

Modeling Time Series Data in Foreign Banks in India

Dr. Parag Kalkar, Dr. Vidula Anil Adkar

Abstract— Post 1991 reforms, Indian economy became an open economy, which meant that, foreign banks and institutions could invest and setup their businesses in the country. The Indian banking system is subjugated by the Public sector banks followed by the Private Sector banks. Foreign banks contribute towards the Indian banking system in terms of technology, skill transfer, modernization of the system, enhancement of banks participation in foreign exchange and many more. Regardless, Foreign banks are increasingly shrinking their presence in India and are also becoming more conservative than private and public sector counterparts. Profitability and Non Performing Assets position being the crucial factors for the sustainability of the banks, Foreign Banks' position is tremendously fluctuating since 2015. Hence, it is necessary to forecast the same. This research paper predicts the response variables; Net Profit, Gross NPA, Net NPA and Net NPA as % Net Advances of the Foreign Banks in India for the years 2018-19, 2019-20 and 2020-21.

Expert time series modeler is used to predict the response variables for three years. Considering the time series data, the best fit simple model is demonstrated. Goodness of fit- R^2 represents the prominent data fit for the response variables. Sluggish forecasted values are observed for the response variable Net Profits, Net NPA and Net NPA as % Net Advances whereas the Gross NPA is consistently showing an increasing trend for the predicted years (2018-19, 2019-20 and 2020-21). The predicted profitability and Non-performing assets of Foreign Banks in India is appalling.

Index Terms— Non Performing Assets, Foreign Banks, Time series modeler, Forecast

I. INTRODUCTION

India witnesses the maneuver of the Foreign Banks since the pre independence era. Country, today, has 44 foreign banks in operation from various countries over the globe. There are two ways of presence of foreign banks in India. First is the branch form of presence which means that the foreign bank has its physical branch in India. Second is the presence through Representative Office in India, which is not actually a branch. Foreign Banks account for less than 1% of the total branch network in the country. However, they account for approximately 7% of the total banking sector assets and around 11% of the profits. Most of the foreign banks in India are niche players and their business is usually focused on trade finance, external commercial borrowings, wholesale

lending, investment banking and treasury services. Some other banks are confined to private banking and wealth management.¹

II. NON-PERFORMING ASSETS

An asset, including a leased asset, becomes non-performing when it ceases to generate income for the bank. A non-performing asset (NPA) is a loan or an advance where; interest and/ or instalment of principal remain overdue for a period of more than 90 days in respect of a term loan, the account remains 'out of order' the bill remains overdue for a period of more than 90 days in the case of bills purchased and discounted, the instalment of principal or interest thereon remains overdue for two crop seasons for short and long duration crops, the amount of liquidity facility remains outstanding for more than 90 days, in respect of a securitization transaction undertaken in terms of guidelines on securitization dated February 1, 2006 and in respect of derivative transactions, the overdue receivables representing positive mark-to-market value of a derivative contract, if these remain unpaid for a period of 90 days from the specified due date for payment. Banks are required to classify non-performing assets further into three categories based on the period for which the asset has remained non-performing and the realisability of the dues: Substandard Assets, Doubtful Assets and Loss Assets.²

III. LITERATURE REVIEW

Various studies have been carried out to forecast the non performing assets of the banks in India. Also, research has been done to study the history of the foreign banks in India.

T. Vinila (2016)³ studied History of Foreign Banks in India. The research focused to study the historical setting, origin and growth of Foreign Banks. The study included the earlier stages of establishment of foreign banks in India, their main business which comprised of financing of foreign trade. The Minority report by Manu Subedar⁴, Indian Central Banking Enquiry Committee, was also included which stated that the main business of Foreign Banks is not the financing of foreign trade but was internal trade of India. The operations of these banks were not confined to the financing of foreign trade. The study period of this research paper extended from 1770 to 1947. The research paper also explains the functioning of the foreign banks from 1870 to 1947.

Gaurav Vallabh *et al.* (2016)⁴ forecasted repo rate, Gross Domestic Product, Loans and Advances and Inflation Rate using Regression models: Simple Linear Regression (SLR), Multiple Linear Regression and Time series-based methods: Moving Average, Simple Exponential Smoothing, Holt, and Holt-winter method. The models proposed by the

Manuscript received April 17, 2019

Dr. Parag Kalkar, Director, Sinhgad Institute of Management
Dr. Vidula Anil Adkar, Faculty Member, Sinhgad Institute of Management

¹(Foreign Banks in India, 2019)

²(Reserve Bank of India- Master Circulars, 2017)

³(T, 2016, Volume 7, Issue 2)

⁴(Vallabh G. , Singh, Prasoon, & Singh, 2016)

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researchers predicted that if the current path was trending, the issue of NPAs would snowball into a major problem with serious repercussions; which makes the banks imperative to implement remedial measures.

Hemavathy Ramasubbian *et al.* (2015)⁵ studied the current position of NPAs in public sector banks, private sector banks and foreign banks. The research was carried out for public sector, private sector and foreign banks in India. The study examined status of sub standard, doubtful, loss assets and Gross NPAs and forecasted the NPAs for the next 6 years. Non performing assets showed an increasing trend for the selected years of all the selected banking sectors. To therefore fulfill the research gap, this research paper forecasts, the profitability and non-performing assets of Foreign Banks in India.

IV. OBJECTIVES

1. To forecast profitability of Foreign Banks in India for the years 2018-19, 2019-20 and 2020-21
2. To forecast the Non-Performing Assets of Foreign Banks in India for the years 2018-19, 2019-20 and 2020-21.
3. To develop a model in time series data of Net Profit (profitability) and Gross NPA, Net NPA and Net NPA as % to Net Advances for the years 2018-19, 2019-20 and 2020-21 with the help of time series modeler.

V. RESEARCH METHODOLOGY

The study is carried out with an empirical approach. The data of 46 Foreign Banks in India is collected for four years, from 2014-15 to 2017-18. The profitability (net profit) and NPA (Gross NPA, Net NPA and Net NPA as % to Net Advances) for the years 2018-19, 2019-20, 2020-21 have been forecasted. The study includes five response variables, Net Profit, Gross NPA, Net NPA and Net NPA as % to Net Advances, and time; predictive variable. Sequence plots for the five variables of four years have been used to study the seasonality and the trend of the data pattern. Expert time series modeler is used for forecasting; Net Profit, Gross NPA, Net NPA and Net NPA as % to Net Advances.

VI. DATA ANALYSIS

Sequence Plot
Chart 01

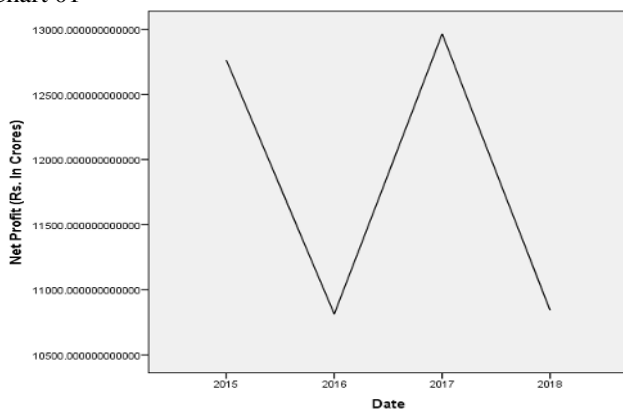


Chart 02

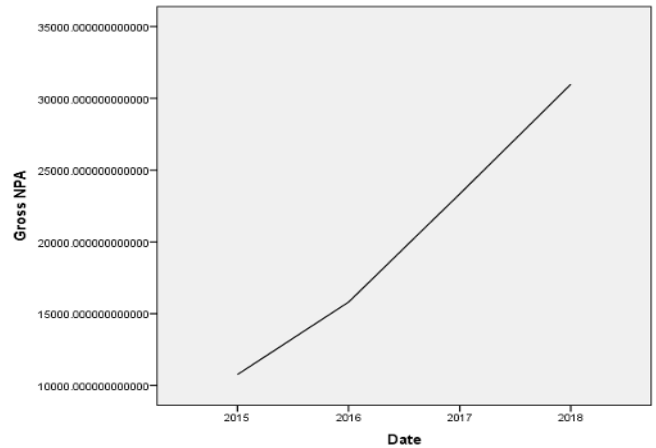


Chart 03

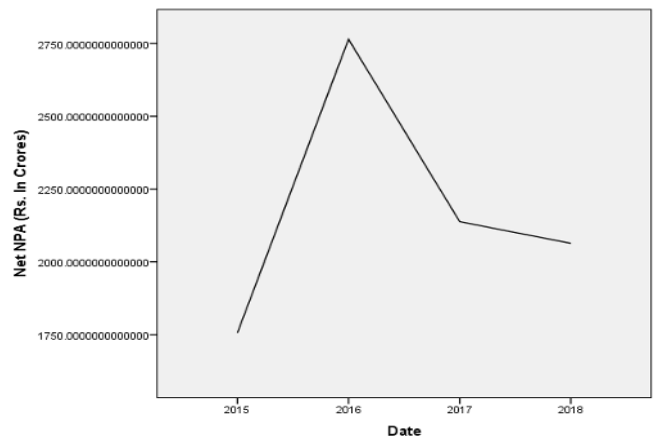
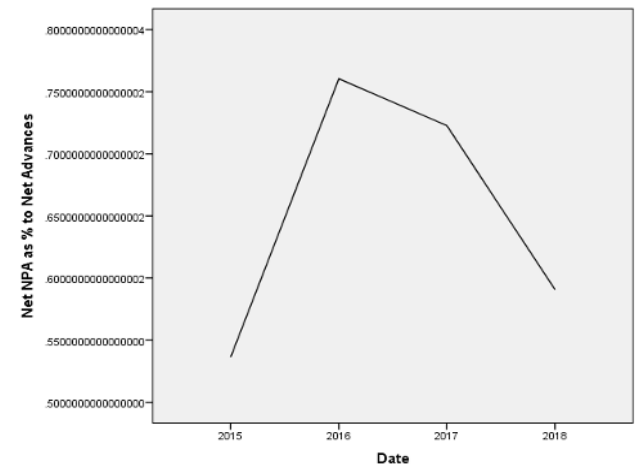


Chart 04



Foreign Banks' Net profit (Chart 1) has shown tremendous fluctuating trend from 2015 to 2018. Gross NPA (Chart 2) is continuously increasing since 2015 whereas Net NPA (Chart 3) shows an increasing trend for the years 2015, 2016; since then the Net NPA of the banks have shown a sluggish trend and for the years 2017 and 2018 it grew steadily. Net NPA as % to Net Advances has shown a fluctuating trend since 2015 (Chart 4).

Time Series Modeler

⁵(Ramasubbian & Thangavelu, Forecasting the Trends of NPAs in Indian Banking Sector, 2015)

Table 01

Model Description

			Model Type
Model ID	Net Profit (Rs. In Crores)	Model_1	ARIMA(0,0,0)
	Gross NPA	Model_2	ARIMA(0,1,0)
	Net NPA (Rs. In Crores)	Model_3	Simple
	Net NPA as % to Net Advances	Model_4	Simple

The best time series model fit for the variables Net Profit, Gross NPA, is ARIMA Model and for Net NPA and Net NPA as % to Net Advances is Simple Model.

Model Summary

Table 02

Model Fit

Fit Statistic	Mean	SE	Minimum	Maximum	Percentile						
					5	10	25	50	75	90	95
Stationary R-squared	.280	.330	-6.883E-15	.643	-6.883E-15	-6.883E-15	5.607E-15	.239	.602	.643	.643
R-squared	.156	.547	-.239	.963	-.239	-.239	-.205	-.051	.722	.963	.963
RMSE	772.085	670.821	.118	1465.756	.118	.118	111.070	811.232	1393.951	1465.756	1465.756
MAPE	10.042	3.692	5.667	14.195	5.667	5.667	6.414	10.153	13.558	14.195	14.195
MaxAPE	16.475	7.618	9.553	25.300	9.553	9.553	9.840	15.523	24.061	25.300	25.300
MAE	604.364	554.024	.095	1127.624	.095	.095	67.980	644.869	1100.244	1127.624	1127.624
MaxAE	877.471	712.314	.155	1691.437	.155	.155	174.980	908.147	1548.287	1691.437	1691.437
Normalized BIC	9.513	9.018	-3.924	14.946	-3.924	-3.924	.192	13.514	14.833	14.946	14.946

Table 03

Model Statistics

Model	Number of Predictors	Model Fit statistics		Ljung-Box Q(18)			Number of Outliers
		Stationary R-squared	R-squared	Statistics	DF	Sig.	
Net Profit (Rs. In Crores)-Model_1	0	4.308E-14	4.308E-14	.	0	.	0
Gross NPA-Model_2	0	-6.883E-15	.963	.	0	.	0
Net NPA (Rs. In Crores)-Model_3	0	.643	-.101	.	0	.	0
Net NPA as % to Net Advances-Model_4	0	.477	-.239	.	0	.	0

R-square (R^2) value measures Goodness-of-fit.⁶ From the Table 03 it is evident that the R^2 value is 0.963 at 95% confidence level which indicates that changes in the predictors are related to changes in the response variable and that your model explains a lot of the response variability⁷.

FORECAST

⁶(Time Series Modeler, 2017)
⁷(2018)

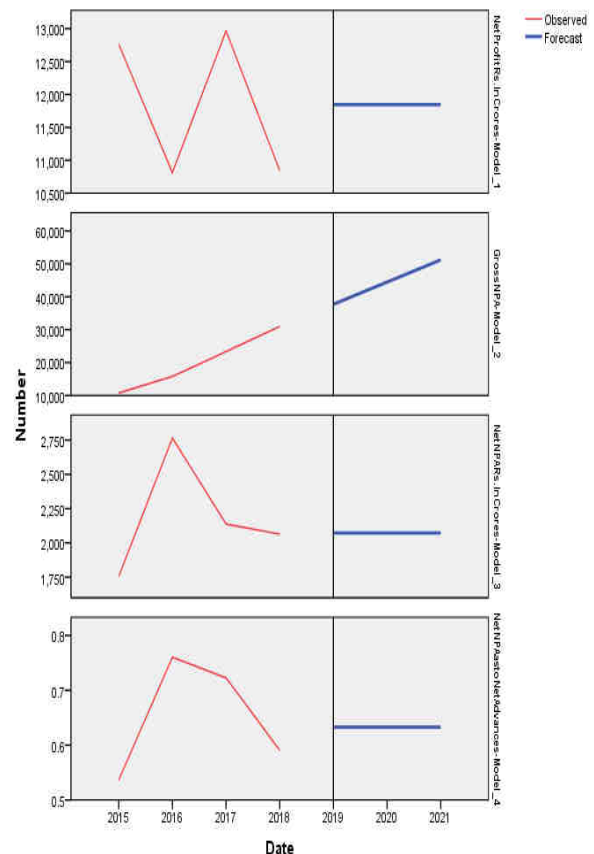
Table 04

Forecast

Model		2019	2020	2021
Net Profit (Rs. In Crores)-Model_1	Forecast	11846.14266	11846.14266	11846.14266
	UCL	15596.77668	15596.77668	15596.77668
	LCL	8095.508648	8095.508648	8095.508648
Gross NPA-Model_2	Forecast	37720.50971	44461.78814	51203.06656
	UCL	44027.14813	53380.72172	62126.48473
	LCL	31413.87129	35542.85455	40279.64840
Net NPA (Rs. In Crores)-Model_3	Forecast	2072.315818	2072.315818	2072.315818
	UCL	3485.089274	3485.151847	3485.214417
	LCL	659.5423620	659.4797889	659.4172186
Net NPA as % to Net Advances-Model_4	Forecast	.6328478295	.6328478295	.6328478295
	UCL	1.009139098	1.012500309	1.015832021
	LCL	.2565565607	.2531953506	.2498636385

For each model, forecasts start after the last non-missing in the range of the requested estimation period, and end at the last period for which non-missing values of all the predictors are available or at the end date of the requested forecast period, whichever is earlier.

Chart 05



VII. OBSERVATIONS AND FINDINGS

Net Profit- Model_1: Profitability (Net profit) of Foreign Banks for the years 2018-19, 2019-20 and 2020-21 is expected to range from ₹ 8095cr (LCL) to ₹ 15596cr (UCL). The forecasted profitability position of Foreign Banks for the years 2018-19, 2019-20 and 2020-21 is ₹ 11846 cr. (Table 04 and Chart 05)

Gross NPA-Model_2: Gross NPA of Foreign Banks in the year 2018-19 is expected to range from ₹31413 cr (LCL) to ₹44027 cr(UCL), in the year 2019-20 it is expected to range from ₹35542 cr (LCL) to ₹53380 cr (UCL), in the year 2020-21 it is expected to range from ₹ 40279 cr(LCL) to ₹62126 cr(UCL).

The forecasted Gross NPA of Foreign Banks for the years 2018-19, 2019-20 and 2020-21 is ₹ 37720cr, ₹ 44461cr and ₹ 51203cr respectively. (Table 04 and Chart 05)

Net NPA- Model_3: Net NPA of Foreign Banks for the years 2018-19, 2019-20 and 2020-21 is expected to range from ₹ 659cr (LCL) to ₹ 3485cr (UCL). The forecasted Net NPA of Foreign Banks for the years 2018-19, 2019-20 and 2020-21 is ₹ 2072 cr. (Table 04 and Chart 05)

Net NPA as % to Net Advances- Model_4 : Net NPA as % to Net Advances of Foreign Banks for the years 2018-19, 2019-20 and 2020-21 is expected to range from 0.2% (LCL) to 1.0 % (UCL). The forecasted as % to Net Advances of Foreign Banks for the years 2018-19, 2019-20 and 2020-21 is 0.6%. (Table 04 and Chart 05)

Foreign Banks are thus expected to have stagnancy in profitability position for the years 2018-19, 2019-20 and 2020-21. The Gross NPA has shown an increasing trend since 2015 to 2018 and as per the forecasted values it continuous to grow further up to 2021. Net NPA and NPA as % to Net Advances shows a fluctuating trend from 2015 to 2018 and grows steadily from 2018 to 2021. Net NPA as % to Net Advances is 60% which thus should a apprehend the Banks for future decisions.

CONCLUSION

Forecasted stagnancy in Profitability, increasing Gross NPA of the Banks and higher NPA as % to Net Advances ratio shows a distressing spell for the Foreign Banks in India.

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