. Here, we encounter a small problem. The actual closing low on the DJIA in 1974 was on Friday, December 6, 1974, at 577.60, the trading day before. Therefore, we cannot be positive that the DJIA had a lower print low on December 9 than it did on December 6, although the theoretical low was lower (the December 6th theoretical low was 572.12). Here, we must defer to hourly readings on the DJIA, which were available in 1974, unlike the 1930s and 1940s. The hourly low on the DJIA on December 9, 1974, was 572.20.

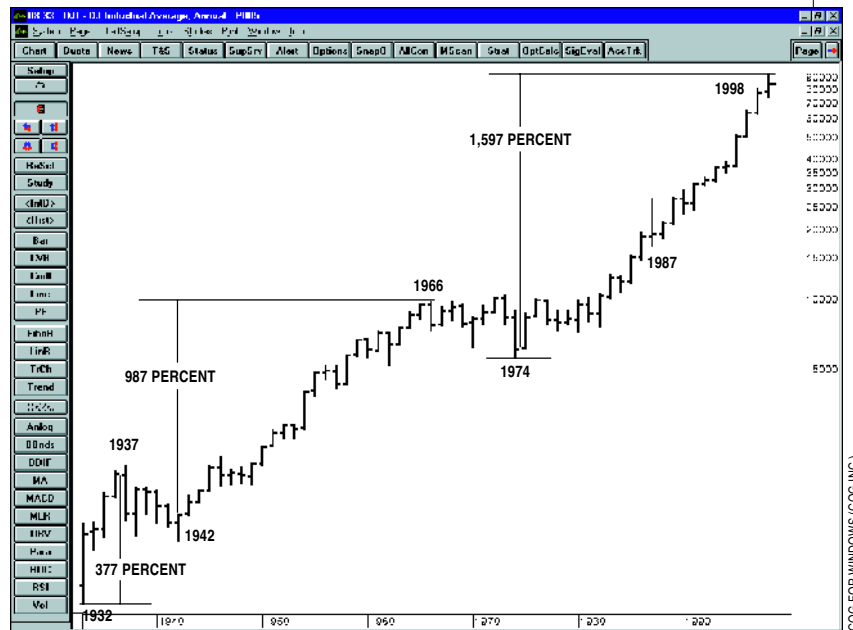


FIGURE 1: DJIA, 1942-66. Here's an increase of 987% between 1942 and 1966. Although we know the increase in the price of the Dow industrials was somewhere between 971% and 980% on a print basis, as in the case of the 1932 to 1937 advance, we can only approximate the exact print level.

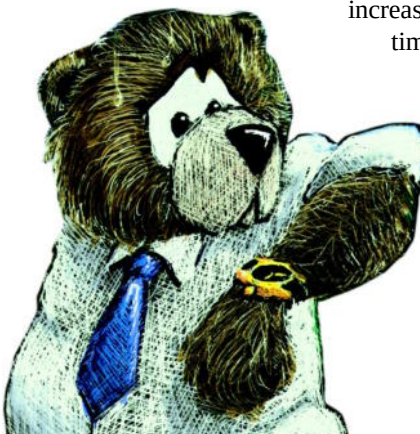
So we know the DJIA was at least that low (572.20) sometime during the trading day, although we do not know the actual print low. From here, we begin the next phase or wave of growth in the DJIA. Using the Fibonacci sequence, we have seen growth of 377% from 1932 to 1937 and 987% from 1942 to 1966. The number following 987 in the Fibonacci sequence is the 17th number, 1597. Applying a percentage growth of 1,597% to the 1974 theoretical low of 570.01 projects a theoretical high of 9673 on the DJIA. On an hourly basis, it projects a high of 9710, and on a closing basis, 9842. This suggests that severe resistance may be seen in the DJIA in the 9600 to 9800 area. As of this writing in late April 1998, the DJIA had reached a print high of 9213.

If we apply the same calculation to the actual closing figures of 1932 to 1937 and 1942 to 1966, we come up with the following. The 1932-37 advance saw an increase of 371.6% on a closing basis (41.22 to 194.40). The 1942-66 advance saw an increase of 2.618 (1.618 multiplied by 1.618) times greater; 92.92 in 1942 to 995.15 in 1966.

If we now multiply 371.6% by 4.236, or $(1.618)(1.618)(1.618)$, we come up with an increase of 1,574%, just slightly less than the Fibonacci number 1,597. Multiplying the closing low of 577.60 on December 6, 1974, by 1,574% projects a closing high of 9669 on the DJIA.

TIME

Ralph Elliott also suggested that in the time duration of his waves, two of the three impulse or advancing waves



tended to be equal in time. Much of this depends on how waves are counted and labeled. It is worth being aware, however, that the time duration of the 1942-66 advance took nearly 24 years (23 years, nine months and 12 days, to be exact).

We are now coming into a period when the advances from 1942 to 1966 and from 1974 to the present are equal in time. It is not necessary, in my opinion, that advances be exactly equal, only that they approximate; I would expect any relationship to be a few months off.

However, if one were to look at this period off the December 1974 low and add 23 years, nine months and 12 days, it would project a high around September 21, 1998. In addition, the DJIA double-bottomed with the Standard & Poor's 500 index in late 1974, with the S&P 500 registering its print low on October 4 of that year. Adding 23 years, nine months and 12 days to the October 4, 1974, low would project a high of July 16, 1998. Moreover, if we were to look at the number of trading days between 1942 and 1966, it would be clear that they were greater than between 1974 and now because markets were open on Saturdays at that point. Therefore, this time relationship is only something to be aware of but does not necessarily have to be precise.

THE CRASH OF 1987

Whether or not the stock market correction of 1987 is considered one of the more significant stock market events of the century, at the time it seemed as if the financial markets might be on the brink of disaster or that we had begun another severe bear market like that of 1929-32. Those with a knowledge of market history and long-term Fibonacci support and resistance levels might find some comfort in realizing that the 1987 stock market correction stopped on a dime at a key Fibonacci support level.

Ralph Elliott discussed key support at the 38.2% and 61.8% retracement levels of previous advances. It was very common for a market to retrace either 38.2% or 61.8% of its previous advance before it began another stage of growth. (The 0.618 or 61.8% level is the inverse of the 1.618 relationship found in the Fibonacci sequence [$1/1.618 = 0.618$], and 38.2% represents the relationship between alternate numbers in the Fibonacci sequence and is also the result when 61.8% is subtracted from 100%.)

At the bottom of the crash in 1987, on Tuesday, October 20, the DJIA bottomed at 1706.9 on a print basis, just over 30 points lower than it closed on the day of the crash, the day before. On a theoretical basis, the market registered a low almost 100 points down since the intraday, and opening prices of stocks were extremely volatile the day after the crash. At its high in 1987, the DJIA

peaked on August 25 at a print high of 2736.6. Subtracting the difference between the DJIA's print high on August 25 and print low on October 20, we come up with a distance of 1,029.7 points. With a quick calculation, we find that the

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crash itself corrected 37% of the market's entire value itself in 1987, so we might naturally look for larger retracements of 50% or 61.8% of previous advances.

But hidden behind all of these dates and price levels is the entire advance from 1932 to 1987. The 1932 low of 41.22 (closing) to the print high of 1987 at 2736.6 shows that the entire crash of 1987 corrected 38.2024% of the entire 55-year advance. If we wish to use the theoretical low of 1932 at 40.56, the correction is 38.1931%. The actual Fibonacci ratio between alternate numbers is 0.381966, or 38.1966%. Figure 2 shows the 1932 to 1987 advance on an arithmetic (nonlogarithmic) chart.

With the 1987 low as a long-term support level in the DJIA, if the 9600 to 9800 area were reached in the next several months, we might look for retracement levels of 38.2, or 61.8% of the entire advance from 1987. That has yet to be seen, but it would be a likely area to look for support. In any case, we know where the numbers stand and how they were generated. It is now up to the market and Fibonacci to validate their usefulness.

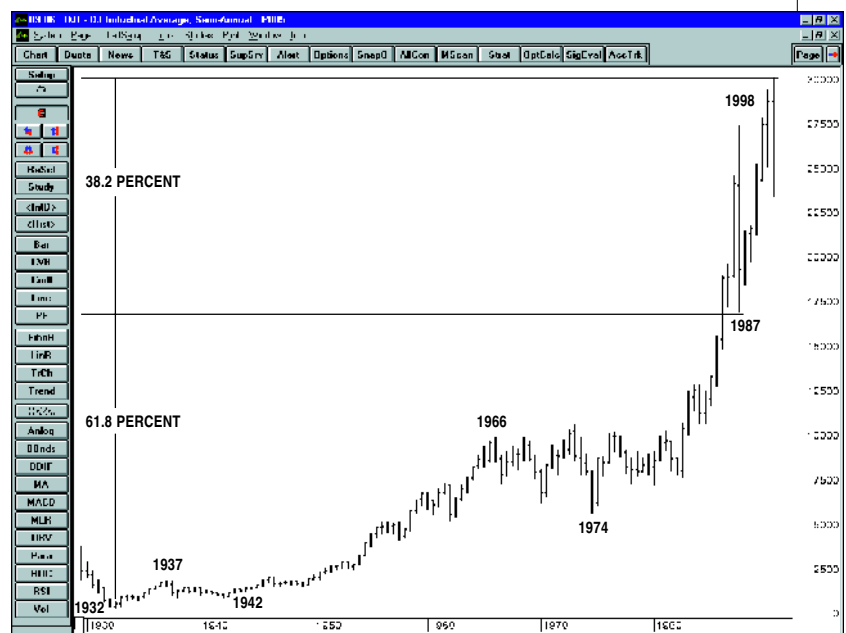


FIGURE 2: DJIA, 1932-87. Here's the 1932 to 1987 advance on an arithmetic (nonlogarithmic) chart.

Kevin Murphy began investing in 1972 and entered the financial industry as a broker in 1990. During his first years as a professional, he ranked in the top 10 nationally in the CNBC/FNN and USA Today National Investment Challenge professional options division from 1990 to 1992, with returns ranging from 500 to 800%. In 1993, he won first place with a return of 1,978% over a period of three months. He currently manages private money and teaches Elliott wave and Gann seminars throughout the US.

RELATED READING

Hartle, Thom [1997]. "Using Fibonacci ratios and momentum," *Technical Analysis of STOCKS & COMMODITIES*, Volume 15: November.

____ [1997]. "Robert Krausz's Fibonacci Trader," product review, *Technical Analysis of STOCKS & COMMODITIES*, Volume 15: November.

[†]See Traders' Glossary for definitions

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