Journal of Fundamental and Applied Sciences

ISSN 1112-9867

Available online at http://www.jfas.info

Research Article

Special Issue

FORECASTING PHILIPPINE DAILY STOCK EXCHANGE INDEX

J. D. Urrutia[1,*], J. L. B. Diaz[2] and E. B. Baccay[3]

[1]Intellectual Property and Management Office, Polytechnic University of the Philippines – Sta. Mesa, Manila, Philippines

[2]Polytechnic University of the Philippines – Parañaque Campus, Parañaque, Philippines

[3]Institute for Data and Statistical Analysis, Polytechnic University of the Philippines – Sta. Mesa, Manila, Philippines

Published online: 24 November 2017

ABSTRACT

The purpose of the study is to produce a model that can estimate a three-year forecast of the Philippine Daily Stock Exchange Index. Seasonal Autoregressive Integrated Moving Average (SARIMA) model is applied ona total of 4,927 daily data observations from 1995 to 2014. By then, actual and predicted values was compared through the paired t-test analysis by testing the hypothesis whether the two series of values are having significant difference or not, and other analysis signifying the accuracy of the model to forecast the future values, that is created through all processes that are included in the evaluation of the model. This study may help the government for generating well-informed decisions regarding the topic discussed and for any improvements they may be able to make in the stock exchanged shares in global market for the country's sake after learning about possible outcome of the study.

Keywords: forecast; models; Philippines; SARIMA; stock exchange.

Author Correspondence, e-mail: jdurrutia@pup.edu.ph

doi: http://dx.doi.org/10.4314/jfas.v9i7s.21

1. INTRODUCTION

Philippine Stock Exchange has played a great role in the world-wide economic upsurge of every countries that has linked through with other countries pertaining a huge financial marketing system of trades in which securities, commodities, and shares with companies can be bought and sold through the processes involved. The stock exchange index is more specific making more formal mechanism for on which the shares are listed, mostly infrastructure that facilitates the trading of the shares, equity of shares, or stocks. By the start of the year 1995, there were already more than a hundred-and-eighty listed companies considering it overall from the year 1992 when the unification of Manila Stock Exchange and Makati Stock Exchange that has totaled a market capitalization of approximately 1.39 trillion Pesos.

In 2012, Philippine Stock Exchange Index reached its records at an uttermost of 5, 832.83 closing at 5,812.73 in which there were overall of 254 listed companies that produced total market capitalization at approximately 10.93 trillion pesos [1]. In 2013, Philippine Stock Exchange has surpassed the 7,000 mark before the fourth month starts which is exactly 7,120.48 achieving high recorded instances for the Philippine Stock Exchange index closing levels. Summed up, the turnover value after half a year exceeded the full year value turnover recorded the previous year at 1.78 trillion. The following of the Index data continues to fluctuate, following the trend of the previous years which started from the midway part of the series where the values still has not exceeded the 2,000 mark.

The study aims to forecast the Philippine Stock Exchange Index where in the processes involved, there will be models generated to forecast the two set of the data series. These models will undergo through processes, testing the accuracy of each of the model combinations. The series of the forecasted data may be of help with the financial insight of any decision making for the price index of the shares of the Philippines in the international trading.

1.1 Objective of the Study

The study aims to generate models that may be used in forecasting the two set of series of data of the Philippines Stock Exchange Index that satisfies the given processes of Time Series Analysis. The outcome of the study may be of help in any resolution regarding the data of the shares of the Philippine Stock Exchange Index by the decision-makers regarding the topics discussed especially when talking about the Global marketing shares of the country. These times, investors tend to capitalize their finances to companies that are having highly secured level of investments and having good outcome values that may be fascinating their interests. It might help the Philippine Stock Exchange to attract more investors and might entrust it whenever they see how efficient or how well the companies in the Philippines can capably hold onto their shares.

1.2 Research Paradigm

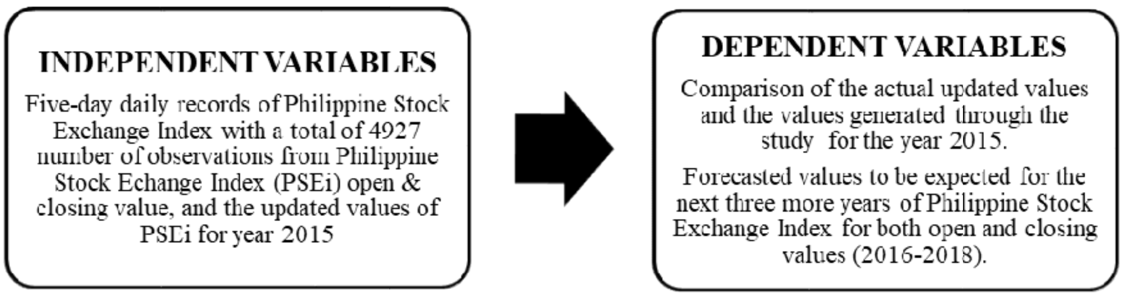

Fig.1. Research paradigm

1.3 Statement of the Problem

1. What are the behavior of the graphs of the Philippine Stock Exchange Index?
2. What are the models that will be used in forecasting the Philippine Stock Exchange Index series the opening market values and the closing market values?
3. What will be the predicted values of the marketing values on the time opened? The closing marketing values?
4. Is there a significant difference between the actual and the predicted values of the two series?

1.4 Scope and Limitations

Research study covers an entire 4927 total number of cases in each series of the Philippine Stock Exchange Index, open and closed marketing values of data, from year 1995 until year 2014 by which the holidays weren't given or not included in the data. Also, the updated values will be observed in the study by means of the tests regarding its comparison with the outcome forecasted values of Philippine Stock Exchange Index that will be generated throughout all the processes included in the study.

2. METHODOLOGY

2.1. Statistical Methods

2.1.1. SARIMA: A Box-Jenkins Approach

Box Jenkins Method comprises identification of the model by which the model may be branded whether it has seasonal component or has not and whether it also has a unit root indicating the data series appears to be non-stationary, also, estimating and approximating the model chosen – one that is at least have lesser errors than the rest of the listed combinations of autoregressive terms and moving average terms generated from the actual data series which was either differenced non-seasonally or not and either it has undergone seasonal adjustment as to accord to how it was identified through the process. Diagnostic Checking of the model is being implemented after estimating the model, generating expected new values, the forecasted sample values and predicted sample values to be compared to the actual values of the data series. Lastly to forecast, the final forecasted values for the next period/s and its graphical presentation [12].

2.1.2. Augmented Dickey-Fuller test

Aside from the patterns that can be possibly present in a series, there also might be existing a unit root within by which a unit root is a random walk component that can make the data series be less possible to predict. In other words, unit root is a feature or a characteristic of a time series data having non-standard and non-normal asymptotic distributions that is not predictable. This means the series of values is not stationary.

David Dickey and Wayne Fuller developed a test that was named after them in 1979, the Dickey-Fuller test, which is used to whether a unit root is present in the an autoregressive model. Augmented Dickey-Fuller test is used to remove all the structural effects in the time series and then the test uses the same procedure. Null hypothesis (the data has a unit root) has to be rejected when the probability value exceeds the given hypothesized p-value of 0.01 which means the data has no need to be differenced, but fails to reject if it is equal or less denotes otherwise [13].

2.1.3. Forecasting

Each and every time a decision is to be made which is concerning for decisions that have long term consequences, it is quite necessary to prepare first and account the historical events to predict what might happen. In this case, predicting the future is reasonably a necessity to generate more accurate conclusions as to what should be the decision to make whenever the outcome would be desirable or not. Decisions that involve the time based data like the stock markets, trade values of goods & services, currencies, and others that are measured at several points in time, number of events, or values that changes over time. Forecasting is how these data are being predicted using the past events or values form patterns that might possibly be present within it, whether the data follows or recreates pattern or not [18].

Forecasting has already been utilized foremost in the statistical approaches to the economic development of each and every single country now. There were two different ways of forecasting a data series, first, dynamic forecasting, where the model processes entirely the past values and is being used to predict future values on a long term run. This forecasting style most commonly to be used by researchers because of its capability to predict an extensive number of values, by which it depends on how accurate the model would be.

Static forecasting, on the other hand, uses the entire number of past values to predict a single value in the future, then, add the predicted value to the present values and reuse the model to forecast the next one and so on. This forecasting style produces predicted values that has closer means with the actual values since it generates the values bit by bit.

2.1.4. Autocorrelation & Partial-autocorrelation/Correlogram (Plotted)

There such a characteristic of a data series that the correlation between the values of the same variables is based on related objects. There is a similarity between observations as a functions of a time lag between them. For these somewhat occurrence of patterns, there are mathematical tools for finding any repetition of patterns, known widely as Autocorrelation and Partial-autocorrelation. These tools comprises many applications in a time series analysis especially in determining any possible patterns like seasonality that may be present in a series. Seasonality, as said earlier, is a pattern that recurs in a series, that means seasonality can also be detected using Autocorrelation & Partial-autocorrelation since it is plotted revealing a function at a time of every lag between the existing observed values. Furthermore, the Autocorrelation can also show the presence of a unit root. This may be possible because having a unit root in a data series makes a data series less to be potentially predicted using a model. Plotted correlogram may show a gradual decrease of the values each lag in a correlogram which indicates the presence of a unit root, and it means the data is not stationary that it needs an order of differencing. It was one of the reason why these tools are used in a linear time series models such as SARIMA, ARIMA, ARMA, and etc.

Autocorrelation and Partial-autocorrelations is also used in determining the Auto-regressive and Moving Average terms. Autoregressive terms Specifies the output variable which depends linearly on its own previous values and on the stochastic term pertaining a model that is in the form of a difference equation. Moving Average is a created series of average of different subsets of the full data set and a type of finite impulse response filter. Thus, integrating these terms forms a function that will become visible in a plotted Correlogram.

To sum it all up, the autocorrelation and partial autocorrelation or simply, the correlogram, is widely used by the researchers in stochastic approaches of a time series analyses for being able to make plotted presentation of functions out of any pattern that may be existing within the data.

2.1.5. Paired T-test

To compare the two paired sets of population means in the case of two samples that are correlated, whether there exist significant difference between them or not, Paired t-test is most commonly to be used. This is a statistical technique that is much necessary in 'before-after' studies, or when the samples are the matched pairs, or when it is a case-control study. Performing this, the two population means are being compared, the observed and the anticipated samples, after performing an expected forecast which simply tells us whether they differ from each other in a significant way under the assumptions that the paired differences are independent and normally distributed.

3. RESULTS AND DISCUSSIONS

3.1. Opening Price Values

As the plotted graph of the Opening Price Data Series, opening values each day of the given data, wavers upward but not until it takes on a gradual decreasing trend of its values for until starting quarter of the year 2003. It then progressed on a rising development. Note that the seasonality isn't as clearly could be seen in the graph but it shows an obvious trend. This simply the series is potent to be not stationary and it might be necessary to difference the series.

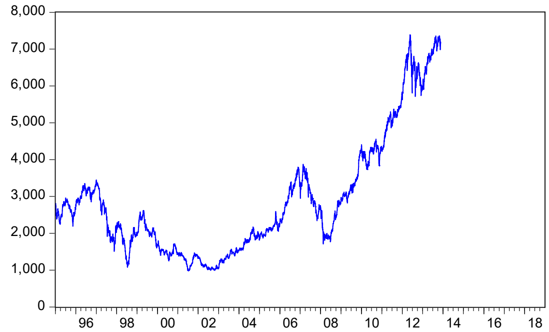

Fig.2. Graph of the actual opening price data series

From the overall series of opening prices of the trading days, the stock market went up for approximately 5,500 increase in values in just the span of five years. The series on the year 2013 reaches its highest peak at 7,388.13 on the 16th day of May. It might possibly the time when the number of companies increased further even after a massive decline in the Philippine Stock Exchange index until the year end of 2013, closing with a gain of around 2.6%.

Until the start of 2014, the foreign funds continues to sell, anticipating recovery in more developed markets and jitters across emerging markets remain relevant. The year ended without exceeding the highest value recorded from last year.

Then, the plotted correlogram shows an extremely slow, turning to zero of the significant spikes in the autocorrelation this indicates the precise presence of a unit root. It means the values in the data series is not stationary and needs to be differenced. Though seasonality might possibly be either not so obvious in the correlogram plotted or it simply is not present. For so, seasonality test was performed to statistically identify the presence of a seasonal component.

Table 1. Seasonality test for opening price data series

Regression Assumption	**Value**	**Verbal Interpretation**
Probability (F-stat)	0.9999	There is no presence of seasonal component within the data series and do not need to be differenced seasonally.
Probability (F-stat) /w trend	0.0000	There is a presence of seasonal component within the data series

Investigators generated dummy variable coefficients, to be regressed against the series which produced F-stat Probability value 0.999996891, rejecting the null hypothesis that is: there is seasonal component lie within the series. It means the data series does not need to be seasonally adjusted. However, the assumption of having a trend in the series was utterly positive and effectively seen in the graph. Then, after having seasonality test in the series supposing there is a presence of a trend, result displayed F-stat value of 0.0000… indicating the failure to neglect the null hypothesis, implies Seasonal differencing is still necessary for the data series.

Table 2. Augmented-Dickey fuller test for opening price data series

Augmented Dickey-Fuller Tests			**Verbal interpretation**
Level	intercept	0.996023555	Has a unit root
	trend & intercept	0.951965717	Has a unit root
	none	0.979470945	Has a unit root
First Difference	intercept	0.000100000	There is no unit root
	trend & intercept	0.000000000	There is no unit root
	none	0.000100000	There is no unit root

In testing the null hypothesis of stationarity of the data using the Augmented Dickey Fuller Test, results shows that the actual data that is not yet differenced, has a presence of unit root with the probability 0.996023555, perceiving the tentative model function to have an intercept regressed along with the generated coefficients. Another temporary model function is generated to test whether it has a unit root, assuming that there is a trend within the series, and adding the intercept to the model function, it has shown a probability that is 0.951965717, which signifies that the series has a unit root. Then, assuming it has no trend and not adding the intercept to the tentative model, it still is not stationary with the probability 0.979470945. All of the test results have failed to reject the null hypothesis which is the series has a unit root. This simply signifies that the actual data of Opening Price Index is not stationary and differencing is necessary for the data. On that note, visibly on the table, supposed that the data has to be differenced, the first differenced series has been undergone to a test for stationarity and all of it has successfully rejected the null hypothesis. It means the first differenced series has no more unit root within it.

Furthermore, the data has not satisfied the assumption of normality as the outcome of the Jarque-Bera test suggests. Visibly on the histogram results that it is skewed to the left side of the graph just as the statistical results displayed along with the plotted histogram of the actual data, where the skewness is 1.192498 and has a kurtosis equivalent to 3.598725 which were clearly has not satisfied the assumption of normality. The Jarque-Bera test probability value also has to reject the null hypothesis that the data is normally distributed. Thus, the data needs to be logarithmically transformed.

Logarithmically transformed data, it has slightly widened in the standard deviation in the graphical perception. However, the values were much smaller, since it has been logarithmically reduced. This may indicate that the data series now is normal in distribution. Then the plotted correlogram of the logarithmically transformed data shows almost the same as the previous one, where the significant spikes were still on a very slow decrease until it reaches zero on a specific lag. Nevertheless, this indicates that the series still has a unit root within it, which means that seasonal differencing is still necessary for the data.

Testing out the same assumption to the transformed series, Augmented Dickey Fuller test results shows that the logarithmic transformed data still exhibit non-stationarity even with an intercept added, with intercept added in the assumption that it has trend, and without both. It simply suggests an order of differencing, for so, to make it stationary. Generating the series that has been non-seasonally differenced, it's plotted graph shows a wavering of the line through the mean zero, implies that it has now negative values but almost the same distribution on the positive values.

Furthermore, it has reduced its trend. On the plotted correlogram, the significance levels were shown smaller to indicate that some significant spikes were much longer than the rest. Furthermore, as the previous results of unit root testing suggests, performing the first order of non-seasonal differencing to the series will have no more presence of a unit root. So the generated series is essentially stationary at present.

Then, after performing the seasonal differencing, the graphical results shows a wavering of the line with the mean zero, implies that the negative values is distributed almost the same as the previous result but just having larger interval values. This indicates that the series is stationary, and has no more need of differencing. The plotted correlogram of the processed series has shown significant spikes in the autocorrelation and partial correlation utterly indicates the number of AR an MA terms that might be used in generating the model for the data.

Possible combinations of the significant spikes in the plotted correlogram were listed to find a well fitted model for the series that may satisfy the following goodness-of-fit assumptions for a distinctive Seasonal ARIMA Model. It turned out, after regressed against the actual data of the opening series, that the model with 8 autoregressive terms, 4 moving average terms, and a seasonal autoregressive terms has the highest R-squared value and has the favorable Durbin-Watson test statistic value and the other 9 combinations which were having very close favorable results and having their MA process to be invertible. However, their AR processes were not stationary.

But considering that there is no intercept included in the data, the combinations were a considerably inclined to have greater errors. Thus, the ten combinations having most favorable results were regressed again with an intercept included in each of the combinations and considering that it has seasonality at a presence of a trend, a trend coefficient to regress with the other terms.

The results, where an intercept coefficient is included and a trend coefficient, are having stationary AR terms and invertible MA terms, where the model that has highest R-squared value is having 7 autoregressive terms and one seasonal autoregressive term and 4 moving average invertible terms is preferred in forecasting the actual data series of the opening price index of Philippine Stock Exchange. Thus, the model that will be used in forecasting the series is SARIMA (7, 1, 4) $(1, 1, 0)_5$.

Table 3. Paired t-test for opening price data series

Paired T-test		Verbal Interpretation
P-value	0.946520875	No significant difference

In forecasting the series, using the static forecasting method, the graph of the generated series gives off almost the same as the observed values yet, makes a slight extensively sharp wavering of the line and the statistical result of the paired t test, performed to determine whether the actual data and the predicted using the model chosen, was 0.9465 by which it indicates there is no significant difference between the two series.

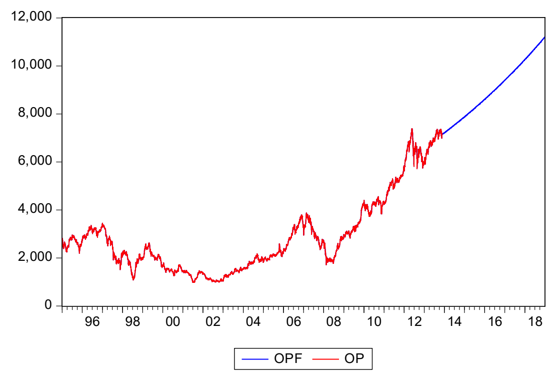

Fig.3. Forecasted opening price index

Then the Dynamic method of forecasting the opening price index, shows a graph that draws a line, having a very small wavering, extending upward until it reached following the trend of the preceding values from the few years before.

3.2. Closing Price index

The plotted graph of the Closing Price index data series, given that it is a 5 day daily data for a total of 4927 observations starting from the year 1995 until the year 2014, the wavering of the line started with a fluctuation in a slight downward trend in the year 1997 and has its lowest values on the year 2001, then began rising up to a continuous fluctuation from the year 2003.

However, a sudden drop of the values has happened between 2006 and 2008 making PSEi at the bottom list of the stock markets in the Asian Markets. However, Prices began to recover in 2009 where the local support has been strengthened to keep the trading afloat. The trend continued to up rise until the end of the available observations. The series reached its highest peak in the 15th day of May 2013, closed the 7392.2 total price index, and expectedly, the following day opens on the highest price index value in the opening price index. The closing price index has almost have the same reason of each of the fluctuating decline and upsurge of the trend. The year 2014 made a sudden drop of values and has roughly reached the peak where the series has its highest.

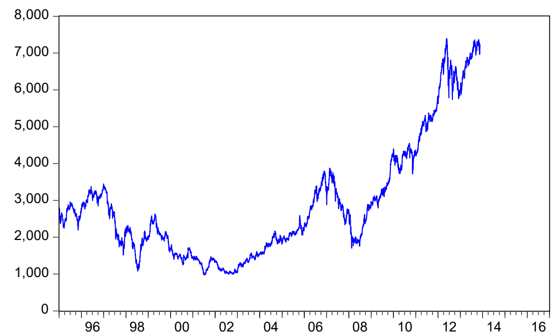

Fig.4. Graph of the closing price data series

The correlogram of the actual data has its all spikes significant. But it has a very slow coursing to reach the value zero. This indicates the possible presence of a unit root, and it means the series is not stationary and needs an order of differencing. However, the seasonality is still not so obvious in the correlogram because it has a significant line level which is much closer to look at when plotted. Thus, a seasonality test will be performed to determine whether the series establish a recurrence of a pattern component in the series.

Table 4. Seasonality test for closing price data series

Regression Assumption	Value	Verbal Interpretation
Probability (F-stat)	0.9999	There is no presence of seasonal component within the data series and do not need to be differenced seasonally.
Probability (F-stat) /w trend	0.0000	There is a presence of seasonal component within the data series

In the statistical test for the seasonality, the results indicate that the series has a probability F-stat value of 0.999997 means to reject the null hypothesis that there is seasonality in the series. Thus, it suggests the series is of no necessity of a seasonal differencing. Nevertheless, the graph of the closing price index displays an obvious trend which may be a slight distortion in the statistical inference of the seasonality test. Performing another test by which a trend coefficient is now included, the results indicate the failure of rejecting the null hypothesis and it means that a recurrence of a pattern is present in the series. Consequently, seasonal differencing is a necessity to adjust the data.

Table 5. Augmented-Dickey fuller test for closing price data series

Augmented Dickey-Fuller Tests			Verbal interpretation
Level	intercept	0.996737	Has a unit root
	trend & intercept	0.960434	Has a unit root
	none	0.982922	Has a unit root
First Difference	intercept	0.000000000	There is no unit root
	trend & intercept	0.000000000	There is no unit root
	none	0.000000000	There is no unit root

The Augmented Dickey Fuller test results also indicate a presence of unit root supports the assumption which was supposed from the correlogram of the actual data when it showed that the significant spikes were slowly turns to zero value. It can be inferred that the data needs to be differenced non-seasonally.

Testing the normality distribution, the Jarque-Bera result suggests that the null hypothesis is rejected at the probability value. This means the data series is not normally distributed, especially when considering the skewness of the data series that has exceeded the zero value, and has a kurtosis and its excess value that has exceeded the hypothesized value of 3. Consequently, this indicates that the data series has to be logarithmically transformed.

The logarithmic transformed closing price index shows almost having the same as fluctuations of the actual values only with a sharper amount of values. However, visibly on the graph, the values is a lot smaller than the interval values on the left side of the graph. This means the values were logarithmically transformed already and may indicate a normal distribution of the data series. Then its plotted correlogram shows a slow turn of the significant spikes to zero. This indicates a presence of a unit root and it means that the series still needs a higher order of differencing.

After the series has been differenced non-seasonally, the plotted graph displays a wavering of the line through the mean zero; it means the distribution of the positive values is as much as of those negative values below zero. The variance has minimized and the trend component has been reduced and it means the data is stationary. Its plotted correlogram has the visible significant spikes at lag 1; however, the significant line is displayed smaller which means, at some lags, there might be significant lags that are just not visible.

Establishing a seasonal differencing as what the seasonality test, the series now has larger interval values and does not exhibit a recurrence in the pattern. This means that the transformed series is now stationary and has no seasonality. The plotted correlogram of the transformed series has displayed significant spikes at few lags, given the total of 9 visible AR terms and MA terms candidates. This gives the possible combinations of the model in forecasting the closing price index of the Philippine stock exchange. Listing the combinations with their R-square values, Durbin-Watson test statistics, and the MA and AR Processes, it turned out ten of the listed combinations are having the highest R-squared values, satisfied the Durbin-Watson statistics, and the combinations were invertible in terms of the Ma process. However, it still was not stationary on the AR process, when regressed against the actual data of the closing price index. These ten to be having the most favorable results, they were regressed again with a constant and a trend coefficient giving off that ten combinations to have stationary AR terms. The results of the ten regressed combinations were all having stationary AR terms, except from the one with greatest R-squared probability value. Thus, the next combination with highest r-square probability value will be used in forecasting the actual data series of the closing price index. The combination chosen has a total of 7 AR terms, 6 MA terms and one seasonal MA term, and trend and intercept component, as the model in forecasting the Philippine Stock Exchange Closing Price index. Thus, the model to be used will be SARIMA (7, 1, 6) $(0, 1, 1)_5$.

In forecasting the actual data series, the model chosen has been used in static forecasting to predict the values, to be compared to the actual observations through paired t-test.

Table 6. Paired t-test for closing data series

Paired T-test		Verbal Interpretation
P-value	0.94596127	No significant difference

The results by which the probability value of their mean is 0.94596127, indicating that there is no significant difference between the two compared series. The plotted graph of the static forecasted series has nearly the same as the wavering of the actual observed values but having a louder variation.

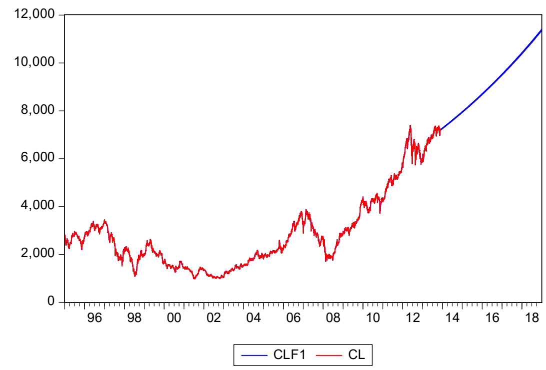

Fig.5. Forecasting closing price index

In forecasting the future values through dynamic forecasting, the plotted graph of the values forecasted has followed a trend that the past observed values have, pertaining to have lesser variations and less wavering of the line.

4. CONCLUSION

The investigators were able to come up with models to be utilized in forecasting the series of the opening and closing prices of the Philippine Stock Exchange index. The model SARIMA (7, 1, 6) (0, 1, 1)5 will be used to forecast the closing price index and SARIMA (7, 1, 4) (1, 1, 0)5 for the Opening Price index. Furthermore, the paired t-test show that on both of the price indices, both resulted which says there were no significant differences when compared with their actual observed values. It suggest that the each of the two models has satisfactorily fitted their specified allotted from the two actual observations of the Philippine Stock Exchange index. The dynamic forecasted values of both series were individually following the trend of their past observed values in which both went on an upward direction.

The study has shown a favorable outcome by which the future values is expected to rise up higher as time passes. Thus, the investigators recommend further inclusion of the future observations to be compared to the future values of the Opening and Closing Price indices of the Philippine Stock Exchange index. This may be of use in any important discussions of the government for any reforms they can make for the betterment of the Philippine economy.

5. ACKNOWLEDGEMENTS

The authors would like to thank, firstly, the Almighty God who gave them the wisdom and determination in constructing the research. They also send their gratefulness to the Polytechnic University of the Philippines and the municipality of Parañaque for the financial support during the presentation of the paper, as well as the publication.

6. REFERENCES

[1] Crisostomo, R. Philippine Stock Market in Perspective. 12th National Convention on Statistics, 2013.Available: www.nscb.gov.ph/ncs/12thncs/papers//IPS-21Finance Statistics/IPS-21_3_Philippine Stock Market in Perspective.pdf

[2] Fu, T. Impacts of Securities Transaction Tax Adjustments in Stock Market in China. Advances in Economics and Business, 2014.Available: www.hrpub.org/download/20140902 /AEB1-11802508.pdf

[3] Aquino, R. Efficiency of the Philippine stock market. Applied Econometrics Letter, 2006. Available: www.tandfonline.com/doi/full/10.1080/13504850500397437

[4] Joshi, P. International Journal of Financial Studies, 2015.Available: www.mdpi.com/2227-7072/3/3/393

[5] Nguyen, N. Hidden Markov Model for Stock Selection, 2015. Available: www.mdpi.com/2227-9091/3/4/455

[6] Mizuno, M. Choice, Confusion and Competition in the Market for Markets: Aiming for Aim in Three Junior Asian Stock Exchanges. Pacific Economic Review, 2008Available: onlinelibrary.wiley.com/doi/10.1111/j.1468-0106.2008.00419.x/abstract

[7] Albaity, M. Impact of the Monetary Policy Instruments on Islamic Stock Market Index Return. Economics: The Open-Access, Open-Assessment E-Journal, 2011Available: www.economics-ejournal.org/economics/discussionpapers/201126

[8] Ivrendi, M. Monetary Policy Shocks and Macroeconomic Variables: Evidence from Fast Growing Emerging Economies. Open-Assessment E-Journal, 2013.Available: www.economics-ejournal.org/economics/discussionpapers/2013-61

[9] So, M. Why is the Peso and the Stock Market Weakening? 2014. Available: moneysense.com.ph/investing/why-is-the-peso-and-the-stock-market-weakening/

[10] Sy, V. The Philippine Stock Market - A Safe Haven. The Philippine Star: Global, 2013.Available: www.philstar.com/business/2013/10/21/1247531

[11] Adhikari, R. An Introductory Study on Time Series Modeling and Forecasting. Available: https://arxiv.org/ftp/arxiv/papers/1302/1302.6613.pdf

[12] Savas, F. Forecast Comparison of Models Based on SARIMA and the Kalman Filter for Inflation. University in Uppsala, Sweden, 2013.Available: www.diva-portal.org/smash/get/diva2:631413/FULLTEXT01.pdf

[13] Mahadeva, L. Unit Root Testing to Help Model Building. London, England: Bank of England,2004. Available: www.bankofengland.co.uk/education/Documents/ccbs/handbooks/pdf/ccbshb22.pdf

[14] TS Notes. Available: www.maths.qmul.ac.uk/~bb/TS_Chapter4_3&4.pdf

[15] Franses, P. Time Series Models for Business and Economic Forecasting,1998. Cambridge University Press. Available: www.cambridge.org/ca/9780521520911

[16] Elder, J. Testing for Unit Roots. Journal of Economic Education,2001. Available: www.deu.edu.tr/userweb/onder.hanedar/dosyalar/elder.pdf

[17] Armstrong, J. From Crystal Ball to Computer Forecasting Principles: Evidence-based Forecasting,1985. Available: www.forecastingprinciples.com/files/LRF-Ch1b.pdf

[18] Advanced Forecasting Method: Dynamic regression models,Available: www.otexts.org/fpp/9/1

How to cite this article:
Urrutia J D, Diaz J L B and Baccay E B. Forecasting Philippine Daily Stock Exchange Index. J. Fundam. Appl. Sci., 2017, *9(7S), 202-218*.