FORECASTING DiGi CLOSING SHARE PRICES USING ARMA MODELS

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I hereby declare that this dissertation contains my original research work. Source of findings reviewed herein have been duly acknowledged.

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ABSTRAK


Dalam kajian ini, dua siri akan dipertimbangkan iaitu siri yang pertama tidak ada nilai pada hari-hari yang tidak dinagakan. Sebagai contoh hujung minggu (Sabtu dan Ahad) dan cuti-cuti umum. Manakala siri yang kedua dimana nilai-nilai ini telah dianggarkan dengan menggunakan kaedah cubic spline.

ABSTRACT

The purpose of this research is to predict DiGi share market by using time series approach and ARMA model. In this study, the data being employed is from 3 January 2000 to 31 December 2007. The data range from 3 January 2000 to 30 August 2007 was used to form the ARMA models while the remaining of the data which is from 1 September 2007 to 31 December 2007 was used to validate the adequacy of the model formed.

In this study, two series have been considered which are the series with unobserved data and the series with the unobserved data being estimated by using cubic spline approach. In this research, the order of the ARMA models has been set to $p+q \leq 10$. Therefore, there are 65 possible models for each series. These possible models will be eliminated to selected models and lastly the best model.

In this research, four best models have been considered which are the best model from the series with the unobserved data and the best model from the series without unobserved data. Furthermore, there are another two alternative best models were taken into consideration in this research. However, at the end of this study, there is only one “best of the best model” being utilised in this study for future short term forecasting. The accuracy of the forecast was compared by using Mean Absolute Percentage Error (MAPE).
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LIST OF SYMBOLS

- \( p \) order of autoregressive models
- \( q \) order of moving average models
- \( \leq \) less than or equal
- \( \geq \) greater than or equal
- \( = \) equal
- \( \neq \) not equal
- \( + \) addition
- \( - \) subtraction
- \( \times \) multiplication
- \( \div \) division
- \( \Sigma \) summation
- \( n \) number of observations
- \( k \) number of parameters
- \( SSE \) sum of square residuals/sum of squared resid
- \( df \) degree of freedom
- \( UCL \) upper control limit
- \( LCL \) lower control limit
CHAPTER 1

INTRODUCTION

1.1 OVERVIEW OF THE PROBLEM

DiGi Communications Sdn. Bhd. (DiGi) is selected in this research basically because of the company’s prospect and the annual financial performance of the company. Besides, in these latest years, the share prices of DiGi always shows continually increment or at least maintain at steady growth stage even there are the periods the share prices turn “down”. Moreover, DiGi is an active share listed on the Kuala Lumpur Stock Exchange (KLSE) main board under the Infrastructure Project Companies Category which in fact affect the Kuala Lumpur Composite Index (KLCI) as well. According to Bursa Malaysia (2007), DiGi is categorized as one of the blue chip company out of the 100 blue chip companies. Kok and Goh (1995) claimed that as one of the blue chip company, DiGi appeared to has big market capitalization and unrestrained by debt. Market capitalization here defined as the number of outstanding shares of stock multiplied by the current price-per-share. Annual report of DiGi for year 2005 stated that DiGi’s mission is to meet individual needs in various functions such as communications, connectivity, and access to information with appropriate security with specific and concrete solution. Along with that,
DiGi also provide an environment where employees can grow and be fulfilled while shareholders to gain superior returns in their investment. Hence, all of the criteria discussed above can actually enhance our country’s economic growth and thus improve the standard of living in Malaysia with the advanced communications’ technology.

1.1.1 History of DiGi

According to DiGi annual report for year 2001, DiGi is a mobile communication company that provides a comprehensive range of convenient, affordable and easy to use wireless services to simplify and enrich the lives of its customers. On the whole, DiGi creates and attracts customers by selecting the most appropriate cutting edge technology so that users are benefits from its products and services which have various choices to suit variety of customers.

DiGi is the leader in voice and data prepaid services that have set industry benchmarks for creativity and innovation. These services are offered under the DiGi prepaid brand name. Alternatively, DiGi also provides postpaid services under the DiGi postpaid brand name.

From DiGi’s annual report for year 2005, DiGi Telecommunications Sdn. Bhd. was founded in September 1994 called Mutiara Telecommunications. At 24 May 1995, DiGi be the first telecommunication company in Malaysia to launch and operate a fully digital cellular network (GSM 1800). In July 1996, Swisscom purchased part of the shares and the name of the company was changed to DiGi Swisscom. In year 1997, DiGi
be the first telecommunication company (then known as Mutiara Swisscom Bhd.) listed on the Kuala Lumpur Stock Exchange (KLSE) main board under the Infrastructure Project Companies Category. Swisscom divested its ownership in 1999. In January 2000, one of the DiGi’s main shareholders sold 30 percent of the company’s shares to Telenor, Norway’s incumbent telecommunication operator. May 2000, the name of DiGi Swisscom Bhd., the holding company of DiGi Telecommunications Sdn. Bhd. was changed to DiGi.Com Berhad. In June 2000, Telenor bought an additional three percent of the company’s shares. The remaining shares (11.1 percent traded on the KLSE) are held publicly and 56 percent by private investors. At December 2000, iDiGi have been launched. DiGi’s new internet Dial-up Access Services in Klang Valley which ensures faster access speeds and reliability. December 2005, DiGi endorsed an industry standard on mobile broadband service that will enhance confidence in the quality of 3G.

1.1.2 Share/Stock

Sincere (2004) stated that a share is simply part of ownership of a business. Owning share means participate in the company’s performance in the form of profits which can be given as dividends and/or capital growth through the value of shares increasing. The money that investors invest in the company will be used for other investors to finance its business or expand the business without having to borrow money. However, Hirt and Block (2005) proposed that owning the common stock of a large corporation does not carry the same ownership rights. For example, shareholders of DiGi cannot tell the management how to run the company or what types of products and services they should be producing. Its
existence does not depend on the people who run it. Hirt and Block (2005), this is because shareholders’ rights are limited.

In Malaysia, Kok and Goh (1995) said that Kuala Lumpur Stock Exchange (KLSE) is the only stock market. KLSE plays a very crucial and climactic function in developing the economic of the country. Wong (1993) defined stock market as a marketplace where people come together to buy and sell shares. Therefore, the price of share is determined by the buying and selling pressure. Stock prices change everyday as a result of market forces. Sincere (2004) explained this by the mean share prices change because of supply and demand. If more people want to buy a stock (demand) than sell it (supply), then the price moves up. Conversely, if more shareholders want to sell their stocks than buy it, there could be greater supply than demand, and the price would fall. The principal theory is that the price movement of a stock indicates what investors feel a company is worth. This involves what news is positive for a company and what news is negative. The company which has a lot of positive news will assure a higher share prices and vice versa.

When the price of a particular stock rises, that stock is said to be “up”, meaning increase in the price. When the price falls, the stock is said to have gone “down”. The terms “up” and “down” are also use to describe the rise and fall of the market as a whole. As a shareholder or stockholder, as a company makes money, the value of its stock goes up. Conversely, if a company loses money, shareholder or stockholder would also share the loss. Furthermore, the price of a stock does not only reflect a company’s current value but it also reflects the growth that investors expect in the future.
Faerber (2000) stated that the most important factor that affects the value of a company is its earnings. Here, earnings are the profits a company makes, and in the long run no company can survive without these earnings or profits. Public companies are required to report their earnings. The reason behind this is that analyst base on their future value of a company on their earnings projection. If a company’s results surprise (are better than expected), the price jumps up. If a company’s results disappoint (are worse than expected), then the price will fall.

“Bear market” can be described as a time when stock prices have been falling on the whole. Meanwhile, a “bull market” is a period when stock prices are generally rising.

Generally, Kok and Goh (1995) advocated that stock market plays very important and decisive roles in stimulating a country’s economics growth. Rising share prices, for instance, tend to be associated with increased business investment and vice versa. Share prices also have an effect on the wealth of households and their consumption. In additional, stock market acts as a medium for various types of securities of companies to be sold and to raise money. Besides, stock market is a medium to enhance healthy competition among the company. With the stock market, people can buy and sell shares easily and less time consuming through agents or brokers. Investment in stock market is therefore said to have greater flexibility. This concept is well-known as liquidity.

A shareholder of the company of course wishes to have plenty of returns for example capital gains, yearly dividend as well as bonus stated by Ch’ng (2003). Returns in the form of capital growth are basically profits earned when the share is traded at the
stock market base on the market value. For example, when one unit of share can be sold higher than its selling price then the principal will be higher. On the other hand, yearly dividend is the earnings given base on the percentage of the company’s share owned by that particular shareholder. Ch’ng (2003) commended that the shareholder who owned larger part of the company’s share will gain more yearly dividend. Bonus is the shares which publicized by the company to distribute free to the company’s shareholder. So, the particular shareholders can enlarge their shares of that company and sell it in the market to make profits.

Hirt and Block (2005) pointed out that risks associated in different types of investments and almost all investments regardless short term or long term. Risks might be generated from outside events for example war, recession, or terrorism. Although the share market historically has outperformed other investments over the long term, the market can experience volatility in the short term. Individual stock prices can go down as well as up. It is important to keep an eye on the share’s performance and to regularly re-evaluate whether they are still continued to be a good investment.

1.2 RATIONALE OF THE STUDY

Hirt and Block (2005) suggested that forecasting is very important to the strategic growth of a company or organization even to a shareholder. With the ability to predict for the future, management can plan ahead and to make necessary adjustments before actual lose occur. The outcome might be a function not only of their risk-taking desires, but also of their ability to be cautious and alert against risk with careful planning or strategies.
This research is basically focused on forecasting the share market movement of DiGi in the future. This study is to observe the prospect of DiGi’s share price whether it will “up” or “down” in the future at BSKL. Such prediction might benefit shareholders, government, and also private sectors as well. With this prediction, shareholders can consider to keep the share for a certain long periods or to sell it in order to make profit or reduced lose. Furthermore, Hirt and Block (2005) stressed that with such prediction, the particular company can plan ahead to increase their share prices in the future.

1.3 OBJECTIVES OF THE STUDY

The purposes of this study are

OB 1: to identify the trend or movement of the share prices based on the past daily data from year 2000 to 2007.

OB 2: to examine the influence of the higher order ARMA model towards forecasting whereas in this case the order $p+q \leq 10$ is considered.

OB 3: to justify whether the best model determined by emphasising the elimination of the lag with insignificant coefficient is superior than the alternative models.

OB 4: to examine the adequacy of the best model in future forecasting.

OB 5: to investigate the effect of forecasting in short term period.

Hirt and Block (2005), share market requires forecast of the future behaviour of the shares. For example, forecasters will begin to predict the “up” and “down” of shares
for specific time periods. These predictions are to determine whether to invest in those particular shares.

1.4 SCOPES OF THE STUDY

This study is written based on the data provided by Bursa Saham Malaysia, BSKL. This research is only applicable to predict the share market of DiGi, a telecommunication company in Malaysia. Moreover, the prediction might be not so accurate because the data collection is only within eight years. This lack of data scenario might be caused by those data are private and confidential in nature. So, only the last eight years’ data (2000-2007) managed to be obtained. Besides, the model which formed by using these eight years’ data will only applicable to forecast the share prices for a short period. This is because ARMA approaches only valid or as a well-predictor for short-term prediction rather than long-term forecasting due to the variation in economic conditions or rapid change in share market. In this study, constant economic conditions will be assumed for the periods (2000-2007) the time series data being collected and for the time period the ARMA model formed uses to forecast. Otherwise, the model that finalised from the data collected from year 2000-2007 may not be adequate. In this case, economic conditions included three elements those are financial position, fiscal capacity and service capacity. Economic conditions can be described as composite of a government’s financial health/status and its endowment and willingness to meet its financial obligations and commitments to provide services.
REFERENCES


