Stock market analysis of a Unibank using Fibonacci Ratio

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Several studies about the US stock market have been conducted to show that there seems to be a pattern in the rise and fall of stock prices. Technical market analyses were done using the Fibonacci Series, Candlestick Pattern, Stochastic Analysis, and Golden Ratio to trace the trends in the stock market. This study is a retrospective analysis of the local stock market performance of one of the most active stocks of the Philippine Stock Exchange. Fibonacci ratios in Fibonacci Retracements and Fibonacci Fans were employed to determine their effectiveness as tools of technical market analysis. The analysis of the random performances of highs and lows and of price resistant points of the stock market revealed that trends have patterns in the local stock market. The observed patterns became more visible when the Fibonacci ratios were applied on the charts. A pattern can lead to the process of detecting alert zones or regions, which could either call for support or reversal. The application of Fibonacci retracements and fan lines using the Fibonacci ratios proved to be effective in the stock market analysis of the Unibank, which is the subject of this study.

Keywords: Stock market, Fibonacci Ratio, Fibonacci Retracements, Fibonacci Fans

Introduction

Stock market analysts use different ways in making business forecasts. Among the methods used is the analysis using Fibonacci Numbers as a way to forecast the level of support and resistance, to project price targets, to set stops and timing entries, and most importantly, to give valuable information about risks (Jagerson, 2008). Jagerson used the Fibonacci analysis to create a trigger to buy in an uptrend when the stock has a high probability of continuing to rise rather than randomly entering a given stock.



Copyright © 2014 University of Santo Tomas Graduate School More important than the sequence of numbers in Fibonacci Numbers -0, 1, 1, 2, 3, 5, 8, 13, 21, ... is the ratio obtained by using the numbers in the sequence. The key Fibonacci ratios expressed as percentages are 0%, 23.6%, 38.2%, 50.0%, 61.8%, 78.6%, and 100%. 61.8% is referred to as the Golden Ratio or the Golden Mean. It is found by dividing a number in the sequence by the number that comes after it, i.e. .

$$\frac{5}{8} = 0.6250; \ \frac{8}{13} = 0.6153; \ \frac{13}{21} = 0.6190$$

The Fibonacci ratio is considered as one of the most important tools in technical analysis. Although the 50% level is not really a Fibonacci ratio, it is also used because of the observed tendency for an asset to continue in a certain direction upon completing a 50% retracement level.

As early as the 1930s, Ralph Nelson Elliott started a systematic study of seventy-five years of stock market data and concluded that movement in the stock market could be predicted by identifying and observing a repetitive pattern of waves. In August 1938, his book written in collaboration with Charles J. Collins entitled The Wave Principle was released. He wrote that while stock market prices may appear random and unpredictable, they are actually not. They follow natural laws that are predictable and measurable. His theory suggests that the stock market moves up in a series of five waves and down in a series of three waves, which are based on rhythms found in nature.

Practitioners in the stock market continue to use the Elliot Wave Principle (EWP) even after Elliot's death in 1948.In



Figure 1. The Elliot Wave Principle from sentitrade.com 1979, Robert Pretcher, an American author and stock market analyst known for his financial forecasts using the EWP, published his first subscription issue of the Elliot Wave Theorist. He wrote in 2003 that a completed Elliot wave displays Fibonacci price and time relationships among its components. Pretcher is the most widely known Elliot analyst. It was said that the DJIA or the Dow Jones Industrial Average met the idealized wave that satisfied the guidelines that satisfied the guidelines by the Fibonacci waves in January 2000.

Jeff Greenbalt (2008), in his article "How to time market reversals with Fibonacci Numbers" discussed the time function as an essential element unknown to most people. He asserted that markets are not random but very precise. Based on observation and trading, he discovered that there appeared a more precise way of using the Fibonacci studies, aside from the effectiveness of 38.2%, 50.0%, 61.8%, and 78.6% retracement levels. He presented the Lucas Series, which was conceptualized by the French Mathematician Edouard Lucas who gave the Fibonacci Series its name. The price action corresponds to the calculated Fibonacci ratios. The Lucas series travels along the Fibonacci

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price axis, the prices also move along a time axis with perfect market precision. Greenbalt also discovered that markets tend to reverse on a Fibonacci number, on a Lucas number, or over the course of a pattern, a combination of the two. Understanding Fibonacci and Lucas symmetries as a key underlying structure of financial markets gives one a huge edge in trading and forecasting.

Soeini, Niroomand, and Parizi (2012) used the Golden ratio and Fibonacci numbers in their research paper as a suitable solution for forecasting the stock market. This series and its ratios showed to have a beneficial effect by ensuring on-time correct forecasts that can lead to a considerable income increase. In most cases, trends answer to the markets. Moreover, based on the capital market, Fibonacci series provide accurate predictions and are assumed as the complete form of Elliot's theory.

Mark Deaton (2008) in one of his articles in the Fibonacci Genius, mentioned that the Fibonacci ratios are one of the most commonly used techniques for the technical analysis of financial markets. Fibonacci retracements provide valuable insights and triggers as to where a high-probability change will happen. Fibonacci extension is less common but powerful when correctly applied. Used as a part of money-management strategy and as a profit-target projection tool, Fibonacci extensions help determine where price will potentially stall or change direction. And when used in combination, these two sets of ratio provide tradable indicators of opportunity.

Existing patterns in the dynamics of local stock markets have been the topic of research works conducted in other countries. Some of these studies focused on the trends and patterns of other countries so as to achieve outcomes similar to local contexts. Certain studies in Asia revealed that technical trading rules have a predictive power for changes in some Asian stock market indices; such observation is consistent with the reason that these markets are or were, during the sample informationally period, inefficient (Bessembinder & Chan, 1995). However, the authors just cited observed that there are alternate explanations, so they conducted additional tests to shed light on them. They found that there is a substantial cross-market correlation in the signals emitted by technical rules, and they documented that the buy-andsell signals emitted by the technical rules in the U.S. Market contains forecast power for returns in the Asian markets. This type of commonality is consistent with the reason that the technical rules identify periods when equilibrium expected returns deviate from unconditional means.

A study conducted in China by Chen, Huang, and Lai (2009) investigated the profitability of technical analysis among eight Asian stock markets from 1975 to 2006. The findings revealed that when nonsynchronous trading bias and transaction costs are ignored, the best strategies in their sample are o □ered by short-term moving averages rules. Likewise, when a one-day lag scheme is implemented to account for nonsynchronous trading bias, changes occur in the optimal trading rules, and there is also a sharp decline in trading profits. Another finding is that when transaction costs are taken into account, the most profitable rules switch to those that are based on long-run moving averages; at the same time, there is a substantial decline in trading profits. As a result, both the reality check and the superior predictive ability test reject the existence of economically profitable rules in all of the Asian stock exchanges. These results clearly show that economic profits are unlikely to be earned from the use of technical analysis within these particular markets.

In the Philippines, research activities pertaining to stock market were only limited to the efficiency of the stock market and the influence of certain industry sectors on the risk behavior in the Philippine Stock Exchange.

Method

Setting

A comprehensive data collection of monthly price activities from records available between 2011 and 2012 was done during the period June 2012 to January 2013.

Data Collection

Data on stock prices of the Unibank, which is one of the most active stocks listed, were obtained from the Philippine Stock Exchange.

Processing and Data Analysis

A systematic review of research was done to reduce the bias that can occur in other approaches. Relevant published and unpublished evidence regarding the analysis of trends in foreign stock market were studied. From the collected data, trend analysis was used to determine how a potential driver of change develops over time. Fluctuations in the stock market indicate the direction of the stock's value. Doing a trend analysis provides a powerful tool for developing an open mind, thus, avoiding prejudices. Among the tools in technical analysis, the Fibonacci Analysis was used in the study. The Fibonacci ratios were applied to the data chart to forecast and project price targets. In this study, only the standard levels of 23.6%, 38.2%, 50.0%, 61.8%, 78.6%, and 100% were used.

Since Fibonacci Analysis is subjective in nature, the application of the ratios on the charts was on the shadows of a candle rather than on the body so as to include the extremes of market sentiments. This is followed by the evaluation of support and resistance lines or areas of the Fibonacci Lines formed in the charts. Fibonacci Retracements and Fibonacci Fan Lines were then used to understand the risks and opportunities in the real-market situation. Both are effective tools to identify support and resistance levels, stop and price target levels, and entries and exits into the market.

Fibonacci Retracement

Fibonacci tools work best when the market is trending. The trend of the stock price chart selected was first identified. Fibonacci Retracements are the ratios used to identify potential reversal levels. Fibonacci retracement is done by taking two extreme points, a peak and a trough, on a stock chart and dividing the vertical distance by the key Fibonacci ratios. Horizontal lines are drawn on the levels to identify possible support and resistance levels. Support level refers to the level at which many buyers tend to enter the

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stock while resistance level refers to the level at which the stock finds it hard to break through it and may be lower in the next term. The most popular retracements among the standard levels are 38.2% and 61.8%. Many traders consider these retracements to be the best since they give the traders a better price in entering their trade in the market, thus, yielding a larger profit.

In this tool, stocks that show trending prices will often pull back or retrace a percentage of the previous move before reversing. The trend of the stock price chart chosen should be identified first. Prices tend to go up, down, or even sideways. Determining the trend on whether it gives an upward trend or a downward trend would be the pattern on drawing the Fibonacci retracement lines. From these lines, reversal points will be located. After looking intently into where the stock moves, which should be indirectly proportional with its trend, retracement on only part of the move is done before the movement continues to the desired direction. The retracement levels on the chart are then plotted to see existing signs of reversals by applying the Fibonacci Ratios. These levels are used as the support or resistance areas or lines. Marked areas on the chart, from which there seems to be existing reversals, are evaluated and interpreted.

Fibonacci Fans

To understand and analyse the movements of prices in the stock market, the Fibonacci Fans was used alongside the Fibonacci Retracements. Fibonacci Fans refers to a charting technique that makes use of diagonal lines which are supported by the standard level Fibonacci ratios to help construct support and resistance trend lines based on time and price.

To start, one has to determine where to put the anchors in the selected charts. An experienced analyst puts the anchors at the lowest point and the highest point on the chart. As this can also depend on one's preference, this part is considered subjective. Based on the Fibonacci ratios 61.8%, 50%, and 38.2%, there will be three diagonal lines formed as the two anchors are connected. Once the lines are drawn, the support and resistance levels are created. These lines measure where prices may reverse and likewise forecast the limits of trend.

As with any other Fibonacci tools, using Fibonacci Fans with other technical market analyses would be a great support in arriving at better analyses and interpretations in evaluating stocks. Alex Douglas (2001) mentioned in his research that numbers from the Fibonacci sequence are also often used as the parameters for calculating various technical indicators like the multiple moving averages or period moving averages. Yet, Fibonacci is not a stand-alone technique. While many traders consider this method as very helpful, it is also somehow considered basic, and so another technique must be used for another objective like price projection. Prices in financial markets are, to some point, predictable from their prior price behavior. There is a proposition that when the market changes direction after a period of trending prices, a magnitude and duration of the next trend is not random but depends on the magnitude and duration of the previous trend. A research paper in London by Batchelor and Ramyar (2006) tested the mentioned proposition on the behavior of the stock market. Using the Dow

Jones Industrial Average (DJIA) as method, ratios of the length and duration of successive price trends are clustered, proving that Fibonacci ratios are evident and reliable within the said method and enabling the identification of potential turning points.

In this study, the Fibonacci tools are used not as a predictive tool. Most people use the Fibonacci tools in their stock and trades

believing that these will give them the chance to predict when to buy a stock, that is, when the prices will go down. These tools have been widely used across the world, yet there is no 100% efficacy in their application. The proponents of this paper only apply these tools as an anticipatory tool.

Results and Findings

Figure 2 shows that the Fibonacci retracement starting the year 2011 was on a downtrend to the trough in late February. The initial trough is a good entry point for long-term traders because the retracement occurred on the 100% level in a span of three months.

Table 4.1 Retracement point for data in Figure 3

Α	Price	Fib. Level	Retracement Point
Low	45.80	0.0%	45.80
		23.6%	48.90
		38.2%	50.82
		50.0%	52.38
		61.8%	53.93
		78.6%	56.14
High	58.95	100.0%	58.95



Figure 2. Price dynamics of the Unibank from January to August 2011

There were small reversals as seen from the graph, but these were resisted by the Fibonacci levels on coming back to its primary trend, which is downtrend.

A pullback happened upon hitting the highest retracement level. It rallied for a week before bouncing on the 50% level that led the market to go up beyond the initial peak. Redrawing of retracement levels was done based on an uptrend this time since a new peak was established. The chart in Figure 3 shows that at the second trough where the price hit the same level as the initial trough, a quick reversal happened. The levels that mostly helped in supporting their corresponding trend are the three upper ratios starting with the

Table 4.2 Retracement point for data in Figure 3

В	Price	Fib. Level	Retracement Point
High	59.50	0.0%	59.50
		23.6%	56.27
		38.2%	54.27
		50.0%	52.65
		61.8%	31.03
		78.6%	48.73
Low	45.80	100.0%	45.80

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Figure 3. Price dynamics of the Unibank from January 2011 to January 2012

50% level. As the graph reversed on the 100% level, it was slow and marked by small reversals again but this time going beyond the initial peak.

From Figure 4, the price continued playing only on the upper area of the 50% retracement level. After three weeks, a major turnover happened on the 50% level, which seemed to go back to the rate as the previous market speed. Thus, another good entry point

Table 4.3 Retracement point for data in Figure 5

С	Price	Fib. Level	Retracement Point
High	69.20	0.0%	69.20
		23.6%	64.43
		38.2%	61.48
		50.0%	59.10
		61.8%	56.72
		78.6%	53.32
Low	49.00	100.0%	49.00

was created starting from the point of the 50% retracement level.

The next section presents the analysis of the data charts using the Fibonacci ratio for Fibonacci Retracement and Fibonacci Fan Lines.

Within the chosen swing low and swing high, the 23.6% fan line already demonstrated a support level as shown in Figure 5. Even the 23.6% retracement ratio served as a support in the market as it rallied through the month of May. The first alert zone placed at the start of June showed that it was a preparation for a pullback going down to 38.2% level until finding its support. However, it took a few more days for the graph to go up beyond the 50% level. It got through the half-retracement in the beginning of July when another alert zone was set on the same retracement ratio but with the 50.0% fan line ratio. However, it then functioned as a support in the original trend. On the increasing movement of the market, it reached the next alert zone that has 61.8% fan line ratio which again signalled that the market would continue the existing



Figure 4. Price dynamics of Unibank from October 2011 to December 2012

Table 4.4 Data points (A) for Fibonacci Fan	
Lines with Retracement	

	A1	A2	A3	A4
	57.000	56.175	59.000	60.750
	57.100	57.200	58.850	60.000
	56.750	55.750	60.800	59.550
	55.950	55.150		60.000
				59.200
				60.900
				59.100
				60.000
				58.550
				59.400
				59.000
				58.400
				59.559
MIN	55.950	55.150	58.850	58.400
MAX	57.100	57.200	60.800	60.900
AVE	56.700	56.070	59.550	59.570

movement. Not later than a month, the market hit its peak on the 78.6% level before it again retraced all the way down through the 23.6% retracement ratio. Hence, it would probably be best to enter and trade with the company in early June because the market went

high enough before falling deep down the lowest Fibonacci level.

The market continued in the alert zone until it hit 61.8% fan line ratio, letting the graph to rise sharply stopping on the next alert zone. This new match of Fibonacci ratios served as a resistance area giving three weeks of decreasing price. It bounced on the 50.0% retracement ratio before the market increased

Table 4.5 Data Points (B) for Fibonacci Fan Lines with Retracements

	B1	B2	B3
	56.950	52.150	56.500
	57.250	52.950	56.850
	55.850	53.000	56.500
	56.000	54.100	57.350
	57.450	51.800	55.400
	56.000	52.850	
	57.000	53.350	
MIN	55.850	51.800	55.400
MAX	57.450	54.100	57.350
AVE	56.640	52.890	56.520

going beyond the initial peak. The chart shows that earlier from where the chosen

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Figure 5. Retracement levels with fan lines of the Unibank from January to October 2011



Figure 6. Retracement levels with fan lines between 2011 and 2012



Figure 7. Retracement levels with fan lines October 2011 to December 2012.

	C1	C2	C3	C4	C5
	63.950	61.050	61.550	64.450	64.900
	64.700	63.250	61.250	63.250	64.600
	66.725	61.500	61.050	64.000	65.750
	66.000		61.150	62.900	65.900
	64.950		61.850	63.000	64.300
	65.050				63.000
	65.500				63.100
	63.000				63.000
	62.400				64.750
					65.000
					63.600
					62.950
					63.500
					64.000
MIN	62.400	61.050	61.050	62.900	62.950
MAX	66.730	63.250	61.850	64.450	65.900
AVE	64.700	61.500	61.370	63.520	64.170

Table 4.6 Data Points (C) for Fibonacci Fan Lines with Retracements

swing high was plotted, both the 23.6% levels of retracement and fan line ratio acted as a support for the market just like what happened in Figure 2.

The market fell right after reaching its highest point. Thereafter, it touched the first alert zone that gave way for the market to continue declining until hitting the next alert zone just below. It was a safe area that made the trend to rally within 23.6% and 38.2% retracement levels. As the market sank below the previous support, a major reversal happened on the 61.8% level before meeting the last alert zone for this figure. This area held the market for about a month with an average price of 64.17 before finally cutting through the initial peak.

Examining the price dynamics of the Unibank indicated that as price moves either upward or downward, there is a recognizable pattern that becomes more obvious when the Fibonacci Ratios were applied to the charts. This shows that the market price retraces on the Fibonacci levels before continuing the prior trend. A pattern then leads to the process of detecting alert zones. With the construction of the different sets of retracement levels in the charts, the results show that a reversal usually takes place when the price hits either 38.2%, 50%, or 61.8% levels. When that happens, the continuance of the trend will be substantiated. With the retracement levels used alongside the fan lines, the alert zones become more predictive; that is, either the price retraces a previous level or it takes a rally or long run and stays undecided within the region before it rises or falls. A fan line considers both the time and the speed of the price that make the alert zones here more analytical than those detected using the retracement, which has the price as its only In the three levels previously basis. mentioned, the reversals are usually considered significant. These reversals must be actually monitored and marked as alert zones by a trader. Some turning points hitting other ratios can possibly act as a support or a resistance. But based on the results, these regions become

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confirmatory zones. The trader, then, can probably wait for the graph to touch the confirmatory zone, and if a breakthrough happens, the trend would continue. If one familiarizes himself with this part of the process, he would have a lesser risk and higher opportunities in investing. Note that the computed price from where the graph can possibly have its shift is not far from the mean value of the prices within the alert zone. This observation goes the same for the two methods used.

Conclusions

Taking into consideration the speed of the movement other than the time interval covered by the price, the Fibonacci fan lines with the retracement levels is more effective than just using the retracement levels.

Future Outlook

Other methods in exploring the price dynamics of different stocks can be used, e.g., the Fibonacci Time Extensions and the Fibonacci Time Projection. The use of these methods may not only detect alert zones but also consider the progress of the market. When combined with the methods used in this research, one may predict more quickly when and where the price could possibly retrace.

References

- Batchelor, R & Ramyar, R., 2006, 'Magic Numbers in the Dow, London', Cass Business School.
- Bessenbinder, H & Chan, K. 1995, 'The Profitability of Technical Trading Rules in the Asian Stock Markets', *Pacific-Basin*

Finance Journal, Vol. 3, pp. 257 – 284.

- Chen, C., Huang, C., Lai, H., 2009, Journal of Asian Economics. The Impact of Data Snooping on the Testing of Technical Analysis: An Empirical Study of Asian Stock Markets, Vol. 20, no. 5, pp. 580 – 591.
- Deaton, M., 2008, Fibonacci Genius. Available from http://fibonaccigenius.com.
- Deaton, M., 2010, Fibonacci Clustering. Available from http:// fibonaccicode.com
- Douglas, A. "Fibonacci" The Man and the Markets', *Standard and Poor's Economic Research Paper*, February 20, 2001. Available from: GlobalMarkets.com.
- Greenbalt, J. How to Time Market Reversals with Fibonacci Numbers, 2008. Available from: <http:// www.tradingmarkets.com/.site/stocks>. [10 August 2012].
- Jagerson, J. Stock Market Analysis and Fibonacci, Part I, 2008. Available from: < http:// www.tradingmarkets.com/.site/stocks>. [10 August 2012].

Jagerson, J. Stock Market Analysis and Fibonacci, Part 4, 2008. Available from: < http:// www.tradingmarkets.com/.site/stocks>. [10 August 2012].

Pretcher, R. 2003, 'Fibonacci in the Stock Market', Futures: News, Analysis & Strategies for Futures, Options & Derivatives Traders, pp. 40-41 [15 August 2012].

Soeini, R, Niroomand, A, & Parizi, A. 2012, 'Using Fibonacci Numbers to Forecast the Stock Market', International Journal of Management Science and Engineering Management, Vol. 7, no. 4, pp. 268 – 279 [15 August 2012].

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