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Reliability of Exponential Smoothing Method for forecasting Islamic Share Price to oil and gas sector in Malaysian Stock Exchange

Nashirah Binti Abu Bakar¹ and Sofian Rosbi²

¹Islamic Business School, College of Business, Universiti Utara Malaysia, Kedah, Malaysia,

²Universiti Malaysia Perlis, Perlis, Malaysia

Corresponding email: nashirah@uum.edu.my

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Abstract

This paper forecast the share price for two companies that related with oil and gas sector. These companies are Sharia-compliant companies that issues Initial Public Offerings (IPO) in year 2012. This paper using forecasting methods which are simple moving average and exponential smoothing. Then, these share prices are evaluated using three types of error, which are mean absolute deviation (MAD), mean squared error (MSE) and mean absolute percentage error (MAPE). The results show exponential smoothing is less error than simple moving average. Therefore, exponential smoothing is more suitable in forecasting the dynamic of share price. This result is to help investors to determine and select share price with higher return using an accurate method.

INTRODUCTION

Financial innovations transformed the traditional financial markets into highly sophisticated markets featuring with high degree of liquidity and wide-array of instruments to share and transfer various sources of risk (Iqbal, 1999). This trend occurred in domestic and international financial markets. This innovation and growth in financial markets was further induced by advances in the financial theory. This trend was occurred with introducing the Islamic investment. Islamic investment was growth up rapidly and earns outstanding recognition from international financial markets in the last decade. Continuing success is the result of increasing demand for Islamic financial products and services by both domestic and international financial intermediaries. Islamic banking is no longer limited to the boundaries of Muslim countries but is establishing roots in non-Muslim countries as well. Moreover, Islamic financial product and service such as Islamic capital market is no longer restricted to Muslims people only.

Part from Islamic capital market, Initial Public Offerings (IPO) for sharia-compliant companies is an alternative way for Islamic companies to growing up and develops. IPO is a common stock that has been widely examined in the finance literature, and academic interest in IPO is continuously till today.

IPO for sharia-compliant companies is act as an alternative source for Islamic companies to raise a capital for expanse a business where the capital must be free from any prohibited element such as usury (*riba*), gambling (*maisir*), and uncertainties (*gharar*) (Abdul Rahim & Yong, 2010).

A large number of studies have examined the performance of share price of IPO (Loughran, et al., 1994). This interest may be related to the importance of IPO market for economic growth and employment, but often the

focus is on the tremendous profit opportunities that IPO frequently offer to investors (Bessler & Thies, 2007). In the same, the studies that focus on the performance of long-term IPO in Malaysia found evidence that long-term performances of IPO are performed better (How, et al., 2007). However, no prior academic has documented the area of forecasting for share price of sharia-compliant in Malaysia.

Thus, this study tries to fulfill this gap by forecast the long-term performance of IPO for sharia-compliant companies using exponential smoothing. Specifically, this study examine long term performance of IPO for sharia-compliant companies using moving average methods and compare with exponential smoothing . Next, this study was analysis the error in the analysis.

LITERATURE REVIEW

Many study was investigated the performance of stock markets worldwide (Boulton, et al. 2011). Various studies investigated the long term performance of IPO market found IPO are underperformed their benchmark. Ritter (1991) examines long term performance of IPO in United States found the significant underperform their benchmark.

Carter et al. (1998) also found IPO stocks are underperformed relative to the market over a three-year holding period is less severe for IPO handled by more prestige underwriters. The same result is reported by Chan, et al. (2004) in China. They found IPO in China is slightly underperformed. While, Lee, et al. (1996) report that Australian’s IPO significantly underperform market movements in the three-year period subsequent to list. Goergen, et al. (2007) discusses the long-run performance of UK IPO and found that the percentage of equity issued and the degree of multinationality of a firm are the key predictors of IPO performance in UK. Drobetz, et al. (2005) found long run underperformance to the fact that IPO firms tend to be small firms when used a small capitalization index as a benchmark. Thus, underperformed of long term IPO are observed in various countries (Kirkulak & Davis, 2005).

Therefore, it is important to forecast the performance of share price to make sure that particular share can give high return. Stock markets are influenced by complex factors and nonlinear relationships among factors existed in different periods such that forecasting the future stock trends for investors are extremely difficult (Kluger & McBride, 2011). Paul (2011) used exponential smoothing technique to predict the future events.

Therefore, implementation of accurate forecasting methods is important in predicting stock prices since the stock market begins (Pavlov & Hurn, 2012). Exponential smoothing is one of the accurate forecasting methods (Taylor, 2004). In this paper, we compare the simple moving average and exponential smoothing. Then, three types of error are calculated. The three types of error are mean absolute deviation (MAD), mean squared error (MSE) and mean absolute percentage error (MAPE).

METHODOLOGY

In Malaysia Stock Exchange, there are 2 sharia-compliant companies that issues Initial Public Offering in year of 2012 for oil and gas sector. Table 1 show the list of the companies. We select this sector because the decrement of the share price in this sector is the highest between years 2015 to 2016. In the same time the volatility of the share price during 2015 until 2016 is the largest.

TABLE I : List of Sharia compliance companies that issues Initial Public Offerings (IPO) in year of 2012 for oil and gas sector

| No. | Stock Code | Company | Board | Sector |
|-----|------------|---------------------------------|-------------|-------------|
| 1 | 5218 | SAPURA KENCANA PETROLEUM BERHAD | MAIN MARKET | OIL AND GAS |
| 2 | 5209 | GAS MALAYSIA BERHAD | MAIN MARKET | OIL AND GAS |

The first company is Sapura Kencana Petroleum Berhad. This company is an oil field services company based in Malaysia. It was formed via a merger between SapuraCrest and Kencana in May 2012.Sapura Kencana provides solutions covering the entire oil and gas exploration and production value chain. The company operates in over 20 countries including Malaysia, Brazil, the United States, Western Africa and the Middle East.

The second company is Gas Malaysia Berhad. This company is a natural gas distribution company in Malaysia. The company headquarters is located in Shah Alam, Malaysia. It has three regional offices, located in Prai, Gebeng and Pasir Gudang, and seven branch offices located throughout Peninsular Malaysia. The 55% of the

company shares are held by MMC-Shapadu Holdings, 25% by Tokyo Gas - Mitsui Holdings and 20% by Petronas Gas Berhad.

Then, this research analyse the movement of share price, starting from the first month until more than 50 months. The data are collected from Datastream (Thomson Reuters). Then, this research calculates two methods of forecasting. The first method is simple moving average and the second method is exponential smoothing prediction method.

The calculation for simple moving average is as follows:

$$\text{Moving average} = \frac{\sum \text{demand in previous } n \text{ periods}}{n} \tag{1}$$

where n is the number of periods in the moving average. In this research, $n=3$ months is selected.

Next, the calculation for exponential smoothing is as follows:

$$\begin{aligned} \text{New forecast} &= \alpha(\text{Last period's actual demand}) + (1-\alpha)(\text{Last period's forecast}) \\ &= \alpha(A_{t-1}) + (1-\alpha)(F_{t-1}) \end{aligned} \tag{2}$$

where α is the smoothing constant. In this research, α is set to 0.80. This setting is to make this forecasting method more responsive to changes because last period’s actual demand are set to be more heavily weighted.

Next, overall accuracy of the forecasting method needs to validate using robustness diagnostic of error. The forecast error can be determined by comparing the forecasted values with the actual or observed values. If F_t denotes the forecast in period t , and A_t denotes the actual value in period t , the forecast error is defined as:

$$\begin{aligned} \text{Forecast error} &= \text{Actual value} - \text{Forecast value} \\ &= A_t - F_t \end{aligned} \tag{3}$$

Then, to validate the robustness diagnostic of forecasting method, three types of error is introduced. The first measure of the overall forecast error for a model is the mean absolute deviation (MAD). This value is calculated by taking sum of the absolute values of the individual forecast errors and dividing by the number of periods of data (n):

$$\begin{aligned} \text{MAD} &= \frac{\sum_{t=1}^n |\text{Forecast error}|}{n} = \frac{\sum_{t=1}^n |\text{Actual-Forecast}|}{n} \\ &= \frac{\sum_{t=1}^n |A_t - F_t|}{n} \end{aligned} \tag{4}$$

Next, the second parameter for measuring overall forecast error is mean squared error (MSE). The MSE is average of squared differences between the forecasted and observed values. The formula for MSE is:

$$\begin{aligned} \text{MSE} &= \frac{\sum_{t=1}^n (\text{Forecast error})^2}{n} = \frac{\sum_{t=1}^n (\text{Actual} - \text{Forecast})^2}{n} \\ &= \frac{\sum_{t=1}^n (A_t - F_t)^2}{n} \end{aligned} \tag{5}$$

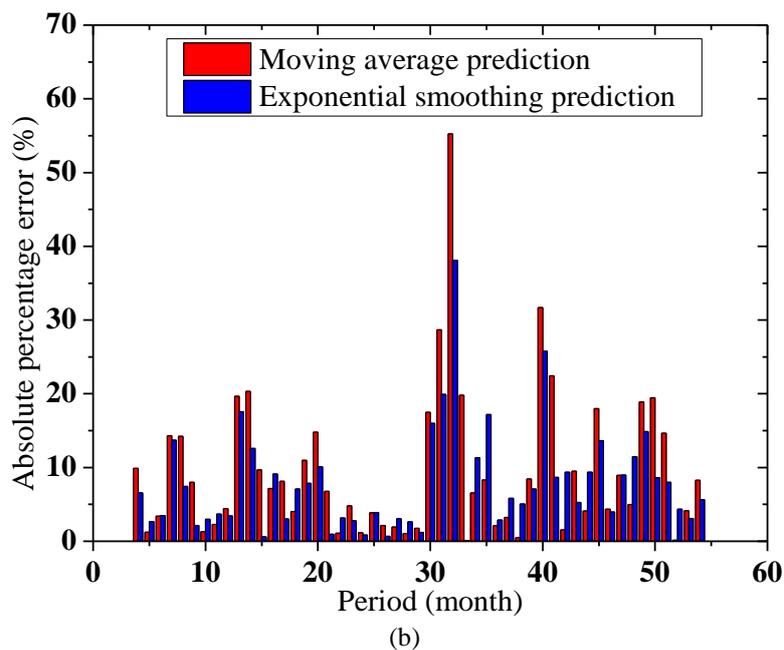
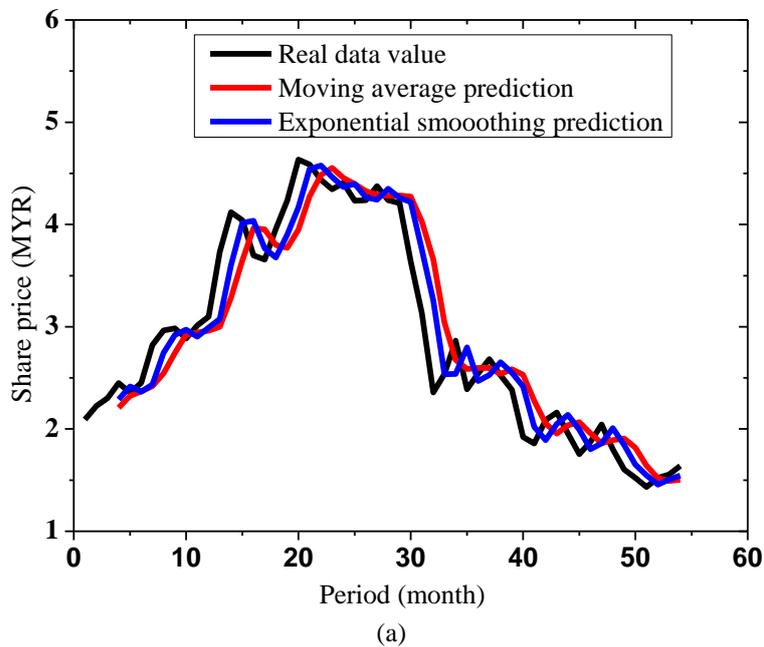
Then, the third parameter for measuring forecast error is mean absolute percentage error (MAPE). The MAPE is computed as the average of the absolute difference between the forecasted and actual values, expressed as a percentage of the actual values. The MAPE is calculated using next equation:

$$\begin{aligned}
 \text{MAPE} &= \frac{\sum_{t=1}^n 100|\text{Forecast error}| / \text{Actual}_t}{n} = \frac{\sum_{t=1}^n 100|\text{Actual}_t - \text{Forecast}_t| / \text{Actual}_t}{n} \\
 &= \frac{\sum_{t=1}^n 100|A_t - F_t| / A_t}{n}
 \end{aligned}
 \tag{6}$$

As robustness for diagnostic error checking, three method of error calculation is compared to find the lowest error for forecasting methods. In this paper, the accuracy between simple moving average and exponential smoothing are evaluated.

RESULT AND DISCUSSION

Figure 1 is the share price characteristics for Sapura Kencana Petroleum Berhad. Figure 1(a) shows the exponential smoothing prediction line is located to the real data of share price. Then, Figure 1(b) shows the absolute percentage error for period 4th month (August 2012) until 54th month (October 2016). It is concluded that exponential smoothing prediction method shows lower value of absolute percentage error. From Figure 1(c) the result shows Exponential smoothing prediction is more accurate than moving average.

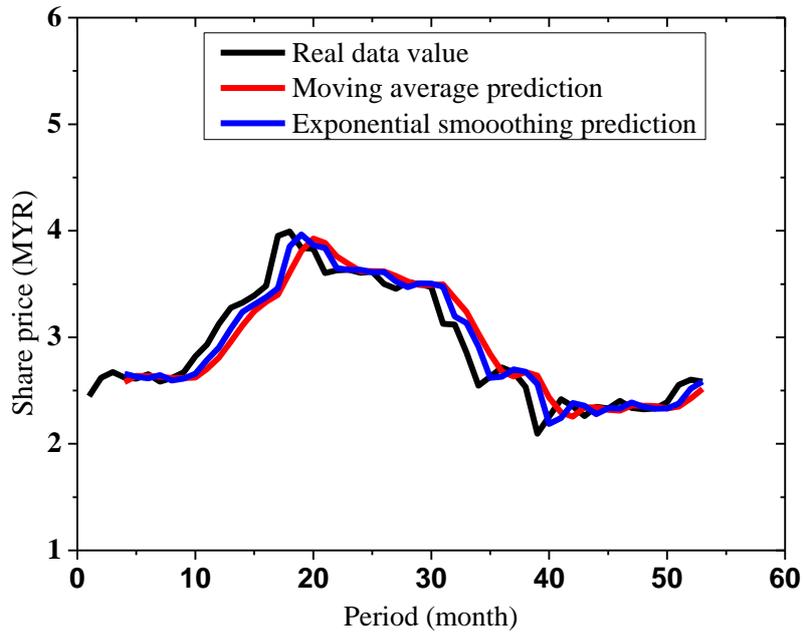


| Error evaluation | Moving average | Exponential smoothing |
|---------------------------------------|----------------|-----------------------|
| Mean absolute deviation (MAD) | 0.268 | 0.211 |
| Mean squared error (MSE) | 0.142 | 0.080 |
| Mean absolute percentage error (MAPE) | 9.797 | 7.795 |

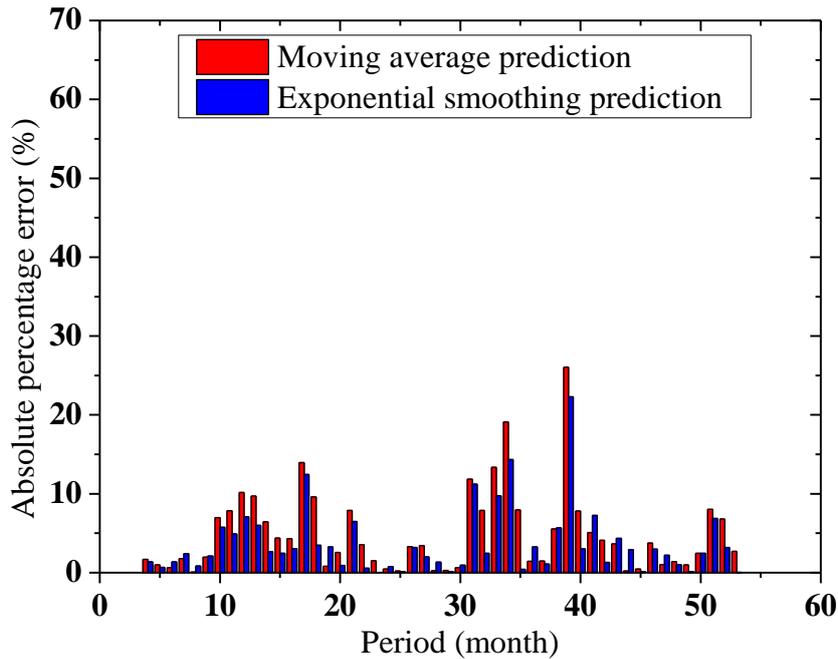
(c)

Figure 1: Share price for Sapura Kencana Petroleum Berhad (a) Real dynamic movement of share price (b) Absolute percentage error analysis (c) Evaluation for three types of error

Figure 2 is the share price characteristics for Gas Malaysia Berhad. Figure 2(a) shows the exponential smoothing prediction line is located to the real data of share price. Then, Figure 2(b) shows the absolute percentage error for period 4th month (September 2012) until 53th month (October 2016). It is concluded that exponential smoothing prediction method shows lower value of absolute percentage error. From Figure 1(c) the result shows Exponential smoothing prediction is more accurate than moving average.



(a)



(b)

| Error evaluation | Moving average | Exponential smoothing |
|---------------------------------------|----------------|-----------------------|
| Mean absolute deviation (MAD) | 0.144 | 0.106 |
| Mean squared error (MSE) | 0.042 | 0.024 |
| Mean absolute percentage error (MAPE) | 4.968 | 3.694 |

(c)

Figure 2: Share price for Gas Malaysia Berhad (a) Real dynamic movement of share price
 (b) Absolute percentage error analysis (c) Evaluation for three types of error

CONCLUSION

The objective of this research is to evaluate the forecasting method to predict the long term performance of share price. The share prices that involved in this research are sharia-compliant companies that listed in Malaysian Stock Exchange in year of 2012. We select two companies that related with oil and gas sector. The companies are Sapura Kencana Petroleum Berhad and Gas Malaysia Berhad. In this research, we analyzed the implementation of two methods of forecasting which are simple moving average and exponential smoothing. From the result in Figure 1 until Figure 2, this research concludes that:

- (1) The value of share price is dynamically moving fluctuate according to market condition. Both of the graph show large decrement of value starting from year of 2015 to 2016.
- (2) The evaluation of each forecasting method is evaluate thoroughly with respect to three measure of error calculation, which are mean absolute deviation (MAD), mean squared error (MSE) and mean absolute percentage error (MAPE).
- (3) The error value for each calculation is bigger if the volatility of error for the share price is higher.
- (4) The forecasting method of exponential smoothing is better than simple moving average because of it is less error. Therefore, exponential smoothing is more accurate in forecasting the dynamic behavior of share price.

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