**International Journal of Thesis Projects and Dissertations (IJTPD)**
Vol. 5, Issue 1, pp: (1-3), Month: January - March 2017, Available at: www.researchpublish.com

# A Naïve Approach for Comparing a Forecast Model

Chuda Prasad Dhakal

PhD, Tribhuvan University, Institute of Agriculture and Animal Sciences, Rampur Campus, Chitwan, Nepal

***Abstract:*** **Comparison of a forecast model, one of the essential elements of forecast model fitting, is totally a different concept than many a times confused concept of its accuracy measure. With accuracy measure alone, no any context or reference could be given to convene an investigated model is better or superior than any other model made from the same data set. This paper aims to demonstrate how a multiple regression model, constructed from time series data can be compared through naïve forecast approach. This, at the same time, has clarified the differentiation between comparison of a forecast model and its accuracy measure. Regarding the context of comparing the models, in this case, in both accuracy measures, mean absolute error and mean absolute percentage error, multiple regression model has taken the lead to be smaller error, meaning that fitted model of the choice i.e., the multiple regression model, was better to the naïve forecast, the benchmark method. This concludes it was worth fitting the multiple regression model.**

***Keywords:*** **forecast models, naïve method, forecast error, forecast accuracy, mean absolute error, mean percentage error.**

## I. INTRODUCTION

Investopedia [2016] defines forecasting as the use of historic data to determine the direction of future trends. According to theweatherprediction.com [2016] different forecast models have different data input and a different mathematical way of equations solving. Also, in many occasions, different forecast models can be developed through different approaches for the same data set for the same purpose. As such the models have differences in resolution, display of output and the integration of physical processes into them. Across use, specific role of a given model would be valid if it fits to the given niche and environmental context. Accuracy and relative efficiency of any investigated model is tested through cross validation (accuracy measure) and the approach of forecast model comparison.

Degree of accuracy of any forecast model is measured with forecast errors (deviation of the actual from the forecasted quantity), which investigate how suitable any forecast model is for a given data set. Various types of forecast errors, all preferred to be smaller, are in practice. Choices of which, are most often relative to the circumstances and the environment of forecasting. Davydenko and Fildes (2016) in their paper entitled, 'Forecast Error Measures: Critical Review and Practical Recommendations' have described where the limitations of the accuracy measures lie and, have given the best alternatives to the respective forecast accuracy measures to varied situations and the practices. Some popular forecast accuracy measures are: Mean Forecast Error (MFE), Mean Percentage Error (MPE), Mean Absolute Error (MAE), Mean Percentage Error (MAPE), Root Mean Square Error (RMSE), Mean Absolute Scaled Error (MASE) etc. In utmost, these forecast errors help update or recommend changes in the models. However, care should be taken that none of the forecast accuracy measures are ideal and, even the most popular ones are controversial.

Many a times, accuracy measure and comparison of forecast models are intermingled. Accuracy measure of a forecast model are found put under the heading of model comparison, while these are two different concepts in fullest. Accuracy measures are used in forecast model comparison. But, measuring accuracy of an individual model does not mean comparing of the forecast model. Accuracy measures of a forecast model investigate how accurate any model is within itself, i.e. the closeness of the forecast values to the observed values. However, comparing of the model is identifying the

difference between the accuracy measures of the respective models, smaller the better. According to (Hyndman & Athanasopoluos, 2014) MAE and MAPE are commonly used forecast errors in model comparison, which provide a measure of the improvement achievable through use of more sophisticated forecasting method. This type of information is much useful than simply computing MAE or MAPE of any single forecast model, since it provides a basis for evaluating the relative accuracy of different models.

Accordingly, when any investigated model on its own do not represent to which reference they come out to be superior or inferior; Average, Naïve, Seasonal Naïve and, Drift are some simple methods of forecasting mentioned in Hyndman and Athanpolous (2016) which are considered as benchmarks for forecast model comparison. Whatever methods of forecasting are developed, they are compared to such simple benchmark methods to know if the method of choice was any better than these simple alternatives. If not, the sophisticated method is not worth fitting. This paper, an extract of a Ph D thesis, entitled "Optimizing a Multiple Regression Model for Rice Production Forecasting in Nepal" demonstrates the comparison of the model optimized using the naïve forecast approach.

## II. MATERIALS AND METHODS

Naïve forecasts are simple. According to which, any observed values of the last year are the forecasts of current year. For instance, forecast of the year 1996 was the observed value of the year 1995, forecast of the year 1997 was the observed value of the year 1996 and so on. In this setting, Naïve method is recommended for model comparison by Makridakis et al. [1998] and, Hyndman and Athanasopoulos [2016]. The authors argue that, this (the naïve forecast) is one of the simple forecasting methods, and most often is found to be incredibly effective to be considered as the benchmark method for comparing models.

This paper bears the part when the afore mentioned Ph D study, reached the stage of investigating, if the model at hand was any better to its simple benchmark method. Time series data [1961-1995] were used to investigate the multiple regression model and out of sample time series data [1996-2010)] cross validation of the model was conducted. The cross-validation process, led computation and interpretation of various forecast errors which included, MAE and MAPE for the investigated multiple regression model. But this was not sufficient for the comparison of the model. Hence forth, also for the naïve forecast method, both error metrics MAE and MAPE were computed. A step ahead of which, for this, the naïve forecasts for the test sample were obtained. And, ultimately for both models the computed error metrics were compared.

## III. RESULTS AND DISCUSSIONS

Following (Table I) is the MAE and MAPE of Multiple Regression Model and Naïve Forecast Method.

**TABLE I: ERROR MATRICS COMPUTED FOR MODEL COMPARISION**

| **Model** | **Forecast Error** | |
|---|---|---|
| | **MAE** | **MAPE** |
| Multiple regression | 199.5848 | 4.77% |
| Naïve Forecast | 240.44 | 5.80% |

Task was to compare investigated multiple regression model with naïve forecast method. Multiple regression model has (MAE = 199.58). This interprets the average size of the forecast error in the model regardless of its sign was nearly 200. However, when the same (MAE = 240.44 ) for the naïve forecast method is considered, clearly, we could say that the multiple regression model was better than the naïve forecast method. The mean of the absolute size of the error was smaller in multiple regression model than that of it to its counterpart, the naïve forecast method. For comparison of the models generated through the same data set, the absolute size of the error is more meaningful. It well decides whether a model was good or bad over the other model.

For the relative comparison between these models, MAPE was put forward. On an average, multiple regression model has cast approximately 5% of the error in its forecasts. Whereas, the same (MAPE) for the naïve forecast method was nearly 6%. Through these result, we could see that in both cases the multiple regression model showed its dominance. And hence, this was the better model than its benchmark, the naïve forecast method.

## IV. CONCLUSION AND RECOMMENDATIONS

This paper has reviewed the literature in forecast accuracy measure and forecast model comparison. Clarifying the difference between comparison and accuracy measure of a forecast model, it has successfully demonstrated comparison of forecast model of choice through naïve forecast approach. Smaller error i.e., both mean absolute error and, mean absolute percentage error of multiple regression model, led to conclude, it was a better forecast model than the simple naïve forecast method, meaning that it was a worth fit. Hence, despite their simplicity in computing and interpreting, naive forecast method is vital in a model comparison ground. Any practitioner therefore, can benefit using this model comparison approach in endeavours to contribute in the science of forecasting in real-life context. The study also has opened door to investigate how other benchmark methods of forecast comparisons serve for the same or still further, if there was any other better approach to compare the forecast method of choice in this context. And, will it be wise to leave this here as it is? All choices are open to follow this naïve approach of forecast model comparison.

## ACKNOWLEDGEMENT

The authors of all papers and the books which are cited are all indebted. In addition, a sincere thank also go to all author of any books, papers, and notes etc. which were helpful during preparation of this research article.

## REFERENCES

[1] Davydenko, A., & Fildes, R. (2016). Forecast Error Measures: Critical Review and Practical Recommendations. *In Business Forecasting: Practical Problems and Solutions*. John Wiley & Sons Inc. DOI: 10.13140/RG.2.1.4539. 5281

[2] Forecasting. (2016). *Investopedia*. Retrieved from http://www.investopedia.com/terms/f/forecasting.asp#ixzz 4Qz4VFtyC Accessed on 12.13.2016

[3] Hyndman, R.J., & Athanasopoulos, G. (2014). Forecasting: Principles and practice, a online text book. Retrieved from http://otexts.com/fpp/ Accessed on 02.05.2014

[4] Hyndman, R.J., & Athanasopoulos, G. (2016). Forecasting: Principles and practice, a online text book. Retrieved from https://www.otexts.org/fpp/2/3 Accessed on 12.11.2016

[5] Makridakis, S., Wheelwritht, S.C., & Hyndman, R. J. (1998). Forecasting methods and application. (3rd ed.). John Wiley & Sons, Inc.

[6] The different forecasting methods. (2016). theweatherprediction.com. Retrieved from http://www.theweather prediction.com/habyhints/122/ Accessed on 12.07.2016