European Journal of Accounting, Auditing and Finance Research
Vol.6, No.3, pp.1-14, April 2018
Published by European Centre for Research Training and Development UK (www.eajournals.org)

MUTUAL FUND FORECAST ANALYSIS. CASE OF INDONESIA ETF (EXCHANGE TRADED FUND) PERIOD FEBRUARY 2014 – JULY 2017

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ABSTRACT: *Performance of mutual fund could be reflected from several factor, one of which are groth of Net Asset Value (NAV) and price of said mutual fund. The NAV growth of Indonesia Exchange Traded Fund (ETF) are considered one of the most significant, reaching 286% growth value in 2016. Besides, ETF industry in Indonesia itself are still at initial stage of growth. Therefore, information regarding this investment instrument are fairly unknown to public. This research aim to analyse price forecasting of Indonesia ETF using ARIMA method. Weekly price data collected and analysed within period of February 2014 to July 2017, and then forecasted for the next ten weeks. Sample of this ETF are taken from actively traded mutual fund in Indonesia Stock Exchange. Results shows that forecasting model of ARIMA (0,1,1) are the best model to forecast Premier ETF price on ETF IDX30, Sharia Premier ETF JII, and ETF Premier LQ45. Meanwhile, ETF Premier Indonesia Consumer, the best forecasting model are by using ARIMA MA(1) MA(4). This results are also supported by accuracy analysis, which shows that each of ETF Premier reached over 80% of accuracy.*

KEYWORDS: Forecasting, Mutual Fund, Exchange Traded Fund, ARIMA.

INTRODUCTION

Capital market has always been an integral part of money market, connecting long term capital supply and demand. Investor who invest in stock market are without doubt expecting a positive return from their investment, either from capital gain or dividend. However, each capital market had different uncertainty for each products offered. Therefore, to avert the risk from these uncertainty, investors require many informations to valued the expected returns against the risk taken in order to maximize their return.

One way to minimize risks in capital markets are by diversing the invested stocks through portfolio. By investing in many and diverse stock, risk from one asset could be negated by another asset's return, therefore resulting in net return to the investors. This diversed portfolio could be formed either by investors on their own, hiring investment manager, or investing on mutual fund. Mutual fund instruments itself has many product variants offered, each with their own characteristic and uniqueness. One of which are Exchange Traded Fund (ETF). According to Indonesia Financial Service Authority, ETF are included on mutual fund instrument categories, which performance are based on certain indexes. ETF itself are traded as stock would be on market.

ETF are considered as an innovation from indexes mutual fund. However, since it was launched and traded in Indonesian market, it's popularity were so low. Added by 2008 global crisis, ETF were considered dead. However, ETF were resurrected on 2011 and grew more popular than it's previous debut. From 2012 to 2016, Indonesia ETF had grown for over 286%. Net Asset Value grew from 1.57 Trillion rupiah on 2012 to 6.05 Trillion rupiah on 2016. This growth were the highest among all Indonesian mutual fund products.

ISSN 2053-4086(Print), ISSN 2053-4094(Online)

Despite it's significant growth, Indonesia ETF industry are still at it's initial growth stage. Information regarding this investment instrument are not yet widely spread among the publics and publications regarding ETF itself are still minimum. Papers and research regarding ETF performance and it's detailed characteristics are still limited. This limitation also limiting investors ability to maximized their returns in ETF instruments due to lack of information. Therefore, investment tools such as price and expected return forecaster are required by investor to maximized their returns.

Based on the problem stated above, this research aim to formulate a price forecasting tools for Indonesia ETF products by utilizing ARIMA model approach. The model wil be formed to four Indonesia ETF products by analysing weekly closing price period of February 2014 to July 2017. Results of this study are expected to give a better picture of Indonesia ETF dynamics and create a forecasting model to assist investor on making investment decision making. This research will test the model ability to forecast by forecasting all Indonesia ETF products price in the next ten weeks, from August 2017 to October 2017.

LITERATURE REVIEW

Investment

Bodie, *et al* (2011) define investment as saving certain income and spend it later to fulfil certain needs. On broader term, investment could be defined as allocating certain sum of money to a products in hope of gaining greater benefits in the future (e.g. real estates, durable goods, capital market, etc). Pratomo and Nugraha (2004) explain that there are three main reason driving people to invest. First, there are future needs or present needs that has not been fulfilled. Secondly, there are desire to protect current owned assets value. And thirdly, inflation. All these three reasons are closely related with future activity and could drive people to plan, execute, and evaluating their investment.

Mutual Fund

Darmadji and Fakhruddin (2006) explaind that mutual fund are one investment instrument alternative to investors, especially to investors who lack of time and skills to calculate risk on their investments. Mutual funds are designed to collect public fund from people who wanted to invests but limited in skills, knowledge, and time. Simatupang (2010) stated that mutual fund could be categorized as mass investment instrument. This is due to mutual fund products are compatible with every type of investors, from personal investors to investing organization such as insurance, banks, retirement plan, and many more. Mutual fund products had terms and conditions regulating it's activity, in which mutual funds could only done on assets listed on money market and capital market in form of portfolio.

Exchange Traded Fund (ETF)

Exchange Traded Fund (ETF) are defined as a form of mutual fund which it's portfolio assets are based on cerain index. It's inclusion then listed and traded on stock exchange in lieu of brokerage services similar to stock market. (Simatupang, 2010). ETF are considered as mutual funds since its portfolio assets are managed by investment manager and hold by third party called as custodian bank. ETF itself are improvement and innovation from it's predecessor, indexes mutual fund. ETF trade mechanism could be seen on image 1.

ISSN 2053-4086(Print), ISSN 2053-4094(Online)

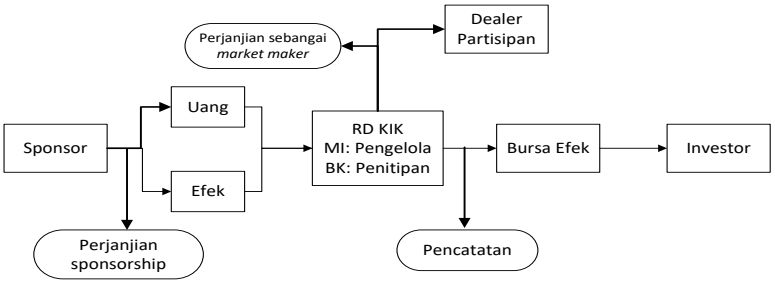

FIGURE 1. Mutual Fund Traded in Stock Exchange Mechanism

Source: Bappepam (processed)

METHODOLOGY

This research are analyze by descriptive quantitative method to study and analyze historical price data and form a forecasting model. Data type used in this research are secondary data in form of weekly closing price of ETF products gathered from various sources within period of February 2014 to July 2017. Sample taken in this research are chosen by purposive sampling. List of Indonesia ETF products are ETF Premier LQ45, ETF Premier IDX30, ETF Sharia Premier JII, and ETF Premier Indonesia Consumer.

AR, MA, ARMA and ARIMA Time Series Modelling

One type of data available on economics are called as time series. Time series had certaing characteristics according to time periods taken, thus data in this type tends to have fluctuating value. There are several method to process time series data, one of which are Box-Jenkins model or commonly known as ARIMA model. Contreras *et al.* (2003) explained that ARIMA technique could be used to analyzed time series data and create a forecast in the future due to its accuracy from it's mathematical model.

ARIMA model contain aspects from AR model and MA model. AR and MA model could only be done on stationary data. Meanwhile, ARIMA model combine AR and MA model after differencing non-stationary model. Differences from AR, MA, ARMA, and ARIMA model could be seen on Table 1.

TABLE 1 Time Series Model Comparison

Model	Assumption
Autoregressive (AR)	Data from current period are affected by data from previous period
Moving Average (MA)	Data from current period are affected by residual data from previous period
Autoregressive Moving Average (ARMA)	Data from current period are affected by data and residual data from previous period
Autoregressive Integrated Moving Average (ARIMA)	Similar to ARMA, except data must be prior to differentiated

Source: Winarno (2010)

ISSN 2053-4086(Print), ISSN 2053-4094(Online)

Autoregressive Model *(AR)*

Autoregressive model could be formulated as below:

$$Y_t = \theta_0 + \theta_1 Y_{t-1} + \theta_2 Y_{t-2} + \ldots + \theta_p Y_{t-p} - e_t \quad (1)$$

Description:

Y_t	Stationary time series data
θ_0	Constant
$Y_{t-1} \ldots Y_{t-p}$	Time series data value on previous period
$\theta_1 \ldots \theta_p$	Coefficient from Autoregressive model
e_t	Residual value from period t

Model *Moving Average (MA)*

Moving Average model could be formula are as follow:

$$Y_t = \varphi_0 + \varphi_1 e_{t-1} - \varphi_2 e_{t-2} - \ldots - \varphi_n e_{t-q} \quad (2)$$

Description:

Y_t	Stationary time series data
φ_0	Constant
φ_n	Coefficient from Moving Average Model
e_t	Residual value from period t.

Autoregressive Moving Average *(ARMA)*

Often times, Y value could not be explained by AR or MA model, but must be explained by both model. Therefore, ARMA model are used to combine both AR and MA model to explain Y. ARMA model formula are as follow:

$$Y_t = \gamma_0 + \partial_1 Y_{t-1} + \partial_2 Y_{t-2} + \ldots + \partial_n Y_{t-p} - \lambda_2 e_{t-1} - \lambda_2 e_{t-2} - \lambda_n e_{t-q} \quad (3)$$

ISSN 2053-4086(Print), ISSN 2053-4094(Online)

Description:

Y_t Stationary time series data

γ_0 Constant

e_t Residual value

∂ dan λ Coefficient from AR and MA

AMRA model has the same characteristic from AR and MA, in which dependent variable Y are affected by data from previous period. ARMA model are also often stated as ARMA (p,q) where p are ordo/degree of Autoregressive and q are ordo/degree from moving average.

Autoregressive Integrated Moving Average (ARIMA)

AR, MA, and ARMA model explained above have similar assumption, time series data are already stationary. However, it is commonly be found that time series data are not always stationary, especially data regarding economics. Therefore a modification to the model must be done by doing diffrencing to time series data in order to create a stationary data. Differencing itself could be done by subtracting data by it previous period data (lag). If ARMA model are often stated as ARMA (p,q) in order to state which order of AR and MA on the model, ARIMA model are stated as ARIMA (p,d,q), where d are number of difference done to make data stationary.

Constructing ARMA/ARIMA model

Juanda and Junaidi (2012) explained that in order to construct ARMA/ARIMA model of p, q, and d, there are several procedure which known as Box-Jenkins procedur. The procedure are as follow:

- Identifying model

  Model combination could be done by evaluating Autocorrelation Function (ACF) to determine order of MA and Partial Autocorrelation Function (PACF) to determine order of AR on Correlogram

- Estimating best model parameter

  Best model are chosen based on goodness of fit, in which comparing highest determinant coefficient value (adjusted R^2) between model, and comparing lowest Akaike Information Criterion (AIC) and Schwarz Criterion (SC) value between model

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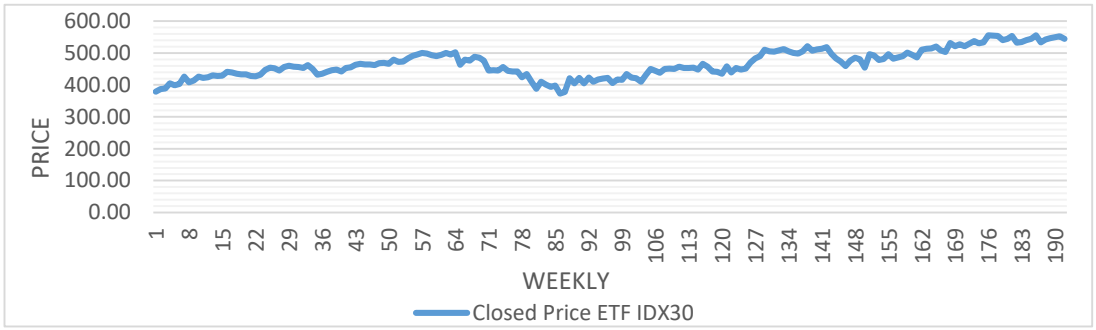
RESULT

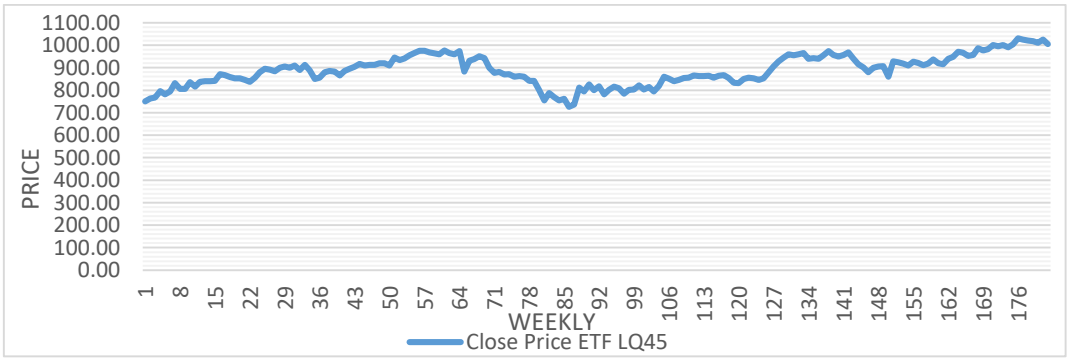
Data Description

Price movement pattern for ETF Premier IDX30, ETF Sharia Premier JII, ETF Premier LQ45, and ETF Premier Indonesia Consumer withing observation period could be seen respectively on graph below:



GRAPH 1. ETF Premier IDX30 Price Movement

GRAPH 2. ETF Premier JII Price Movement



GRAPH 3. ETF Premier LQ45 Price Movement

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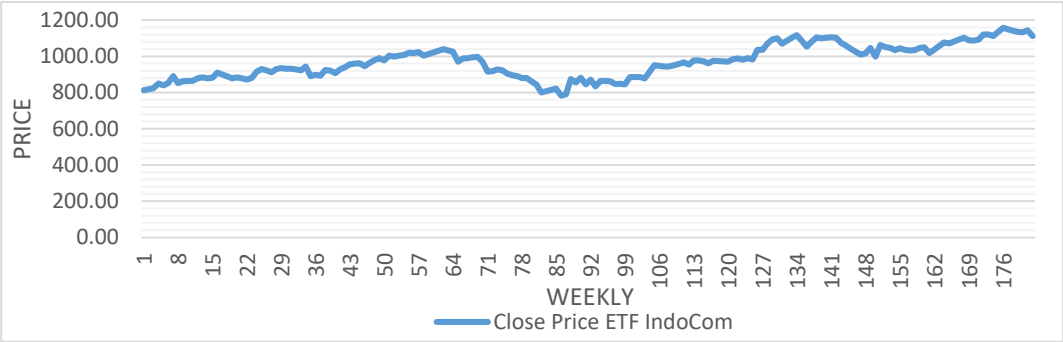


GRAPH 4. ETF Premier Indonesia Consumer Price Movement

Based on graph 1 to graph 4, it can be seen virtually that all ETF products shows similar trend. Up to year 2014, all four ETF products have positive trend, however it is declined mid 2015 due to depreciation on Indonesia currency since US Dollar were appreciated due to European economic crisis. After those decline, all ETF product have positif trend once more. Overall, all four ETF products show positif trend within observation period.

Stationary Data Test

All data from Indonesia ETF products (ETF Premier IDX30, ETF Sharia Premier JII, ETF Premier LQ45, ETF Premier Indonesia Consumer) shows that all data are not stationary at level. Therefore, modification by differencing data must be done to create a stationary data. (Aritonang, Lerbin R, 2002). Stationary test result by using Augmented Dickey Fuller (ADF) method could be seen on Table 2.

TABLE 2 Unit root data test result

Data on First Difference Level	ADF Test Statistic		Critical Value McKinnon Table			Description
	t statistic	Prob	1%	5%	10%	
ETF IDX30	-17,24070	0,0000	-3,466786	-2,877453	-2,575332	Stationary
ETF JII	-16,81055	0,0000	-3,466786	-2,877453	-2,575332	Stationary
ETF LQ45	-15,96609	0,0000	-3,466786	-2,877453	-2,575332	Stationary
ETF IndoCon	-15,43758	0,0000	-3,466786	-2,877453	-2,575332	Stationary

Source: Processed Data

After closing data of ETF products transformed to first difference, test result shows that all data had already been stationary. This is proven by probability value of all ETF products at 0.0000 or lower than 0.05. This means that next step of model calculation could be done.

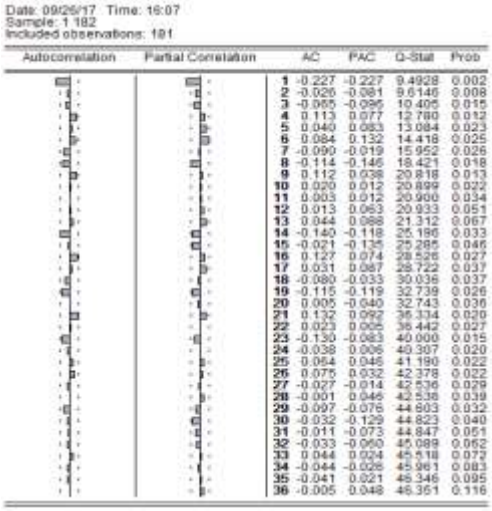
ISSN 2053-4086(Print), ISSN 2053-4094(Online)

ARIMA Analysis

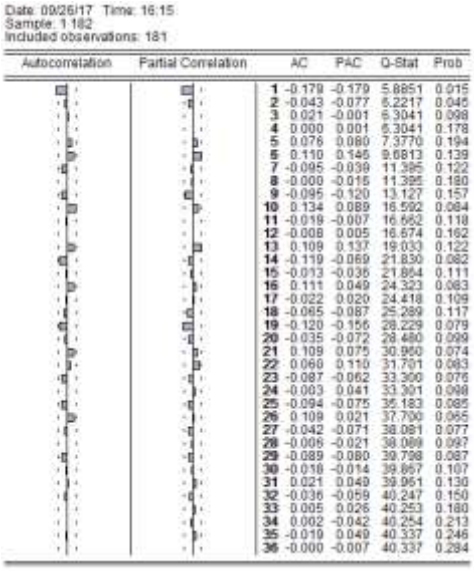
Determining best fit ARIMA order are by identifying Autocorrelation Function (ACF) and Partial Autocorrelation Function (PACF) from stationary data above. Corellogram ACF and PACF from each ETF products could be seen on Figure 2 below:

ETF Premiere IDX30

ETF Sharia Premier JII



ETF Premier LQ45



ETF Premier Indonesia

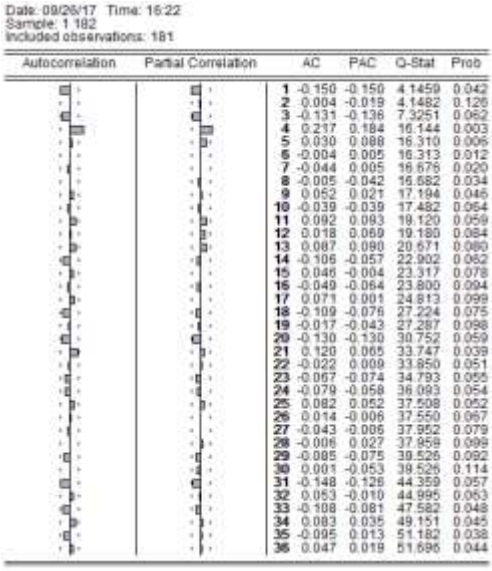


FIGURE 2. Correlogram ACF dan PACF Reksadana ETF

Based on image 2 above, ACF and PACF of each ETF products shows different pattern. This indicates that estimated ARIMA model fit for each ETF products forecasting will also be differ. Estimated ARIMA model for each ETF Products could be seen from Table 3 to Table 6.

ISSN 2053-4086(Print), ISSN 2053-4094(Online)

TABLE 3. ETF Premier IDX30 Estimated ARIMA Model

No	Model ARIMA	Probability		Sig.	AIC	SC	*R-squared*
1	(0,1,1)	MA(1) 0,0000	:	Yes	7,763787	7,816801	0,079586
2	(1,0,0)	AR(1) 0,0004	:	Yes	7,777840	7,830853	0,066420
3	(1,1,1)	AR(1) 0,8233	:	No	7,774388	7,845073	0,079991
		MA(1) 0,1243	:				

Source: Processed data

TABLE 4. ETF Sharia Premier JII Estimated ARIMA Model

No	Model ARIMA	Probability		Sig.	AIC	SC	*R-squared*
1	(0,1,1)	MA(1) 0,0002	:	Yes	8,482548	8,535561	0,059136
2	(1,1,0)	AR(1) 0,0014	:	Yes	8,490428	8,543442	0,051604
3	(1,1,1)	AR(1) 0,7469	:	No	8,492744	8,563429	0,059938
		MA(1) 0,1915	:				
4	AR(1)danAR(8)	AR (1) 0,0007	:	Yes	8,482567	8,553252	0,070184
		AR (8) 0,0393	:				

Source: Processed data

TABLE 5. ETF Premier LQ45 Estimated ARIMA Model

No	Model ARIMA	Probability		Sig.	AIC	SC	*R-squared*
1	(0,1,1)	MA(1) 0,0024	:	Yes	8,799164	8,852177	0,036309
2	(1,1,0)	AR(1) 0,0046	:	Yes	8,803319	8,856333	0,032252
3	(1,1,1)	AR(1) 0,7833	:	No	8,809538	8,880223	0,036960
		MA(1) 0,4113	:				

Source: Processed data

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TABLE 6. ETF Premier Indonesia Consumer

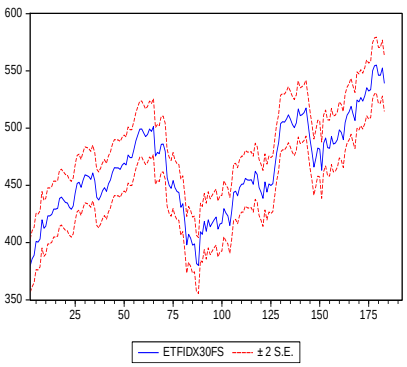
No	Model ARIMA	Probability	Sig.	AIC	SC	*R-squared*
1	(0,1,1)	MA(1) : 0,0318	Yes	8,824462	8,877475	0,024006
2	(1,1,0)	AR(1) : 0,0330	Yes	8,825603	8,878616	0,022876
3	(1,1,1)	AR(1) : 0,0022 MA(1) : 0,0208	Yes	8,829866	8,900551	0,029625
4	(4,1,1)	AR(4) : 0,0271 MA(1) : 0,0420	Yes	8,789911	8,860596	0,068440
5	(1,1,4)	AR(1) : 0,0404 MA(4) :0,0162	Yes	8,786263	8,856948	0,072069
6	MA(1) MA(4)	MA(1) : 0,0414 AR(4) :0,0134	Yes	8,783377	8,854062	0,074785

Source: Processed data

The best fit model could be determined by evaluating lowest AIC and SC value for each possible ARIMA model on each ETF products. Also, by determining the highest R-Squared for each possible ARIMA model on each ETF products. Table 3 to table 6 are tentative possible model of ARIMA. Based on AIC, SC, and R-Square value, it is shown that ETF Premier IDX30, ETF Sharia Premier JII, and ETF Premier LQ45 best fit model are ARIMA (0,1,1). However, for ETF Indonesia Consumer as best fit model are ARIMA MA(1) MA(4). This ARIMA model will then be used as price forecasting model for each ETF products.

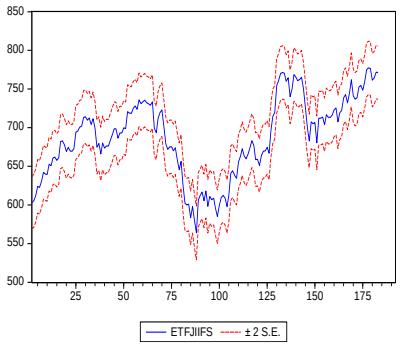
FORECASTING RESULTS

After determining best fit model above, the next step are creating forecasting model. By using statistical analysis tools Eviews and inputting ARIMA model (0,1,1) for ETF Premier IDX30, ETF Sharia Premier JII, and ETF Premier LQ45, also ARIMA model MA(1) and MA(4) for ETF Premier Indonesia Consumer. The results of the forecasting are as follow:



Forecast: ETFIDX30FS
Actual: ETFIDX30
Forecast sample: 1 192
Adjusted sample: 2 192
Included observations: 181

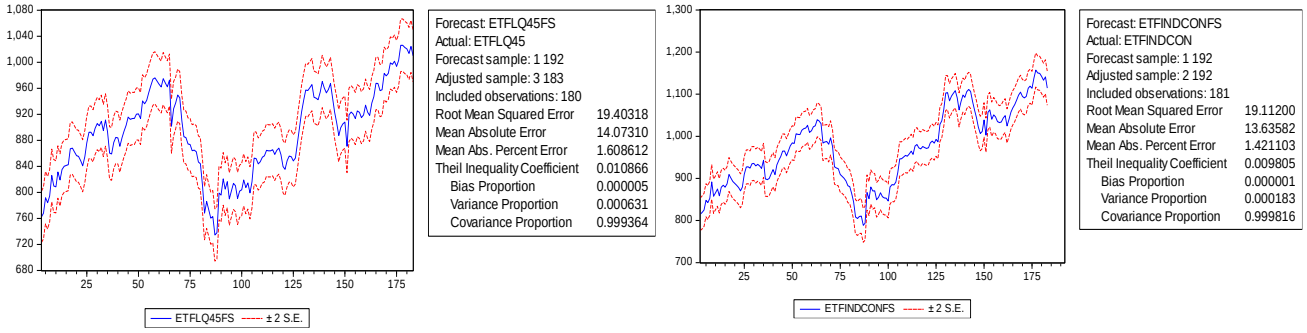
Root Mean Squared Error	11.54448
Mean Absolute Error	8.516571
Mean Abs. Percent Error	1.863363
Theil Inequality Coefficient	0.012421
Bias Proportion	0.000003
Variance Proportion	0.001117
Covariance Proportion	0.998881



Forecast: ETFJIIFS
Actual: ETFJII
Forecast sample: 1 192
Adjusted sample: 2 192
Included observations: 181

Root Mean Squared Error	16.53659
Mean Absolute Error	12.20745
Mean Abs. Percent Error	1.803627
Theil Inequality Coefficient	0.011996
Bias Proportion	0.000000
Variance Proportion	0.001667
Covariance Proportion	0.998333

ISSN 2053-4086(Print), ISSN 2053-4094(Online)



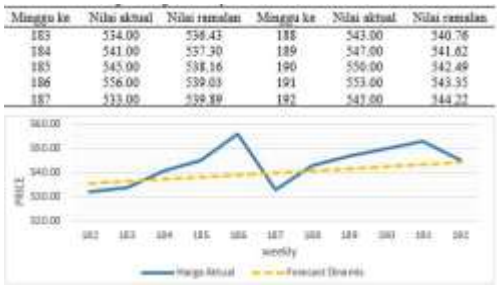
GRAPH 5. Forecasting Model for Each ETF Products

Based on forecasting graph above, it is conclusive that ARIMA model (0,1,1) for ETF Premier IDX30, ETF Sharia Premier JII, and ETF Premier LQ45, also ARIMA MA(1) MA(4) for ETF Premier Indonesia Consumer are the best forecasting model. It is shown by price movement between error range -2 to 2 (Juanda & Junaidi, 2012). Also, the models forecast are considered good because the model had fairly low percentage error. It is shown from relatively small MAPE (Mean Absolute Percentage Error), 1.8833 for ETF Premier IDX30, 1.8036 for ETF Sharia Premier JII, 1.6086 for ETF Premier LQ45, and 1.4211 for ETF Premier Indonesia Consumer. This MAPE value indicates that model accuracy for each ETF Products are 98.12%, 98.20%, 98.39%, and 98.58% respectively.

10 Weeks Forecast Results

Based on ARIMA model above, future forecasting for each ETF products could be done. Forecasting from this research are short term forecast for the next ten weeks, from week 183 to week 192 (August 2017 – October 2017). Forecasting results for each ETF products could be seen on graph below.

ETF Premier IDX30



ETF Sharia Premier JII

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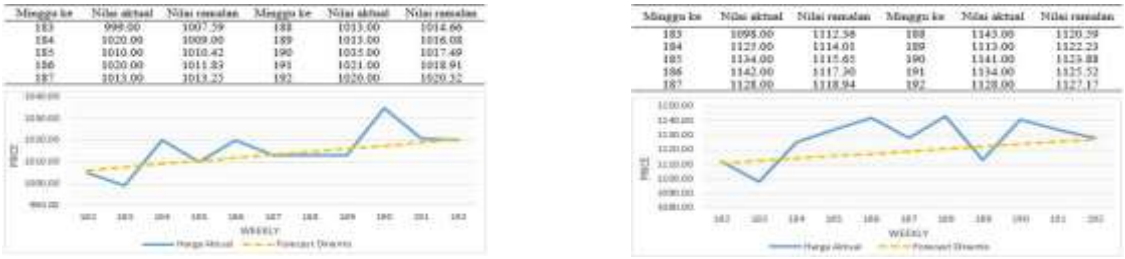
ETF Premier LQ45 ETF Premier Indonesia Consumer



GRAPH 6. Price Forecast vs Actual Comparison Each ETF Products

Graph 6 above shows variance of estimated closing price and actual closing price from each ETF products. It can be seen that actual closing price from ARIMA (0,1,1) model for ETF Premier IDX30, ETF Sharia Premier JII, and ETF Premier LQ45, also ARIMA MA(1) MA(4) for ETF Premier Indonesia Consumer are not far from it's forecasted value. On each ETF Products, it is also could be seen that majority of actual price are above the forecasted price and the price trend tend to also be the same as actual which are positive.

Based on forecasting model above, in general constructed model already able to give a very good explanation regarding trend and actual price forecasting. Although, the forecasted model still not yet 100% reflecting actual price since there are still differences between actual price to forecasted model. Among all four ETF products, ETF Premier LQ45 became the lowest discrepancy between actual and estimated price, followed by ETF Premier IDX30, ETF Premier Indonesia Consumer and ETF Sharia Premier JII.

Accuracy Analysis

Model accuracy could be determine by paired comparison between actual price difference and expected price difference. Price difference could be calculated by subtracting price on period t to price period t-1. Model accuracy are used to evaluate how good the forecast could predict the vector of estimated price and actual price. If the vector (either positive or negative) from forecasted price are the same with actual price vector, then it is considered good accuracy. Meanwhile, if the vector (either positive or negative) are different from actual price vector, then it is considered bad accuracy. Results from accuracy results could be seen on Table 7.

TABLE 7. Forecast Accuracy Results

ETF Products	Vector		Accuracy
	Different	Same	
ETF IDX30	20	161	88.95%
ETF JII	26	148	81.77%
ETF IndoCon	29	152	83,98%
ETF LQ45	18	163	90.06%

Source: Processed Data

Based on table 7 above, ETF Premier LQ45 have the lowest difference of estimated and actual vector by 18 out of 181, showing that the correct prediction from the model reached 90.06%. Followed by ETF Premier IDX30 with 88.95% (20 out of 181), ETF Premier Indonesia Consumer with 83.98% (29 out of 181), and lastly followed by ETF Sharia Premier JII by 81.77% (26 out of 174).

ISSN 2053-4086(Print), ISSN 2053-4094(Online)

CONCLUSION

Forecast analysis done to ETF instrument shows that ARIMA (0,1,1) model are the best model for ETF Premier IDX30, ETF Sharia Premier JII, and ETF Premier LQ45. Meanwhile ARIMA MA(1) MA(4) are the best model for ETF Premier Indonesia Consumer. This shown statistically through AIC, SC, R-squared value, also from MAPE value which averaged below 2% error. Also, vector accuracy analysis shows that the model reached average of 86.19% vector accuracy in genera.

Forecast analysis became the most prominent factors to determin investment action for investors. Forecasting are ideal if the expected price are truly equal to actual. However, in real world, this are very rarely happen. Discrepancies either in expected-actual value or vector tend to occurred. This facts are also stated by Bodie dan Kane (2014) who stated that discrepancies between actual and estimated value will always occurred on any forecasting model. Despite of these fact, forecasting information are still necessary to investors.

Based on results above, investors could take investment decision when the ETF price are under underpricing moment. Underpricing moments occurred when actual price are below the expected price, which indicates that price tend to increase in the future. By taking investment decision on underpricing moment, investor would gain more return. Garnfikel (1993) confirm this theory by stating that when underpricing moments occurred, it is expected that actual price and return would enter bullish moment, so investor could take long position (buy). On the other hand, investors are suggested to take short position (sell) when price are in overpricing moments, or when actual price are above estimated price. Gu & Lev (2011) stated that overpricing position indicates that asset price are on it's peak and tend to enter bearish trend. Therefore, short positioning on this moment will prevent further loss to investors.

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