

Model Building and Forecasting of Bank Credit to Public and Private Sector

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Abstract In this research the data comprises of the bank credit to public and private sector from 1983 to 2013. The main objective of the research is to select suitable model for the bank credit to public and private sector. For analysis purpose E-views version 5 has been used. First of all stationarity of the series has been checked and it is observed that the series of bank credit to public sector is stationary at first difference and series of bank credit to private sector is stationary at second difference. For identification of suitable ARIMA model correlogram has been performed and a class of models has been estimated. Most appropriate model is selected by applying different diagnostic checks and comparing several descriptive measures. Finally forecast has been made for the year 2014.

Keywords Bank Credit, ARIMA, GARCH, Model Building, Public Sector, Private Sector

1. Introduction

Forecasting is prediction of future. It is used for planning by management to cope with the future uncertainty. This future prediction is based on the data of past and present. Forecasting usually based on certain assumptions, which are assumed by management. If there is any error in assumptions then there will be similar error in forecasting. Different techniques are used to forecast such as Box Jenkins, Exponential smoothing, Moving Average, Delphi Method and Regression analysis. For forecasting, data should be in order so that the results can be accurate.

Importance of forecasting cannot be ignored in every sector of economy. Budget is forecasted by Government to meet the expenses, imports and exports are also forecasted, prices are also forecasted, inflation rate is also forecasted, total supply of money is also forecasted, these all forecasting's are done by economists to suggest the proper planning before there arise a serious issue in the economy. In

the same way importance of forecasting cannot be ignored in banking sector. When the budget is planned or the goals of business are settled mostly bankers rely on forecasting. No doubt it is their settled situation reality may be different from their forecasting. But even then the planning of any business involves forecasting. Forecasting helps in decision making in banking sector. In banking sector normally interest rate, inflation rate, work stress in banking sector, failure of banking sector, deposits in upcoming years are forecasted.

The most important internal limitation of forecasting is time. For accurate forecasting time is needed. Small businesses cannot afford a full time employee. This responsibility is assigned to any one as part time, the person assigned this responsibility will not take it as full time activity. Sometimes organizations do not maintain their data as a result forecasting cannot be done. There are also some external factors that affect the forecasting and such factors are uncontrollable. For example entry and exit of competitors, new technology, weather conditions and new laws affect the forecasting. Importance of banking sector cannot be ignored in Pakistan. As banks influence the per capita income of country, it can be increased with the help of banks in country. Economists also focus that for better economy there should be better banking system in Pakistan. Better banking system also cause creditworthy firms and increase in savings which will also increase investment in country. Since last few years, it has been experienced that banks has been unable to bring down bad debts, known by SBP website, newspaper and Journal published by commercial banks. Table 1 shows the bad debts to total debts ratio for last four years.

Table 1. Bad debts to total debts ratio for last four years

Years	Bad debts ratio
2010	14.9%
2011	15.7%
2012	14.5%
2013	14.8%

By keeping this in view, it is strongly needed that banks should have to minimize the credit risk and provision of bad debts by forecasting the 'loans for future. So that, banks can design proper policies to avoid any uncertainty. Commercial banks grant loans based upon the needs of the people.

1.1. Scope of Study

Scope of this study is to build a regression model and forecast expected trend for bank credit to public & private sectors banking industry. However, research will be limited to credit given by the commercial banks and not the credit given by any other financial institution because commercial banks grant major amount of loans. Moreover, the data will only be consisting of last 30 years and not beyond and the forecasting can only be done for next one year with the given data.

1.2. Objectives

Based upon the above discussions, the objectives of the study are as follows:

- To develop a Model for enhancing bank credit to public & private sector
- To forecast bank credit to public & private sector
- To assist Government/policy makers for planning

2. Literature Review

Forecasting is a tool to anticipate future behavior of variables based upon past data. Researchers have used this tool frequently for the said purpose. It has been used even in a higher number of researches in the fields of economics, business and banking. Different researches have been done on the topics such as failure of banks in 1980, loan crises and loan granted to the Private Sector, credit and stress in banking sector etc. Researches in developed countries are of advance nature. Since developed countries spend a lot of budget on Research and Development in every field of study, therefore, these countries are very advance in research as compare to developing and third world countries. These developed countries have worked a lot in the field of forecasting e.g. in UK total money supply is forecasted, bank deposits, bank losses also forecasted. Few of them related to this work are given below:

Bastos [1] used the data of loans of Portugal and applied parametric fractional response regression and nonparametric regression tree model to forecast bank loan losses. Researcher found that the decisions to give credit are based on external and internal ratings and he found that 58% loans are recovered on personal guarantees. Further he found that recovery rate in trade sector is less than real sector. In this connection, firm's age played a vital role in recovery. Researcher suggested that regression tree may be a good alternative to parametric model and banks can use this to

improve their performance. Martinsen et al. [3] constructed models based on disaggregate data of Norges Bank of Norway for forecasting GDP rate, Consumer Price Index and unemployment rate for Sweden and Norway. Researchers divided it in seven regions and found that total five factors explain 93% of variation in Norwegian database and in Swedish database it was 96% and the correlation between different regions was 0.59. Further, researchers found that first factor explain almost 53% of variation in Norwegian data base and 65% in Swedish database.

Mills & Stephenson [4] took the data of UK Money supply for time series forecasting system. Researchers found R square of change in rate of M3 the counterparts CGBR, BL and NNDL which means that there is between 25% and 60% of variation in the series. Researchers used three alternative forecast systems for money growth and found the bias and regression proportion are closer to zero while change in proportion and slope coefficient are almost one. Further, researchers found R square statistic was only 0.53, which indicated that there is a clear proportion of changes in money growth which are still not explained. Researchers suggested that model may include more variables for greater accuracy.

Hawang et al. [2] worked to predict bank failures and deposit insurance premium. This research focus on the FDIC insured banks. The data was collected from the FDIC annual income and all call report band for the period from 1985 to 1988. Logistic regression method is used to predict the likelihood of bank failures. The researchers found out that equity, profitability or liquidity have an inverse relationship with bank failure i.e. if anyone of the former is higher chances of the latter will diminish. It is also to be noted that the ratio of past loans to total assets is one of the factor leading to a loss of banks.

3. Research Methodology

For getting the objectives of research it is necessary to apply proper methodology after the collection of annual data of bank credit to public and private sector from Statistics Bureau's Lahore Office. Based upon the above discussion, the methodology for this study will be Time Series Analysis for model building ARIMA. This study will help to review lending policies of SBP.

3.1. Population of Study

Commercial banks are the population of study because commercial banks are more involved in the provision of finance to public rather than any other financial institution. Commercial banks are the leading institution of money market and capital market.

3.2. Study Sample

All the commercial banks working in Pakistan are included in this study. Central bank provides the value of

total loans by commercial banks during a financial year without distinguishing their nature.

3.3. Time Period

Data will be collected for the period of 30 years i.e. from 1983 to 2013 because for Time Series Analysis it is required the data should be at least of 30 years.

3.4. Data Sources

Data will be collected in hand from Statistical Bureau’s Lahore Office, regarding total bank loans granted to public and private sector without any description of use of these loans because central bank find the total loans given during a financial year.

3.5. Variables Used

There are two variables in this study for analysis: bank credit to Public sector and bank credit to Private sector. This

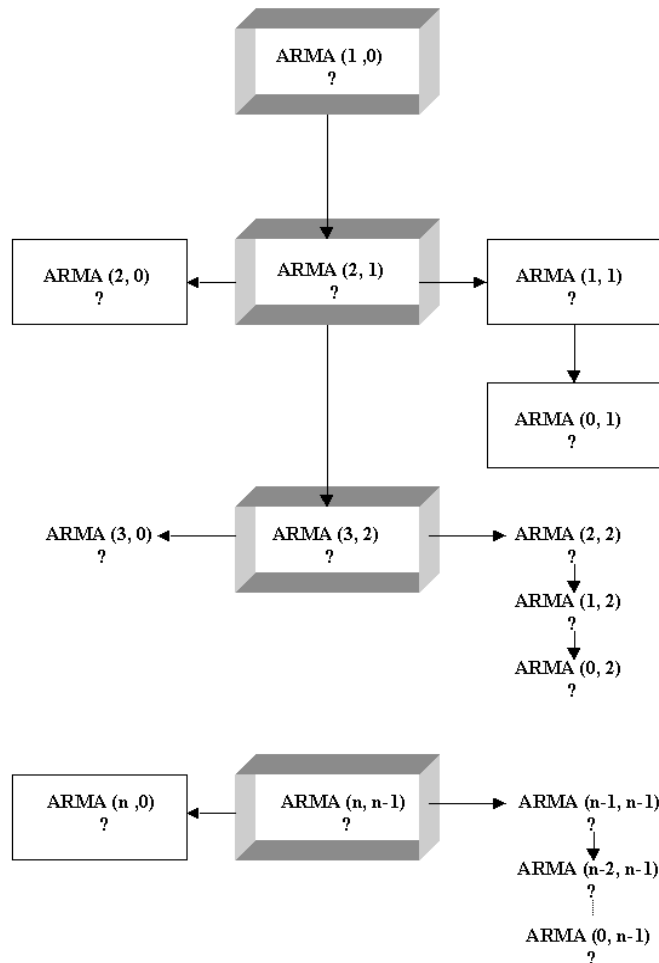
study will not discriminate the loans by purpose and will encompass loans advanced by banks for all purposes. Here in this study, total loans given by commercial banks will be discussed.

4. Analysis

The section will analyze the data for forecasting. Statistical software SPSS has been used for checking the Normality of data and E-views has been used to analyze data. ARIMA model and Box Jenkins Methodology is used for forecasting because it is being consider the most suitable methodology for meeting the objectives of research. Different models are run to find out the most suitable model for forecasting. Three of them are selected for bank credit to public sector and three are selected for bank credit to private sector. Series was stationary at first difference for bank credit to public sector and series was stationary at second difference.

Working of ARIMA model is shown by diagram

Model Selection Process in Box-Jenkins Modeling Approach



4.1. Comparison Table of Bank Credit to Public Sector

In table 2, different models of bank credit to public sector are being compared to find out the most suitable model for forecasting.

Table 2. Comparison Table of Bank Credit to Public Sector

Models	ARIMA(1,1,0)	ARIMA(2,1,2)	ARIMA(4,1,4)
S.E	40845.46	43873.69	45063.17
SIC	24.15	24.38	24.44
AIC	24.11	24.38	24.34
DW	1.89	1.22	1.22
R ²	0.04	-0.04	0.03
Adjusted R ²	0.04	-0.08	-0.07

4.2. Comparison Table for Bank Credit to Private Sector

In table 3, values of the different models of bank credit to private sector are being compared to find out the most suitable model for forecasting.

By using the comparison of Tables 2 and 3, forecasting of bank credit to public sector and private sector is done. By using ARIMA (3,2,3) Forecast Model has been develop to forecast Bank Credit to Private Sector. Forecasted value for 2014 is 4086281. By using ARIMA (1,1,0) Forecast Model has been develop to forecast Bank Credit to Public Sector. Forecasted value for 2014 is 428322.8

Table 3. Comparison Table of Bank Credit to Private Sector

Models	ARIMA(2,2,2)	ARIMA(3,2,3)	ARIMA(5,2,5)
S.E	85293.51	84491.32	88919.13
SIC	25.71	25.7	25.8
AIC	25.61	25.6	25.71
DW	2.15	2.007	2.32
R ²	0.108	0.16	0.14
Adjusted R ²	0.073	0.12	0.10

5. Conclusions

The comparison study of fitted models for bank credit to public and private sector explains that ARIMA model with (1,1,0) is suitable for forecasting bank credit to public sector and ARIMA model with (3,2,3) is suitable for bank credit to private sector. Appropriate model has been chosen by applying distinct standards for example: Sharwarz Information Criteria, Durbin Watson Test, Standard Error of Regression, Akaike Information Criteria. In the above selected models Standard Error of Regression is less than other models and in the same way Akaike Information Criteria and Sharwarz Information Criteria is less as compare to other models. Adjusted R Square and R Square of the models (1,1,0) for public sector and (3,2,3) for private sector shows that in estimated observation both models clarify the

best variation by preceding lag observations.

5.1. Recommendations

After the analysis and forecasting of bank credit to public and private sector there are few recommendations being made to State Bank Pakistan and the Government of Pakistan. This work may help them to review the policies.

- SBP should check the increase in ratio of loans. It is being noted that loans have increased up to 5.64% as compared to previous year. It will ultimately affect the value of Rupee negatively.
- As the flow of money will increase inflation will also increase. Government should check that with the increase of loans economic activity should also accelerate otherwise inflation will damage the economy seriously.
- It is also suggested to government that if loans are increasing in the country these loans should be used to control the business cycles.
- It has also been observed that bad debt ratio of banks, even after the efforts made by banks in this regard, is not being controlled. It has remained almost the same over last four years' time so it is required by the higher management to control bad debt ratio otherwise this ratio will increase and banking sector will not be in a position to compete at international level. Keeping in view recent financial crunch faced by the world's leading economies, banks should issue more secured loans to avoid this situation.
- Monetary policy should be supportive, monetary shocks can damage the process of credit creation. It will limit the strength of banks to advance loans.

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