

**THE PRESENCE OF THE GOLDEN SECTION IN THE MSCI AC ASIA
PACIFIC SHARE PRICE INDEX**

Dr. Lucie Meixnerová,

Moravian University College Olomouc, Tr. Kosmonautu 1288/1, 799 00
Olomouc, Czech Republic.

ABSTRACT

The Fibonacci sequence represents an element, on which not only the financial markets are based, but also other things such as the system of nature, human physique and the entire world around us. The Fibonacci sequence, which is based on the Golden section, is able to predict the price and time scope. This confirms the sequence to be a reliable method, which can be used to determine the dynamics of the share price index development. The basis of the financial market trend analysis is the human behavior, its reactions, motivators and tendency of the investors to be a part of the population crowd. It is possible to identify trends, development changes and financial market price fluctuations while studying the crowd psychology. The crowd is based on opinions, understanding, information and behavior codes, the result of the human behavior is measurable in the financial markets' price fluctuation. The market price fluctuations together with the theoretical bases and the presence of the Golden section in the financial market were proved on the MSCI AC Asia Pacific share price index development in this paper. The presence of the Golden section is not a coincidence, it reveals the prognoses of the financial market price changes, which are a result of the human crowd behavior.

Key words: Fibonacci sequences, Golden section, crowd psychology, share price index

Introduction

The financial markets attract a great deal of investors, which are trying to value up their available resources. Each of them owns the best possible know-how, yet they are not able to

make profits if their behavior is influenced by emotions. The basis for the initiation of the crowd mind might be fear, tension, conflict or stress. The crowd mind arises in the moment when people cease to make decisions based on their own judgment, rather they blindly follow the behavior and decisions of the crowd. The crowd is a dynamic system. If we are trying to analyze the market, we also have to examine the behavior of the crowd, which we encounter on a daily basis through common life situations. The crowd psychology gives us a theoretical frame, which helps us to explain not only normal and abnormal behavior on the financial markets, but also helps us to explain the inner mechanism on which both growth and drop of the share market prices are based. There are many theoretical models which explore the human mind and the effect of the psychological factors on the market share prices. The most of these models indicate that the behavior of the share markets is irrational. The market share prices oscillate, growth, drop and it is probable that certain swinging exists between the opposite market movements and that this swinging is influenced by the crowd behavior. In reality, the crowd behaves based on the given equations of the Fibonacci sequence and the 2,618:1 ratio represents the Golden section. Using the above mentioned ratio we are able to identify the presence of “unstable” cycle in the price changes. This increases accuracy of the price setting (high, low) and final decisions of the investors.

The aim of the paper is to verification of the presence of the Golden section in the share price index of the MCSI AC Asia Pacific.

Leonardo Fibonacci da Pisa (1202, 1220, 1225) defined an ascending sequence of numbers up to infinity. The important character of the Fibonacci sequence is that each number in the sequence divided by the next following number gives a result of approximately 0,618. The number 0,618 is the Golden number. The ratio 0,618:1 is the Golden section and stable ratio between lengths ($0,382:0,618 = 0,618:1$). If we divide higher number of the Fibonacci sequence by a lower number, the result is 1,618. The inverse number to 1,618 is 0,618. Another relation is connected to a number 0,82 (in the sequence represents value second adjacent) and its inverse number 2,618. The Golden section is generally considered to be a haphazard coincidence or an evolutionary genetic consequence and there are minimal efforts to discover further relations and clarifications.

Each relation in the Fibonacci sequence is a sum of two previous numbers. This arranging can be extended by negative relations, which are equal to those positive relations. The Golden

section represents a significant role within the dimension of geometric figures (two and three dimension structure). Dunlap (2006)

The Golden section can be found in the general life, nature, music or art. It is used for quantifications of the social processes and also for observing and examining the market prices and crowd behavior in terms of the financial markets as people always tend to make decisions intuitively according to the numbers around them. The Fibonacci Golden section therefore uses a fact that the investors or the crowd behave according to a predefined set of rules, which can be set using valid formations. The crowd is a dynamic system, which is however unstable in its very existence and that is why a random behavior of the crowd exists within the financial markets. Plumber (2009)

Data

The share price index of MCSI All Country Asia Pacific Index (MSCI AC Asia Pacific Index) from the Morgan Stanley Capital International company has been selected for verification of the Golden section presence. It has been selected as it represents a whole variety of the shares on the market.

MSCI AC Asia Pacific is an index measured by the market capitalization. It is designed to include companies with big and middle capitalization on five evolved markets (Australia, Hong Kong, Japan, New Zealand and Singapore) and eight emerging markets (China, India, Indonesia, Korea, Malaysia, Philippines, Taiwan and Thailand) in the Asia-Pacific region. Share price indexes from December 1969 till July 2014 have been used for the analysis. The initiation value was set as 100 points for the year of 1969. For the graphical visualization of the index composition please refer to attachment 1.

Methodology

For the identification of the price targets, so called index points, a target equation is used, which results from the Golden ration of 2,618:1. This ratio expresses a change of two prices in two dimensions (price, time). The index targets are calculated based on an arithmetic average. Using the equation and number 2,618 it is possible to identify the presence of the index changes. This equation also offers precise predictions of the possible break-even points.

The target equation for the growing market:

$$P_t = P_2 + (P_1 - P_2) \times 2,618 \quad \text{Equation 1}$$

The target equation for the downward market:

$$P_t = P_2 + (P_2 - P_1) \times 2,618 \quad \text{Equation 2}$$

Where P_t is the price target and P_1 and P_2 are points of the share price index.

Results

Graph no.1 and graph no.2 show the trend of the share price index of MSCI AC Asia Pacific and specific reached price targets are colored. The calculation of the price targets for the growing market can be found in the table no.1 and for the downward market graph please refer to table no.2.

A very important matter of fact between the prediction and the actual index points result in years 1989 to 1998 is the drop of the share price index by 684,010 points. This drop is connected with the downfall of the Japan index Nikkei 225 and with the beginning of the Japanese recession. The level of 2373,134 points has actually never been exceeded. The dark time for the share market also is the period from summer of 1997, when the Asia financial crisis has started.

From the calculations of the downward market index prices, calculated for period 2012 till nowadays the result is that so far the index targets have not been reached and an index drop to the level of the price targets can be expected in terms of months or years.

It is probable that if the targets are not reached, the crowd panics, which forms conditions for the changes and emphasizes the price calculations effect.

Table 1: MSCI Asia Pacific, the growing market

Date	Points	The price target	The real target
31. 3. 1973	203,988		
31. 10. 1974	111,092		
29. 2. 1984		354,293	356,884
31. 7. 1981	300,123		
30. 9. 1982	246,019		

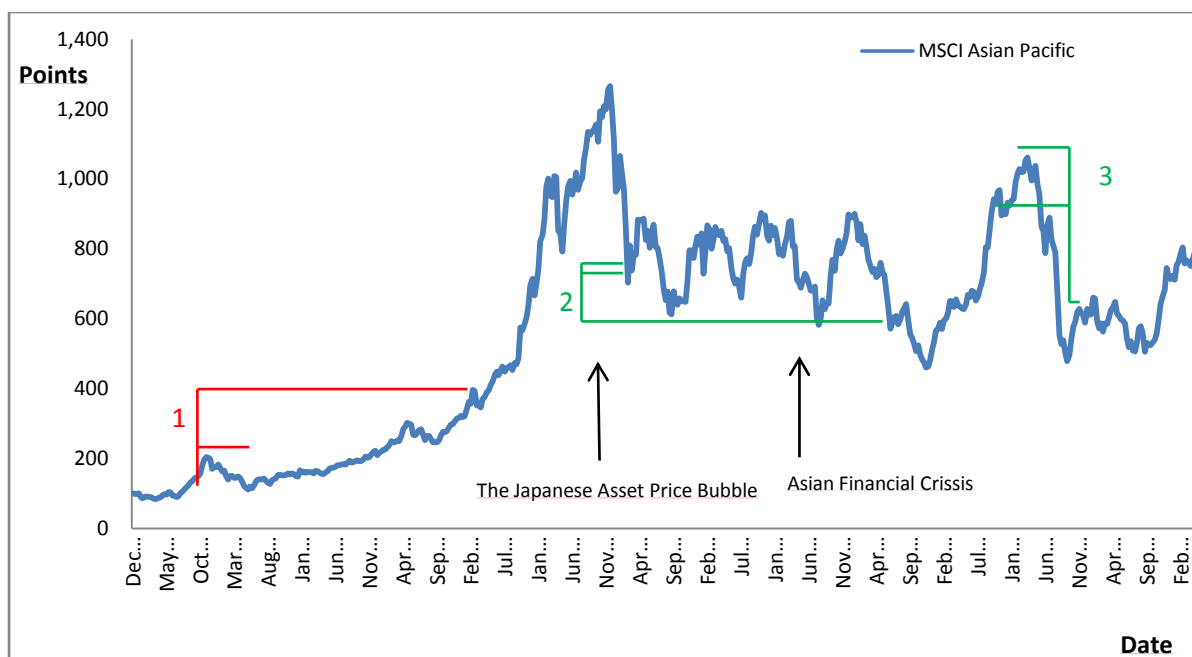
31. 10. 1984		387,663	389,946
29. 12. 1989	1266,291		
30. 9. 1998	582,210		
		2373,134	not reached
31. 3. 2000	900,303		
31. 3. 2003	460,334		
		1612,17	not reached
31. 3. 2002	641,800		
31. 3. 2003	460,334		
31. 8. 2006		935,411	932.255
19. 9. 2012	547,386		
11. 10. 2012	525,807		
15. 10. 2012		531,456	530,182
22. 5. 2013	792,350		
13. 6. 2013	672,683		
		985,971	not reached
23. 7. 2013	759,447		
28. 8. 2013	711,464		
24. 9. 2013		759,447	762,983
2. 1. 2014	805,330		
4. 2. 2014	722,518		
4. 7. 2014		805,330	803,270
4. 4. 2014	770,409		
14. 4. 2014	737,535		
31. 7. 2014		823,615	812,527

Table 2: MSCI Asia Pacific, the downward market

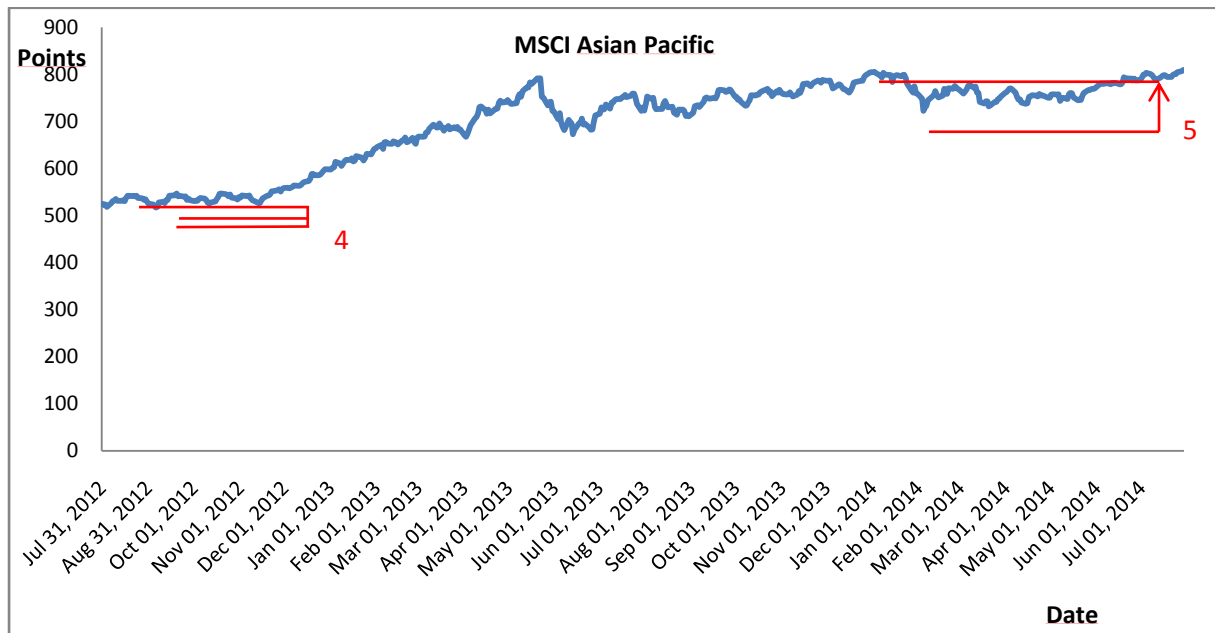
Date	Points	The price target	The real target
30. 11. 1970	83,683		
31. 1. 1973	203,988		
31. 10. 1974		110,970	111,092
31. 10. 1974	111,092		
31. 8. 1987	1008,528		
29. 12. 1989		1340,95	1266,921
28. 9. 1990	703,273		
31. 10. 1990	809,384		
28. 9. 2001		531,583	570,999

31. 5. 2006	895,978		
29. 7. 2007	1061,992		
31. 8. 2009		627,367	628,358
31. 3. 2003	460,334		
29. 6. 2007	1061,992		
28. 11. 2008		513,1486	526,961
31. 5. 2012	505,466		
29. 6. 2012	530,736		
		464,579	not reached
13. 6. 2013	672,683		
23. 6. 2013	759,447		
		672,683	not reached
25. 6.2013	682,581		
2. 7. 2013	729,844		
		606,109	not reached
30. 8. 2013	711,253		
26. 9. 2013	767,920		
		619,565	not reached
4. 2. 2014	722,518		
7. 3. 2014	778,736		
		631,557	not reached

Graph 1: MSCI Asia Pacific, 12/1969 - 07/2014



Graph 2: MSCI Asia Pacific, 07/2012 - 07/2014



From the analysis we can observe that the share price index runs on a mathematical basis of the Fibonacci numbers. The analysis also confirms the presence of the Golden section and related mutual connections on the share price market. The understanding of the financial market while using the Golden section to determine the price target encourages the investors' confidence that the expectations will be met. The reasons for not reaching the targets and for unstable and unexpected price changes of the MSCI AC Asia Pacific might be e.g. media, political changes, economic or financial changes, government shake-out or other factors that might not have been expected. The crowd examines these factors and using the data it reconsiders the final decisions. The new information can bring doubts, stress as well as optimism of the investors, relating to the future development of the market and its share index.

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Attachment 1

Graph 3: The index composition

