aracne

VESNA D. JABLANOVIC

THE GOLDEN RATIO AND THE EQUILIBRIUM STOCK MARKET INDEX IN ELLIOTT WAVE THEORY

aracne

aracne

ISBN
979–12–218–0318–1

FIRST EDITION
ROMA 17 NOVEMBER 2022

Contents

Introduction

> Why is the Golden Ratio (1.61803) of such interst of traders? Known by various names since the ancient Egiptians and Pythagoreans 570–490 BC the first definitions come from Euclid (325–265 BC); The Divine Proportion, or Divina Propotione by Luca Pacoli (1445–1517) was the earliest known treatise devoted to the subject and was illustrated by Leonardo da Vinci, who coined the name section aurea or the "golden section". By any of its historical names, it is of little interest to investors, but investors rarely face the day–to–day battle field of global market action (Brown, 2008, p. 1).

Fibonacci analysis is an extremely effective tool for understanding market movement. Fibonacci analysis gives traders a clear explanation of what this tool is, how it works, and to apply it in markets. This monograph covers a wide range of topics including Fibonacci ratios for the equilibrium stock price / stock market index projection.

Also, this monograph offers a practical guidance on such specific tools as Fibonacci analysis is eminently practical, showing the most effective use of a technique that can increase the probability of trading success. Also note that the inverse or reciprocal of Phi (1.618) is phi (0.618).

The Fibonacci ratios (0.09, 0.146, 0.236, 0.382, 0.5, 0.618, 0.764, 0.854, and 1) are used to analyze the markets. The Golden Ratio (Φ) and its inverse (φ) have an important role in this analysis.

On the other hand, Lidwell, Holden, and Butler (2010, p. 114) define: «Golden Ratio (golden mean, golden number, golden proportion) is 0.618. Adding the number 1 to the Golden Ratio = Phi (Φ =1.618). Both 0.618 and 1.618 are used interchangeably to represent the golden ratio because they represent the same geometric relationship».

This definition of the golden ratio will be used in this monograph. Namely, Golden Ratio (golden mean, golden number, golden proportion) is 0.618. Adding the number 1 to the Golden Ratio = Phi (Φ =1.618).

It is important to anticipate the equilibrium stock market price and/or stock market index. Fibonacci levels and the logistic equation can be used to determine equilibrium value of stock price/stock index. This innovative approach enables you to predict equilibrium stock price/equilibrium stock index in advance.

Phi, (the golden ratio, divine proportion, divine section, golden proportion, golden cut, golden number) and the numbers of the Fibonacci series have been used to analyze and predict stock market moves (retracements).

Namely, Fibonacci numbers were used by W.D Gann and R.N. Elliott. The classic Elliott Wave series consists of an initial wave up, a second wave, then the third wave (usually the largest) up again, then another retracement, and finally the fifth wave. Further, each of the major waves (1, 3, and 5) could themselves be separated into subwaves, and so on, and exhibit other Fibonacci relationships. The golden ratio, or phi, appears frequently enough in the timing of highs and lows and price resistance points that adding this tool to technical analysis of the markets may help to identify fibonacci retracements, the key turning points in price movements. According to Meisner (2012), phi (1.618), may help to identify the key turning points in price movements (fibonacci retracements).

This monograph shows that the golden ratio (0.618), Fibonacci numbers, and the logistic equation are used to predict the equlibrium value of stock price (index).

Also, this monograph shows that the golden ratio (phi) may help to identify the equilibrium stock price (index). Thus, the golden ratio and Fibonacci numbers/ratios can define the equilibrium stock price (index) in Elliott Wave Theory.

In this sense, the basic aim of this analysis is to prove that the golden ratio (0.618) can determine the equilibrium value of stock market index in Elliott wave theory.

This monograph presents a relation between the equilibrium stock market index and the golden ratio, a relation based on the chaos theory (the logistic equation), which utilizes aspects from the Elliott Wave Theory, presented by Ralph Nelson Elliott.

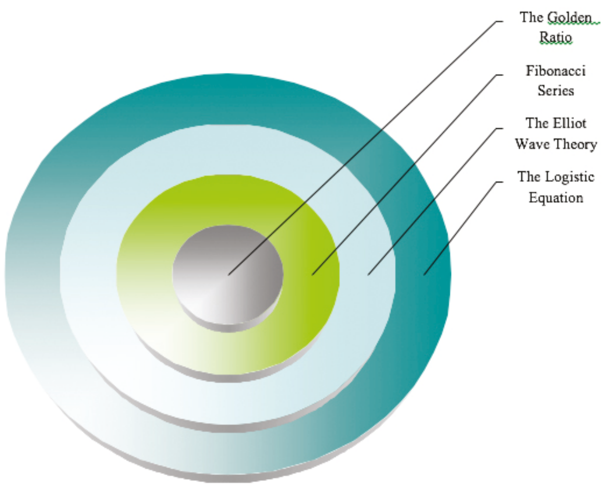

Figure 1. The Equilibrium Stock Market Index Approximates to the Golden Ratio (0.618).

Chapter I

Fibonacci Series and the Golden Ratio

1.1. Fibonacci Numbers

Leonardo Pisano Bogollo (Fibonacci; 1170–1250), an Italian mathematician from Pisa, developed the model to describe the growth of rabbit populations. This is the first model in population ecology.

Table 1.1. In 1202 Fibonacci investigated how fast rabbits could breed in ideal circumstances in one year.

Start			Pair of Rabbits			1
1 month			Pair of Rabbits			1
2 month			Pair of Rabbits	Pair of Rabbits		2
3 month	Pair of Rabbits		Pair of Rabbits	Pair of Rabbits		3
4 month	Pair of Rabbits	Pair of Rabbits	Pair of Rabbits	Pair of Rabbits	Pair of Rabbits	5

He is credited with introducing the Fibonacci sequence in his book Liber Abaci, or "Book of Calculation" in 1202. The Fibonacci numbers are: 0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, etc. Namely, the sequence of numbers 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, and so on to infinity is known today as the Fibonacci sequence. Leonardo Fibonacci da Pisa discovered the Fibonacci sequence. He introduced the decimal system. He discovered the Fibonacci Summation series. This series takes 0 and adds 1 as the first two numbers. Succeeding numbers in the series adds the previous two numbers and thus we have 0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89 to infinity (or 0+1=1, 1+1=2, 2+1=3, 3+2=5, 5+3=8, 8+5=13, 13+8=21, 21+13=34, 34+21=55, 55+34=89, etc.).

Table 1.2. Fibonacci series: f(x) = f(x–1) + f(x–2).

f(x) =	f (x–1) + f (x–2)	
1	1	0
2	1	1
3	2	1
5	3	2
8	5	3
13	8	5
21	13	8
34	21	13
55	34	21
89	55	34

The Fibonacci number sequence has interesting properties:

— each number is the sum of the two prior numbers (1+2=3, 2+3=5, 5+8=13 8+13=21, etc.);
— a number divided by the previous number approximates 1.618, Φ, as the number increase;
— a number divided by the next highest number approximates. 6180 (the golden ratio);
— a number divided by another two places higher approximates. 3820, the basis for the 38.2% retracement;
— a number divided by another three places higher approximates. 2360, the basis for the 23.6% retracement.

These relationships between every number in the series are the foundation of the common ratios used to determine the equilibrium stock market index in Elliot wave theory.

Various Fibonacci ratios can be created in a table shown below where a Fibonacci number (numerator) is divided by another Fibonacci number (denominator). These ratios, and several others derived from them, appear in nature everywhere, and in the financial markets. They are easily seen in nature (seashell spirals, flower petals, structure of tree branches, etc.), art, geometry, architecture, and music.

Table 1.3. Fibonacci Ratio Table.

	N	u	m	e	r	a	t	o	r		
D		1	2	3	5	8	13	21	34	55	89
e	1	1 1	2.00000	3.0000	5.0000	8.000	13.000	21.000	34.000	55.000	89.000
n	2	0.5000	1.00000	1.5000	250000	4.000	6.500	10.500	17.000	27.5	44.5
o	3	0.3333	0.66667	1.0000	1.6667	2.6667	4.333	7.000	11.333	18.333	29.667
m	5	0.2000	0.40000	0.6000	1.0000	1.600	2.600	4.200	6.800	11.000	17.800
i	8	0.1250	0.25000	0.3750	0.6250	1.000	1.625	2.625	4.250	6.875	11.125
n	13	0.0769	0.15385	0.2308	0.3846	0.6154	1.000	1.6154	2.615	4.2308	6.8462
a	21	0.0476	0.09524	0.1429	0.2381	0.381	0.6191	1.000	1.619	2.6191	4.2381
t	34	0.0294	0.05882	0.0882	0.1471	0.2353	0.3824	0.6177	1.000	1.6177	2.6177
o	55	0.0182	0.0364	0.0546	0.0909	0.1455	0.2364	0.3818	0.6182	1.000	1.6182
r	89	0.0112	0.0225	0.0337	0.0562	0.0899	0.1461	0.236	0.382	0.618	1.000

1.2. The Golden Ratio (0.618)

The Golden Ratio (golden mean, golden number, golden proportion) is 0.618. Adding the number 1 to the Golden Ratio = Phi (Φ =1.618). Both 0.618 and 1.618 are used interchangeably to represent the golden ratio because they represent the same geometric relationship (Lidwell, Holden, and Butler, 2010, p. 114).

This definition of the Golden Ratio is accepted in this monograph.

The Golden ratio (Golden Section, Divine Proportion or Golden Mean) is derived from the Fibonacci number sequence. 1.618033988749895… is called Phi (Φ). The inverse of Φ ($1/\Phi$) is 0.6180339887 (φ). The reciprocal of Ø (Phi) is also Ø (Phi) –1.

There is one unique point, however, at which the ratio of the large piece (B) to the smaller piece (C) is exactly the same as the ratio of the whole string (A) to the larger piece (B), and at this point this Golden Ratio of both is 1.618 to 1, or Phi (Φ).

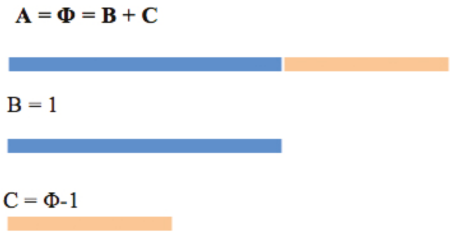

Figure 1.1. Phi ($\Phi = 1.6180339887498895\ldots$), is the solution to a quadratic equation.

If

$$A/B = B/C$$

then

$$\Phi/1 = 1/(\Phi - 1)$$

Further,

$$\Phi^2 - \Phi - 1 = 0$$

Using this quadratic equation (if $\Phi > 1$) gives:

$$\Phi = \frac{1}{2}(1 + \sqrt{5})$$

or

$$\Phi = 1.618$$

Inversely:
if

$$B/A = C/B$$

then

$$1/1.618 = 0,618/1 = 0.618$$

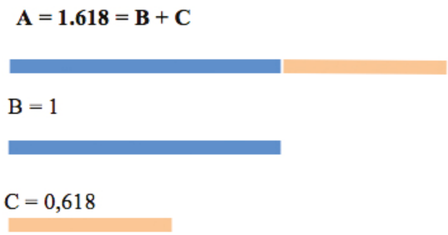

Figure 1.2. The inverse of Φ (1/Φ) is 0.6180339887 (φ).

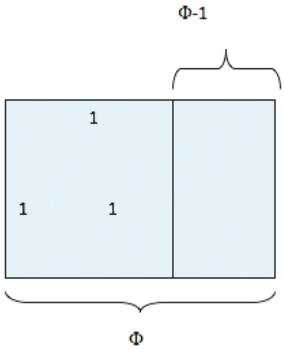

Figure 1.3. Fibonacci Rectangles and Φ.

Further, there are Fibonacci Rectangles.

Connect the corners of the squares and you get the golden spiral.This is a spiral (the Fibonacci Spiral). The shape of a snail shell or some sea shells.

After the first several numbers in the Fibonacci sequence, the ratio of any number relative to the number directly to its right is approximately 0.618 and the ratio of any number relative to the number directly to its left is approximately 1.618, the reciprocal of 0.618.

If we take the ratio of two successive numbers in Fibonacci's series, dividing each by the number before it, we will find the following series of numbers. In this sense, the ratios converge to 1.618. Any number in the Fibonacci sequence divided by the number before it, approaches Φ.

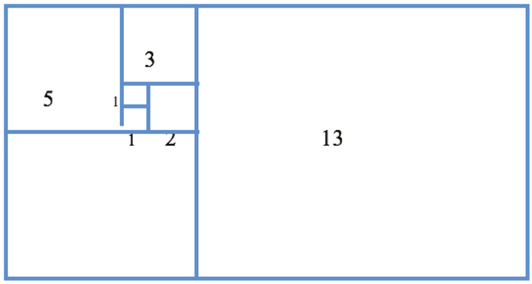

Figure 1.4. Fibonacci Rectangles.

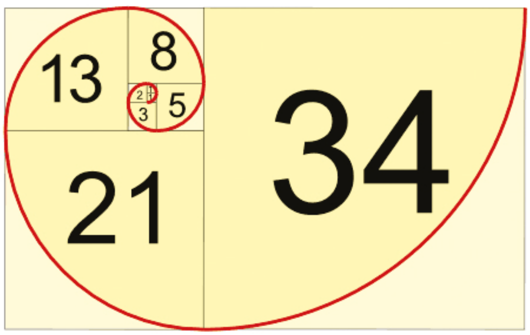

Figure 1.5. The Fibonacci Spiral. Source: https://www.mathsisfun.com.

Table 1.4. The ratio of any number in the Fibonacci sequence relative to the number directly to its left is approximately 1.618.

The Fibonacci number sequence	The ratio of any number in the Fibonacci sequence relative to the number directly to its left	The ratios converge to 1.618
1		
1	1/1	1
2	2/1	2
3	3/2	1.5
5	5/3	1.667
8	8/5	1.6
13	13/8	1.625
21	21/13	1.615
34	34/21	1.619
55	55/34	1.618
89	89/55	1.618

If you plot a graph of these values you'll see that they seem to be tending to the Φ (1.618).

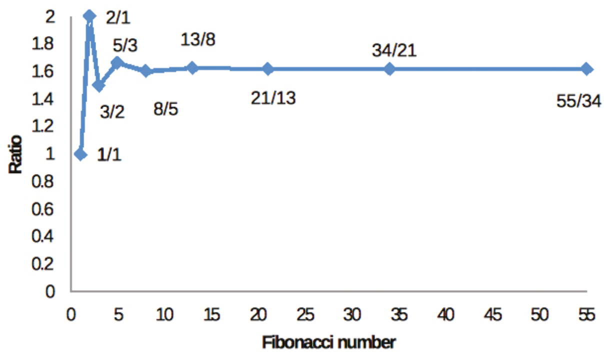

Figure 1.6.

After the first several numbers in the Fibonacci sequence, the ratio of any number to the next higher number is approximately. 618, (as the Golden Ratio or Golden Mean) and the next lower number is 1.618 (Φ).

1.3. There are Many Applications of the Golden Ratio (Φ)

The stock market has the very same mathematical base as do these natural phenomena. Nature relies on the Golden Ratio to maintain balance, but the financial markets also seem to conform to this divine proportion.

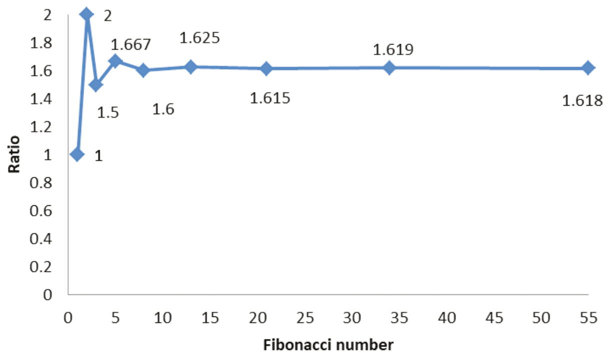

Figure 1.7.

Table 1.5. The ratio of any number in the Fibonacci sequence relative to the number directly to its right is approximately 0.618.

The Fibonacci number sequence	The ratio of any number in the Fibonacci sequence relative to the number directly to its right	The ratios converge to .618
1		
1	1/1	1
2	1/2	0.5
3	2/3	0.667
5	3/5	0.6
8	5/8	0.625
13	8/13	0.615
21	13/21	0.619
34	21/34	0.618
55	34/55	0.618

The Fibonacci series is the mathematical foundation of the Elliott's Wave Theory. Also, the properties of this sequence appear throughout nature and also in the arts and sciences.

The Golden Ratio is involved in such diverse phenomena as atomic structure and DNA molecules, planetary orbits and galaxies, the brain and nervous system, musical arrangement, and the structures of plants and animals. Fibonacci numbers frequently appear in the numbers of petals in a flower and in the spirals of plants:

> 1.618 (or .618) is known as the Golden Ratio or Golden Mean. Its proportions are pleasing to the eye and an important phenomenon in music, art, architecture and biology. William Hoffer, writing for the December 1975 Smithsonian Magazine, said: [. . .] the proportion of .618034 to 1 is the mathematical basis for the shape of playing cards and the Parthenon, sunflowers and snail shells, Greek vases and the spiral galaxies of outer space. The Greeks based much of their art and architecture

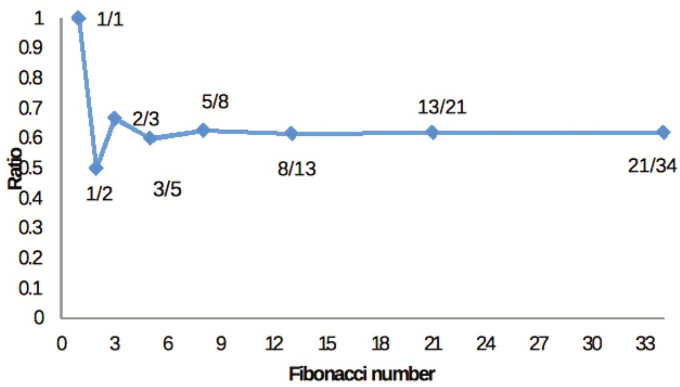

Figure 1.8.

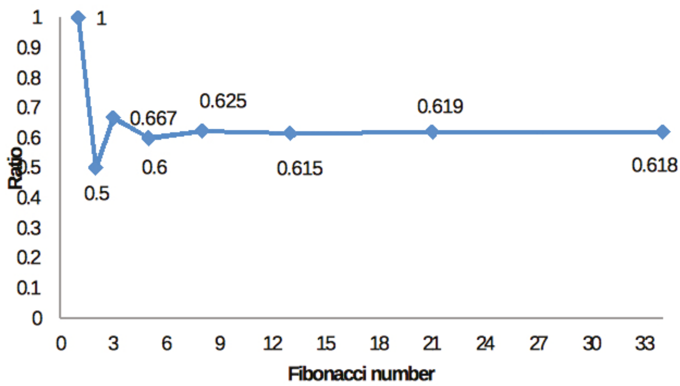

Figure 1.9.

upon this proportion. They called it "the golden mean" (Frost A.J., Prechter R., 2006, p. 54).

The Golden Ratio is found in the proportions of many animals, in plants, in the solar system and even in the price and timing movements of stock markets and foreign currency exchange.

Nature uses the Golden Ratio in its most intimate building blocks and in its most advanced patterns, in forms as minuscule as atomic structure, microtubules in the brain and DNA molecules to those as large as planetary orbits and galaxies. It is involved in such diverse phenomena as quasi crystal arrangements, planetary distances and periods, reflections of light beams on glass, the brain and nervous system, musical arrangement, and the structures of plants and animals. Science is rapidly demonstrating that there is indeed a basic proportional principle of nature. By the way, you are holding your mouse with your five appendages, all but one of which have three jointed parts, five digits at the end, and three jointed sections to each digit (Frost A.J., Prechter R., 2006, p. 55).

There are many examples of the Golden Section or Divine Proportion in nature: the proportions of the human body; The proportions of many other animals; Plants; DNA; The solar system.

Also, Phi appears in: Art and architecture; Music; Population growth; The stock market, etc. For example, the dimensions of the Stradivarius violins built around 1700 show Phi relationships.

Figure 1.10. The Golden ratio indicates an important aspect of nature. Source: https://www.designbyday.co.uk.

Figure 1.11. Phi is related to phenomena as diverse as the petal arrangements of roses, and the shape of our galaxy.

Figure 1.12. A sunflower grows in the Fibonacci Sequence number. Sunflowers, which have opposing spirals of seeds, have a 1.618 ratio between the diameters of each rotation.

Figure 1.13. Pine cones too have clockwise and counterclockwise spirals.

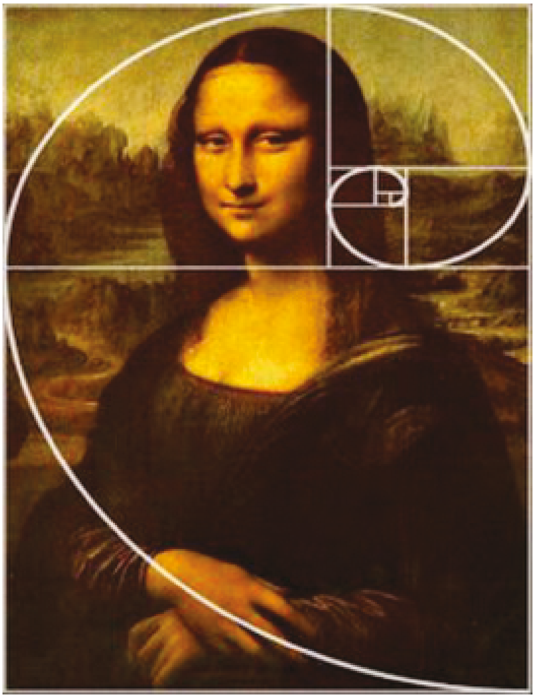

Figure 1.14. Phi is claimed to have been crucial in the design of the composition of the Mona Lisa. Source: https://fibonacciwithart.weebly.com.

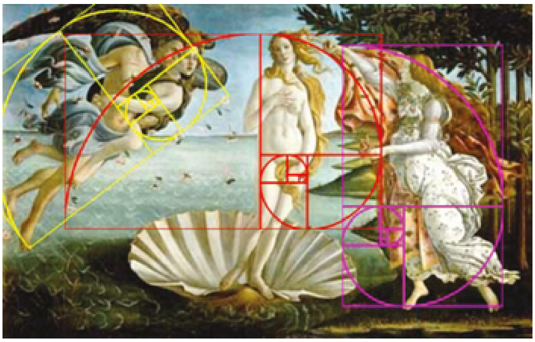

Figure 1.15. Golden Ratio in Art: Sandro Botticelli, "The birth of Venus". Source https://fibonacciwithart.weebly.com.