MODELLING SHARE PRICES WITH ARMA METHOD

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ABSTRACT

Investment in stock market such as an essential asset and forecasting is the tool often used by investor to forecast future share price. Forecasting exhibit the future trend of the share price and underlying the behavior of the trend. Further planning can be made by company according to the trend analysis and maximize profit by modify the behavior now. In this paper, Star Publication (M) Berhad is chosen as the company to do the study and the historical data of the company is used as the data. There is missing value in data collected and estimated by using polynomial order nine. ARMA method is used to do forecasting and the processes contain four phases. This research restricted p+q≤7, hence there is total 35 possible models, and models are selected by using coefficient test. The selected models will test by eight selection criteria to obtain best model for forecasting. Final phase is goodness of fit which is test on normality and randomness of the residuals. The backward transformation is applied in order to transform forecast indexes into forecast prices. At the end of the study, the MAPE is applied to test the reliable of forecasting result. The main finding in this research paper is ARMA method is performed well in short term. In this research demonstrated that residuals is not normality distributed which indicate there is possible source of error that the ADF test does not always produce precise result.
PEMODELAN SAHAM DENGAN KAEDAH ARMA

ABSTRAK

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LIST OF SYMBOLS AND ABBREVIATION

= equal to
≠ not equal to
+ addition
− subtraction
× multiplication
÷ division
< less than
> greater than
≥ greater than or equal to
Σ summation
√ square root
σ² variance
μ mean
SSR sum of square regression
SSE sum of squares residuals
SST total sum of square regression and residuals
MSR mean squares of regression
MSE mean square of residuals
var variance
cov covariance
exp exponential
CHAPTER 1

INTRODUCTION

1.1 Overview

In this 20th century, many jobs have constant wage and effort not rewarded. But in the market there is no close relationship between time and reward. Wealth can be made in short term depend to hard work and skills. Money and stock market have become essential assets. Trading environment is a completely free arena, there is no alternative way to restrict it. In fact, market is cannot be control or manipulated the market. Investor have responsible on the investment return and need to familiarize to the market environment.

Every investor is a rational human being using the best skills to maximize their own profits. The purpose of forecasting is allowing investors to modify the behaviour now to get the better way to get the profit. Forecasting is planning tools that improve the management and cope with the uncertainty of the future. The method using the past and present data to get the trends and analysis apply on the trends. The method using for forecasting the future stock prices are ARMA model in time series.

Investment is the essential part of the business company. In this study, the stock market data was collected from Star Publication (Malaysia) Berhad from 1st of September 2007 until 31st of March 2012. Forecasting able to present the future trends and underlying the behaviour of the share price which is the component that
affect the confidence of investors. Investors can invest according to their planning by referring to the potential of the company performance.

1.2 Problem Statements

Choudhry et al. (2007) stated that the Asian financial crisis of 1997-98 have effect on the financial market of the Far East region which included Malaysia. The economic crisis in 2008 also have a significant impact on financial market and the recently debt crisis in 2011 might also lead to new recession. Malaysia stock market has plunged more than 50% and would be worst over the time. AAA status of the US’ credit rating also downgraded to AA+ due to the debt crisis. S&P’s credit downgrade has articulated the fears of the investment and policy-making circles. Financial stocks fared poorly amid the global uncertainty. Uncertainty will affect the confidence of investor to put the money for investment because nervous the future stock price will fall. Stock prices are said to be a function of supply and demand. Due to positive relationship between the demand and stock price, the confidence of the investor will affect the stock price. Stekler (2007) cyclical turns affect the accuracy of forecasting with possibility underestimated growth rate in expansionary periods and overestimated when it was decelerating. Due to the shock like economic crisis and recession accuracy of the forecasting is not determined.

1.3 Forecasting

Ramanathan (2002) stated that time series forecasting is most commonly based on attempts to predict the value if a variable from past values of the same variable. In this study, historical data is used to do forecasting. Forecasting environment separate in three time period which is estimation period in sample forecast, ex-post forecast and ex-ante forecast. Ex-post forecast provide test to check the persistent of forecasting and ex-ante forecast is for prediction of the unknown future.

According to Gujarati & Porter (2009), there are few popular methods for forecasting which is autoregressive moving average (ARMA), autoregressive integrated moving average (ARIMA) and also known as the Box-Jenkins methodology, vector autoregression (VAR). Then, for solving the problem of the volatility clustering,
two method is suggested which is conditional heteroscedascity (ARCH) and generalized autoregressive conditional heteroscedascity (GARCH) model.

1.4 Stock market

Stock market is the place that the share in company are bought and sold, allowing companies have opportunity to acquire capital and investors allow investing the preference share. Stock market environment is a completely free arena, cannot control by investor or company. The stock market also is a place for companies which want to raise capital for their business. The way to invest in stocks is through a stock exchange, an organized marketplace under strict rules, regulations and guidelines. Bursa Malaysia is the Malaysian stock exchange and Bursa Malaysia has over 1,000 listed companies. Companies are either listed on Bursa Malaysia Securities Main Market or ACE Market. Through the stock market, companies able acquire this cash by publicly float the company. Through an Initial Public Offering or IPO, the stocks in a company which listed on the stock market can be purchase. To provide more chance for stockholder to buy more stocks in the company, company can raise additional money on the stock market. In the same time that the company makes a profit, the stockholder will gain profit in the form of a dividend. Typically, the numbers of shares that have been issued multiplied by the share price imply the value of a company.

1.5 Stock price factors

Stock prices change because of market forces. The price of stock is determined by supply and demand at the most fundamental level. If stock buying (demand) is more than stock selling (supply), then there will be increase in price and vice-versa. Other than the demand and supply factor, there are a lot of factors like market sentimental, interest rate, performance of the industry, reputation of the company, the earning results and earning guidance, expectation of investor, take-over or merger, new product introduction to markets or introduction of an existing product to new markets, new major contracts or major Government orders, share buy-back, dividend, stock splits, insider trading, Analyst upgrade or downgrades, addition or removal to or from Stock Index and others.
Bae & Chan (2004) stated that the degree of investibility have positive relationship with the stock return volatility even after controlling for country, industry, firm size and turnover. The stock classify into three group to measure the investibility which is non-investible (foreigners may not own any of the stock), partially investible (foreigners may own up to 50% of the stock) and highly investible (foreigners may own more than 50% of the stock). As a result that the highly investible stock exhibit higher return than non-investable stocks and as support evidence on the impact of market integration on emerging market volatility.

1.6 Background of the company

Star Publication (Malaysia) Berhad run a business in the Printing & Publishing industry. Malaysia's leading integrated media organisation, with group revenues totalling more than RM1 billion for 2010. The Star also has controlling interests in few radio stations and online portals. Holding more media assets is one of the strategies to add to its existing portfolio. In fact, radio is a tool that useful for communication media with potential growth opportunities, as shown by the increase in its share of advertising expenditure in recent years. The proposed acquisition will allow Star to have more potential in the market for radio advertising to supplement its present significant status in the market for print advertising.

From Star Investor Relations, 2011, annual report of star publication (Malaysia) Berhad stated that revenue of the Star Publication (Malaysia) Berhad increase every year from year 2006 to year 2010. In year 2006, total revenue is RM723,564 and increase to RM1,061,700 in year 2010 which is 46.7% increment. The net earning per share increasing from year 2006 to year 2007 but decreasing in year 2008. The net earning per share in year 2007 is 22.90 sen and decrease to 18.81 sen which drop 17%. In year 2009 there is slightly recover and growth in year 2010 which is 25.04 sen. The low net earning per share in 2008 is the impact of the economic crisis to the investor and the stock market.

According to the statement dated 30th April 2010, renewal of authority for Star Publication (Malaysia) Berhad is proposed to purchase its own shares. Approval
for the Director to purchase up to ten per centum (10%) of the issued and paid-up share capital of the company is granted when the Thirty-seventh (37th) AGM of the company held on 26th May 2009. Company also announced to Bursa Securities to get the approval of shareholders for the purposed share buy-back. The issued and paid-up share capital of the company is RM 738,563,602 comprising RM 738,563,602 Star Publications' shares inclusive of 70,200 Star Publications' share at 31 March 2010. There are rationale for the proposed share buy-back which is The company may be able to stabilize the market prices of the shares by reducing the number of shares in issue but if the shares purchased are cancelled, the shareholders also can gain profit due to increase in its EPS which cause by the reduction in its issued and paid-up share capital.

1.7 Purpose of this Research

The purpose of this study is to forecast the future trend of share price in order to do analysis the trend. The analysis may underline the behaviour of the trend and identifies the economic structural changes.

1.8 Objective

(i) Justify that the best model are superior.

(ii) Recognize the behaviour of Star Publication (M) Sdn share price.

(iii) Able to analyze the forecast value based on the number of autoregressive lag.

(iv) Applicability of the restricted condition $p+q \leq 7$ for the chosen data.

(v) Provides a future trend of the Star Publication (M) Berhad which as a guideline for investor that will aid in decision making.
1.9 Scope of work

The company chose for this study is Star Publications (Malaysia) Berhad. The data taken is historical data of Star Publications (Malaysia) Berhad from 1st of September 2007 until 31st of March 2012 which is four and half year data. The opening price is chose as the data to do forecasting and there is missing value which is unobserved data. The unobserved data included Saturday, Sunday and Public holidays in Malaysia which no transaction occurs in those days.

1.10 Limitation of Study

Goodwin & Wright (2009) stated inappropriate reference class which does not contain extreme events is one of the causes of low predictability. When system has relation with the fundamental changes will cause problem. Time series usually show a trend with possibility presence of a seasonal periodicity and some random fluctuation. If the trend underlying the growth process then the trend can be forecast with a condition that growth rate is constant. Hence, there is a limitation when fundamental change due to the change of macroeconomics factors which will affect the persistent of forecasting.
CHAPTER 2

LITERATURE REVIEW

2.1 Overview

In this research, focus on accuracy of the forecasting. Uncertainty will affect the confidence of investor like financial crisis. Due to positive relationship between the demand and stock price, the confidence of the investor will affect the stock price. Due to the shock like economic crisis and recession accuracy of the forecasting is not determined. Data is necessary to be stationary in order to proceed to forecasting progress and the unit root test is one of the tests for the stationary. The classical unit root test is Augmented Dickey-Fuller test (ADF). For the measurement of forecast accuracy, MAPE is widely used to test the reliable of the result. In this research, ARMA method is used and ACF and PACF are used to identify the order of p for autoregressive and order of q for moving average.

2.2 Uncertainty and Limitation of Forecasting

In real life, there is existence of uncertainty that cannot be ignored and in fact there is limitation of forecasting. Makridakis et al. (2009) stated inaccurate forecast may lead to a dilemma for decision and policy maker. Averaging is the method used to reducing the variance of forecasting error to improve accuracy since not all statistically model provide accuracy result. There are two types of uncertainty "subway" and "coconut" uncertainty. "Subway" uncertainty is refer to which can model and reasonably incorporate in probabilistic predictions like normally distributed forecasting errors, while "coconut" uncertainty which cannot be modelled, and also
rare and unique event which difficult to predict. Then, completely unexpected rare and unique event labelled as "Black Swans".

There is a lot of case that large errors made by forecasters in the past and implications of these errors are discussed. According to past research make evidence that people have a strong tendency to underestimate the effect of the event splitting, and exhibit a problem of developing fail-safe systems. “Coconut” is occurrence of a rare event with critical consequences. Most of our real life contain "subway" and "coconut" uncertainties and cause which make the forecasting future prices impossible. This paper stated the most appropriate forecast is averaging the forecasts of such models which able to improve the accuracy of predictions. Forecasters usually focus more on making absolute prediction but ignoring the uncertainty.

There are three type of uncertainty known known, known unknowns, and unknown unknown. For known known, we know the result in the future but for known unknowns is when there is rare event that expected but don know when will happen. The last one is unknown unknowns which there is unexpected rare event like Black Swan. For known unknowns allow quantify and model the uncertainty for some event and not all of it , for example bubbles in financial market involved in coconut uncertainty which uncertainty cannot be quantify and modelled. Coconut uncertainty is difficult to model even with plenty of historical data. With ample quantitative data are available, uncertainty can be access by studying the distribution and independence of forecasting errors. Error is necessary to be normally distributed, constant and independent of each other. Greater the violation of these three assumptions, the greater the uncertainty in future forecasting errors. The distribution of the error might not well behave either in yearly, monthly and daily and cause cannot quantify the uncertainty. Normal distribution characterized by more error around the mean, and long tails exceeding 4 standard deviations. Hence, is not easy to model statistically and require judgmental consideration in order to fully access on uncertainty of the predictions. Another point is that volatility in a period also affect the persistent of the uncertainty in forecasting future prices. An approach is proposed in order to solve the problem of incapable of measure uncertainty quantitatively which underestimate by humans.
There is three steps for the approach which is accept the existence of the uncertainty, assess it magnitude and augment its range. Augment part is divide to two way which is "future-perfect thinking" and mechanical way for augmenting uncertainty. But the "future-perfect thinking" is no formal. The mechanical way which is estimate range of upper and lower values that would include 95% of all possible outcomes. In this paper, range doubling is encouraged for the small sample size. Another mechanical way is use the difference between the largest and smallest observation in the past as an initial estimate of the range to estimate the range accurately. This paper discuss about the issue of the accuracy and limitation of forecasting when presence of uncertainty.

2.3 Reference Dependency and Decision Making

Toh & Zamri (2010) mentioned that investors are attention-driven, but also that investors' judgement displays reference dependence. The attention-based strategy does not produce positive abnormal return except in the case of buying portfolio consisting of loser stocks. The portfolio whose current price rises above (or fall below) its 52-week high (low) at the date formulation lead to underperform (outperform) in the consecutive period. Past research stated that the cumulative prospect theory contain three major characteristic which is the rank dependence, reference dependence and sign dependence. Reference dependence is refer to the utility from an investment is not simply a function of wealth level. This paper used daily extreme price changes like daily winner and loser stock as a attention-grabbing event in order to track that whether the daily winner and loser stocks is the factor that able to attract the investors' attention. Incorporating the reference point (52-week high and 52-week low) is extension of the study which used to determine the whether the investors' judgement exhibit reference dependence. Further investigation about the attention-based strategy whether can make short-term profit-making opportunity.

There are two attentions which is goal driven or stimulus driven. Controlling by Investors' planned strategies and aim in a "top-down fashion" will be the goal driven, while controlling by significant attributes of some event in a "bottom up" is stimulus driven. Visibility increase due to heavily traded stocks which is a stimulus-driven attention which moving a less visible to a subset of visible to attract the attention of investors. There are also evidence shows that reference point as an important
REFERENCES


