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TREND ANALYSIS OF FINANCIAL PERFORMANCE OF THE BANK OF CEYLON, SRI LANKA

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Abstract

Trend analysis is important in banking to analyze and predict their financial statements. The aim of this study is to analyze the trend of key financial performance indicators; profit, advances and deposits of the Bank of Ceylon, Sri Lanka. Non-parametric loess analysis, Sen's slope, linear/quadratic trend modeling, growth curve fitting and change point analysis were implemented to understand the trend pattern of the data. Results revealed that quadratic trend model was suited for advances and growth curves for both deposits and profits. The loess analysis detected upward trends for both advances and deposits but it was nearly horizontal for profit. The estimated slopes of the trends were significant in the Sen's slope of three financial indicators. Potential significant changing points were detected in all

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three series through change point analysis. This analysis will direct investors to get a solid understanding about the bank before going to implement their decisions.

1. Introduction

The Bank of Ceylon (BOC) is Sri Lanka's foremost government and commercial bank which is established in 1939 [1]. The theme of the bank is 'bankers to the nation'. The glorious existence of the bank is now completing more than eight decades. It is a premier financial service provider in Sri Lanka. Its wide variety of financial services comprises of not only trade, development, corporate, mortgage and lease financing but also investment, off-store and commercial banking, credit card services, foreign currency transactions, securities, pawn brokering, etc. The BOC reaches to the nation through more than 645 branches. The first overseas branch of the bank established in United Kingdom. As BOC is one of the leading banks in the country, its financial stability is beneficial to all stakeholders. An analysis of financial performance of the BOC may use by the management or other related administrative decision makers to adjust the processes and to forecast future financial statements of the bank.

Financial performance of a bank measures results of its operations and policies over period of time in monetary basis. Efficient and effective analysis of financial performance allows to reach its ultimate goal of maximize the profit. This kind of analysis is particularly important in an extremely dynamic, competitive and uncertain business environment. Novel growth opportunities can be identified and suggested through the analysis together with minimized inefficiencies which will drive the business forward. Further, this analysis is crucial in comparing the financial position of the bank among other competitors in the same industry. Profit, advances and deposits are some of the indicators of a financial performance of a bank. Banks take deposits from individuals or groups and it is the largest liability for banks. Then banks invest it in securities or lend to companies/consumers. Banks also earn revenue from fees related to ATM machines, account

checking and credit cards, etc. Bank loans or advances are very popular among people and can be defined as an amount of money lent at interest from a bank to a borrower. The profit of a bank can be derived from the difference between the rate they paid for the deposits and the rate they receive from borrowers. Financial performance can be analyzed through trend analysis. Trend analysis assesses past historical data to detect future movements of a variable of interest. It shows an overall direction of our process in a specific time period. Trend may be upward, downward or horizontal in nature. This analysis is particularly important in banking sector to analyze and predict their financial statements. The aim of this study is to analyze the trend of three key financial performance indicators; namely, profit, advances and deposits of the Bank of Ceylon, Sri Lanka. Trend analysis will direct investors to get a solid understanding about the bank before going to implement their decisions.

Trend analysis of variables has been analyzed by many researchers in diverse fields. Hess et al. in [2] presented seven statistical approaches applicable for trends analysis in the field of environmental science. They have made recommendations through a simulation study [2]. Jain and Kumar [3] summarized results related to trend analysis of temperature and rainfall in India by a review article. According to their article, Sen's slope and Mann-Kendall test were widely used in researches [3]. The impact of branchless banking on the Financial Performance of Commercial Banks in Kenya was studied by Dzombo et al. [4]. They selected an agency and electronic banking channels as indicators for the financial performance of commercial banks in the country. Based on the study, they recommended to implement both channels to improve the financial performance. The association of risk management and financial performance of banks in Nigeria was found Adeusi et al. [5]. The study finalized positive impact of risk management on financial performance. The association of capital structure and financial performance was analyzed in another study by using 10 commercial banks in Sri Lanka [6]. The financial performance was measured using return on assets as well as return on equity (ROE). Results denoted short term debt to total assets ratio, long term debt to total assets

ratio and size were not significantly related to ROE. According to the literature, no research was found related to the trend analysis of three financial indicators mentioned in the study, specially based on Bank of Ceylon, Sri Lanka.

2. Materials and Methods

Data consist of quarterly reported details of profit, advances and deposits of the Bank of Ceylon, Sri Lanka. Data from final quarter of 2009 to first two quarters of 2020 were extracted from the reports issued by the Bank of Ceylon, Sri Lanka. The reports can be accessed through the link https://www.boc.lk/index.php?route=information/information&information_id=25. Trend of the data were analyzed using methods; namely, non-parametric loess analysis, Sen's slope, linear/quadratic trend modeling, growth curve fitting and change point analysis. The analysis was done using the R software package and Minitab statistical software.

2.1. Non-parametric loess analysis

The loess stands for locally weighted scatter-plot smoother. The loess analysis is a simple approach for fitting curves to the data. In the non-parametric loess analysis, it does not assume any distribution for the variables. Even though the method is flexible approach for curve fitting, it does not provide a mathematical relationship between variables.

2.2. Sen's slope

The method is useful in estimating the magnitude of the trend present in a time series. This method was proposed by Sen [7]. The trend is measured as:

$$\beta = Median\left(\frac{x_j - x_i}{j-1}\right), \quad j > i, \tag{1}$$

where β denotes estimate for the trend (Sen's slope estimate). $\beta \geq 0$ indicates upward trend for the time series. $\beta < 0$ indicates downward trend for the series.

2.3. Linear/quadratic trend modeling

In a linear trend, the values or the data points of the series tend to increase or decrease at a constant rate. A linear trend can be denoted as:

$$Trend = \beta_0 + \beta_1 x. \tag{2}$$

In a positive linear trend, dependent variable increases at a constant rate as the independent variable increases whereas in a negative linear trend, it decreases at a constant rate with the independent variable.

In a quadratic trend, the data points of a time series increase or decrease at a rate that is not a constant. Therefore, it changes over time. The trend is not a straight line. The trend can be expressed as:

$$Trend = \beta_0 + \beta_1 x + \beta_2 x^2. \tag{3}$$

In the quadratic trend, dependent variable increases at an increasing rate as the independent variable increases.

2.4. Growth curve fitting

The growth curve fitting provides useful insights on the characteristics of a series. Exponential growth curve is widely used in practice. The exponential function has the form $y = \alpha b^x$, where a and b are constants.

2.5. Change point analysis

This is performed on a time series to detect whether any changes have occurred in the series. The method provides the number of changes as well as the time of each change. The analysis directs to find causing factors for each change. Hence, the method is helpful in process enhancement and growth. The method assumes no specific distribution.

3. Results and Discussion

The time series plots of advances, deposits and profits are depicted in Figures 1-3, respectively. Clear upward trend can be seen in both the series of advances and deposits. Some seasonal fluctuations are apparent in the

series of profits. The seasonal variation seems to be multiplicative (not additive) in nature.

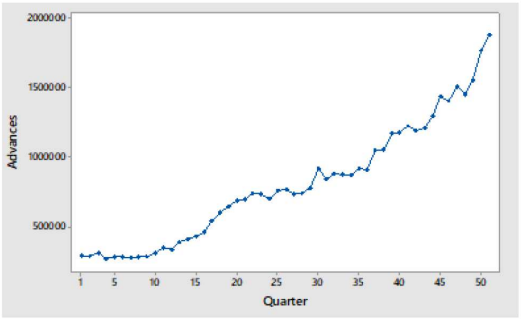

Figure 1. Time series plot of advances.

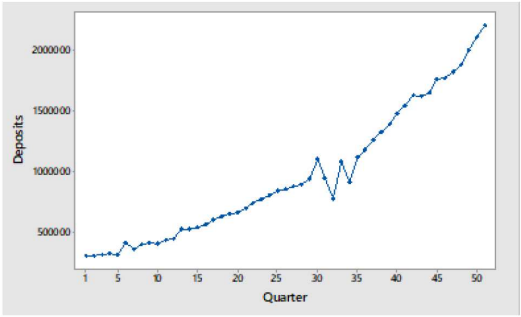

Figure 2. Time series plot of deposits.

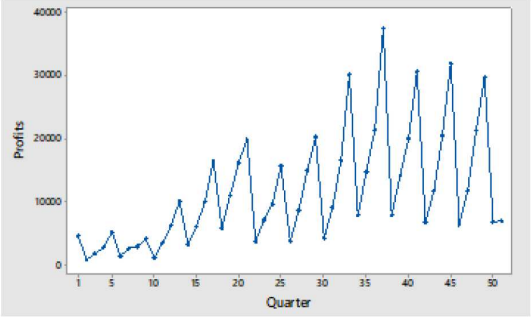

Figure 3. Time series plot of profits.

Descriptive statistics are summarized in Table 1. Coefficient of variation (CV) shows that the variability of all three indicators is approximately equal.

Profit, advances and deposits show positive (right) skewness. Therefore, distributions of these variables are not normal but positively skewed. Investors should keep this fact in mind as many financial models develop based on a normal distribution.

Table 1. Descriptive statistics: advances, deposits, profits

Variable	Mean	SE of mean	Standard deviation	Skewness	CV
Advances	60 320	801 063	430 769	0.59	7.141
Deposits	76 538	962 283	546 588	0.68	7.141
Profits	1 264	11 535	9 025	1.11	7.140

The fitted linear and quadratic trend models with a growth model for the variable deposits are shown in Figures 4-6, respectively. Apparently, growth curve model suits well for the deposits and it was confirmed by reporting the minimum summary measures (Table 2). Therefore, growth curve model is more appropriate for the deposits than a linear or a quadratic model. The fitted line of the growth model is $Y_t = 291189 \times (1.04041^t)$, where Y_t stands for the deposits at time t.

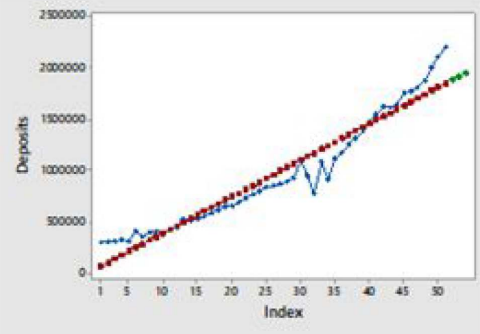

Figure 4. Linear trend model for deposits.

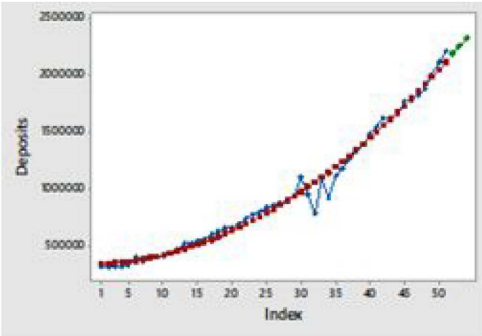

Figure 5. Quadratic trend model for deposits.

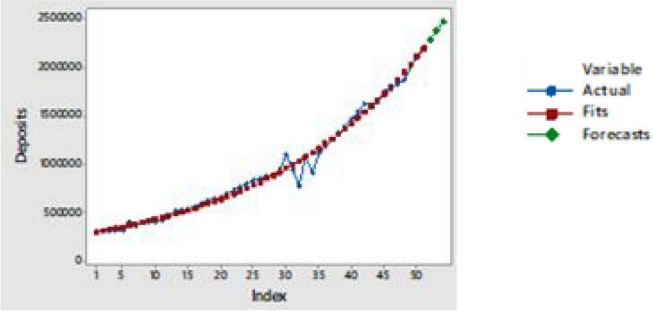

Figure 6. Growth curve model for deposits.

Table 2. Comparison of model efficiencies for deposits

Model	MAPE	MAD	MSD
Linear	15.32	1.11428e+05	2.02321e+10
Quadratic	6	44408	4403966424
Growth	5	38449	3647794075

The fitted linear, quadratic and growth curve models for the advances are depicted in Figures 7-9, respectively. Quadratic trend model appears to fit well to the overall trend. MAPE, MAD and MSD of the fitted models are summarized in Table 3. The minimum summary measures were given by the quadratic model. Therefore, the quadratic trend model is appropriate for the advances than the other two models. The fitted quadratic trend line is $Y_t = 252489 + 7488t + 396.4t^2$, where Y_t stands for advances at time t.

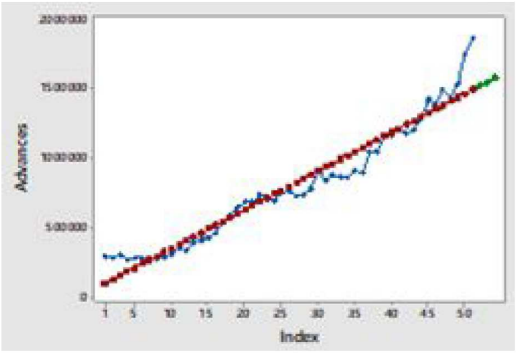

Figure 7. Linear trend model for advances.

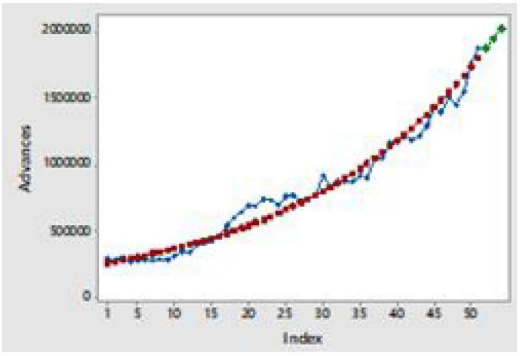

Figure 8. Quadratic trend model for advances.

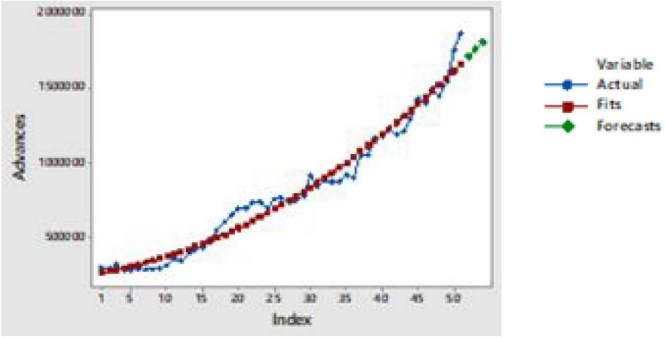

Figure 9. Growth curve model for advances.

Table 3. Comparison of model efficiencies for advances

Model	MAPE	MAD	MSD
Linear	12.3278	76600	1.08083e+10
Quadratic	8	56518	4912803212
Growth	9	56773	5157372143

Figures 10-12 show the original data, the fitted trend line, and forecasts for the variable profits, respectively. The summary measures of the fitted models are stored in Table 4. The minimum measures were given by the growth curve model. Therefore, the growth curve model is more appropriate for the profits. The fitted line of the growth model is $Y_t = 2899.49 \times (1.04099^t)$, where Y_t is the profit at time t.

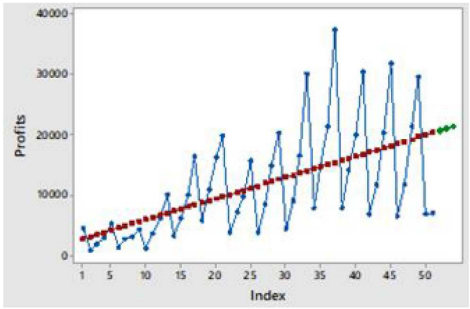

Figure 10. Linear trend model for profits.

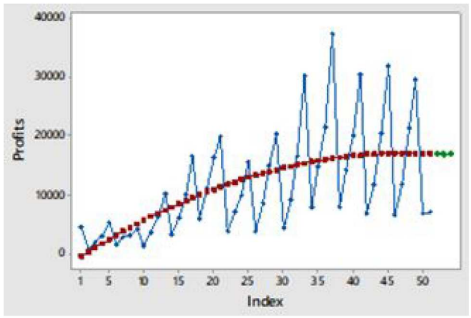

Figure 11. Quadratic trend model for profits.

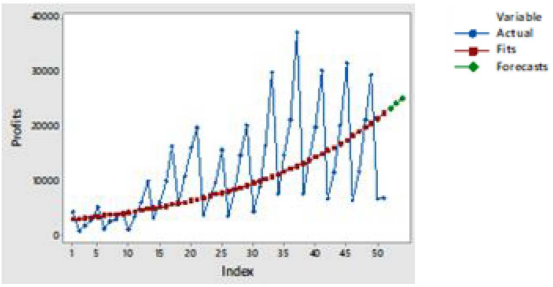

Figure 12. Growth curve model for profits.

Table 4. Comparison of model efficiencies for profits

Model	MAPE	MAD	MSD
Linear	77	5609	53283669
Quadratic	71	5522	50861857
Growth	64	5442	49528248

Non-parametric loess curves for the three performance indicators are presented in Figures 13-15. A general upward trend can be identified for both advances and deposits but the trend line estimated for the profit is nearly horizontal. The horizontal trend lines will provide precise points for entering and exiting trades and will be useful for traders.

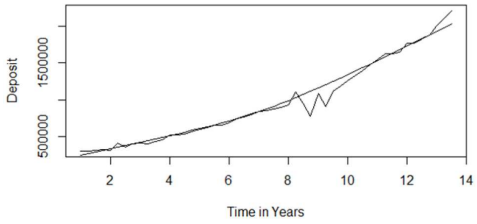

Figure 13. Nonparametric loess curve for deposits.

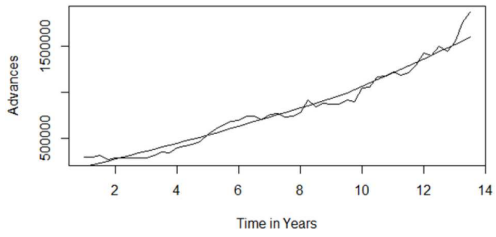

Figure 14. Nonparametric loess curve for advances.

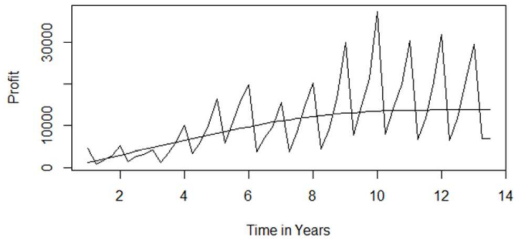

Figure 15. Nonparametric loess curve for profits.

Sen's slope estimates are summarized in Table 5. Sen's slopes were positive and statistically significant (5% level of significance).

Table 5. Sen's slope estimates for advances, deposits and profits

Variable	Sen's slope	Confidence interval	*p* value
Advances	26878.62	(24965.33, 29276.13)	< 2.2e-16
Deposits	32963.14	(29245, 36938.78)	< 2.2e-16
Profits	318.87	(170.47, 471.33)	7.25e-07

Multiple changing points in the series of advances, profits and deposits were detected through change point analysis and shown in Figures 16-18. More than 5 changing points were detected in both the series of advances and deposits. But only, three changing points were detected for profit. Individual changing points should be investigated distinctly with associated time period to determine if enhancements or process variations executed through the bank had an effect on the series (output).

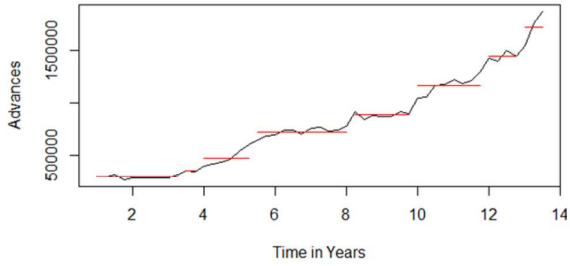

Figure 16. Change points in the series of advances.

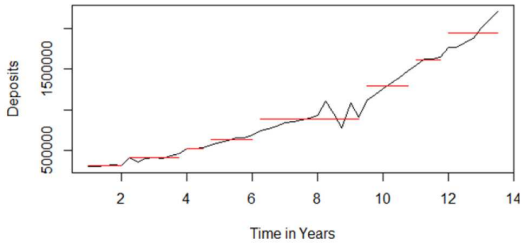

Figure 17. Change points in the series of deposits.

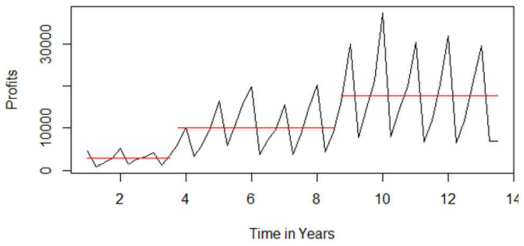

Figure 18. Change points in the series of profits.

4. Conclusion

The paper analyzes the trend of three key financial performance indicators; namely, profit, advances and deposits of the Bank of Ceylon, Sri Lanka. Non-parametric loess analysis, Sen's slope, linear/quadratic trend modeling, growth curve fitting and change point analysis were implemented to understand the trend pattern of the three financial performance indicators. BOC is one of the leading banks in the country and therefore its financial stability is beneficial to all its stakeholders. A trend analysis of key financial performance indicators of the BOC is very much useful to adjust the ongoing processes as well as to forecast the future financial statements of the bank. Further, the analysis will direct investors to get a solid understanding about the bank before going to implement their investment strategies.

Identifying the trend is the first and a crucial step in the process of analyzing the financial position of a bank. One major drawback of trend analysis is that it may not purely accurate. Trend analysis is merely depending on the past information. Sometimes historical behavior is not

always an indicative of the upcoming scenario. Multiple factors may influence the financial performances of a bank and these factors are varying over time. Therefore, it is always advisable to conduct an extensive research with special attention to grasp uncertainties into some extent to make a better prediction.

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