

A TIME SERIES MODELING ON GOODS AND SERVICES TAX OF INDIA

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Abstract:

The objective of this research is to forecast the GST revenue of India for the financial year 2020–2021 using series technique with the help of Autoregressive Integrated Moving Average model (ARIMA). In any economy, tax analysis and forecasting of revenues is of paramount importance to ensure the economic and fiscal policies. This study is important to identify significant variables affecting tax revenue specifically in India. The data used for this paper was from August 2017 to December 2019 (monthly) and focused on forecasting for 2020. For the forecasting of total tax revenue, component of month wise GST revenue was used. The results of this study revealed that the ARIMA model gives better-forecasted values for the total tax revenues of India. It is further demonstrated that major tax revenue is generated by GST, which cause more inflation that directly hits the working class of India.

Keywords: GST, Forecasting, Revenue, ARIMA, Economics growth

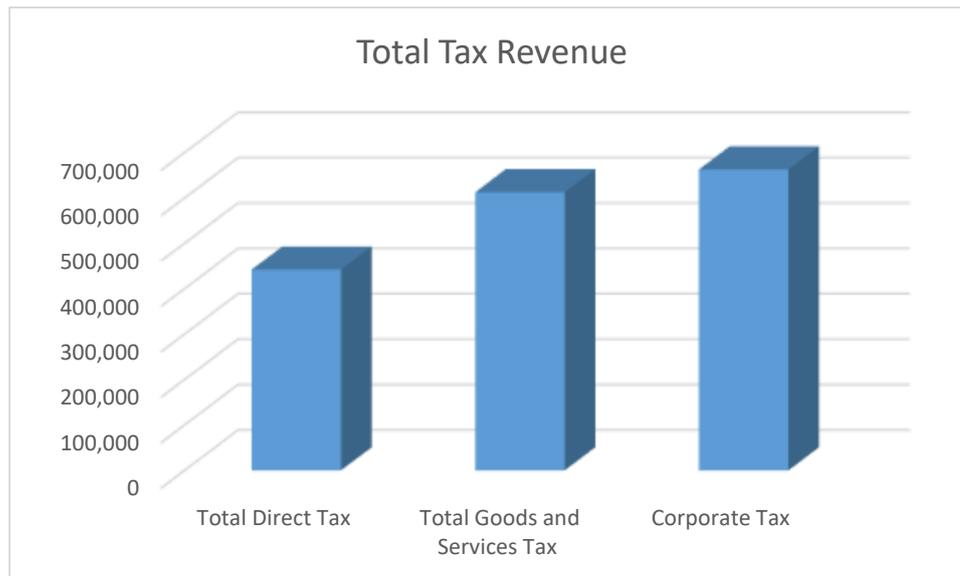
Introduction:

Taxation is one of the vital components of development of any country. The revenue from taxation is used to finance public goods and services such as infrastructure, sanitation, transportation and all other amenities, which are provided by the Government. From the view of economists, a tax is a non-panel, yet compulsory transfer of resources from the private to the public sector levied on a basis of predetermined criteria and without reference to specific benefit received. Each rupee of tax contributed helps Government to provide better infrastructure, rural revival, and social well-being. Taxation is also considered as a major tool available to Government for removing poverty and inequality from the society. On the other hand, tax reform is an essential component of any comprehensive strategy for structural adjustment & the resumption of growth.

This research is carried out in the context of future forecasting of these GST revenues for the financial year 2020-2021. It is evident from Figure 1; the substantial amount of tax

revenue is generated by GST. According to (Myles, 2000), the tax to G.D.P. ratio had significantly increased in developed economies, but in developing economies this ratio remained low. (Chaudhry & Munir, 2010) has proposed an optimal tax theory, and suggested an effective agricultural policy to increase tax net, and recommended, if local bodies were made to be responsible then tax revenue can be increased significantly.

Figure: 1



Source: Ministry of Finance

Review of literature:

The literature regarding determinants of tax revenue has gained considerable attention from financial experts, economist, and researchers worldwide. The findings of previous studies demonstrated the different effects in developed and developing economies. The developed economies have strong tax networks, which are well documented electronically. However, the developing countries are still in a transition phase to establish a strong and documented taxation system. Therefore, we have discussed the following previous literature specifically for the developing economies:

(Himani, 2016) Studied the elements of tax collection in the case of India; he took tax revenue collection from direct and indirect means. He concluded that the tax collected through indirect means has generated more revenue as compared to direct taxes.

(Aamir, et al., 2001) Carried out a comparative study between India and Pakistan; they compared direct and indirect taxes for both countries. They concluded that Pakistan collected

more revenue through indirect taxes, however, India generated more revenue through direct taxes. This study further indicated that indirect taxes extended the gaps between rich and poor, and further exploits the vulnerability of working class.

(Streimikiene, Ahmed, Vveinhardt, Ghauri, & Zahid, 2018) The objective of this research was to forecast the tax revenue of Pakistan for the fiscal year 2016–17 using three different time series techniques and also to analyze the impact of indirect taxes on the working class. The study further analyzed the efficiency of three different time series models such as the Autoregressive model (A.R. with seasonal dummies), Autoregressive Integrated Moving Average model (A.R.I.M.A.), and the Vector Auto regression (V.A.R.) model. In any economy, tax analysis and forecasting of revenues is of paramount importance to ensure the economic and fiscal policies. This study is important to identify significant variables affecting tax revenue specifically in Pakistan. The data used for this paper was from July 1985 to December 2016 (monthly) and focused on forecasting for 2017. For the forecasting of total tax revenue, we used components of tax revenues such as direct tax, sales tax, federal excise duty and customs duties. The results of this study revealed that among these models the A.R.I.M.A. model gives better-forecasted values for the total tax revenues of Pakistan. The results further demonstrated that major tax revenue is generated by indirect taxes, which cause more inflation that directly hits the working class of Pakistan.

(Daba & D.K, 2014) One of the main objectives of the Ethiopian tax reforms was to generate adequate tax revenues to finance ever increasing public expenditure on poverty alleviation and development projects. This would be achieved through streamlining of the tax system to mobilize tax revenues from national economic growth. The purpose of this article is to analyze and compare tax revenues performances of the two governments in power in Ethiopia during the last 39 years. The overall analysis reveals that tax reforms failed to boost total tax revenues and to bring tax structure change from indirect tax to direct tax.

Objective of the Study:

- To forecast the GST revenue for the financial year 2020–2021

Methodology:

Researcher has used univariate examination to analyze a single variable (tax revenue) at a time for univariate variables such as the total tax revenue (T.R.). This research used only secondary data. A reasonable period of time was considered for the forecasting purposes, i.e.

around 2.5 years starting from August 2017 to December 2019. The tax exemptions have already been incorporated in the final tax revenues, which were published by the Ministry of Finance, India. The proposed methods used for the forecasting of total GST revenue are ARIMA Model.

Analysis and Interpretation:

Table: 1

Model Description			
			Model Type
Model ID	GST	Model_1	ARIMA(2,1,0)

Table: 2

Model Fit					
Fit Statistic	Mean	SE	Minimum	Maximum	Percentile
					5,10,25,50,75,90,95
Stationary R-squared	.312	.	.312	.312	.312
R-squared	.466	.	.466	.466	.466
RMSE	5783.502	.	5783.502	5783.502	5783.502
MAPE	4.140	.	4.140	4.140	4.140
Max APE	16.824	.	16.824	16.824	16.824
MAE	4016.882	.	4016.882	4016.882	4016.882
Max AE	17405.899	.	17405.899	17405.899	17405.899
Normalized BIC	17.802	.	17.802	17.802	17.802

Table: 3

Model Statistics							
Model	Number of Predictors	Model Fit statistics		Ljung-Box Q(18)			Number of Outliers
		Stationary R-squared	R-squared	Statistics	DF	Sig.	
GST-Model_1	0	.512	.766	20.734	15	.046	0

The above table interprets - Table 1 shows that the study has been reached (ARIMA (2, 1, 0), and its model fit is shown in Table 2. The model statistics (Table 3) is accompanied by descriptive graph (Figure 2), which has suggested upward trend for the series. Model fit table shows that all the values are in between acceptable values. Thus, Table 3 shows that there is

significant infusion in this model and also R-square value is 0.76 is considered and model is accurate with 76.6%.

Figure: 2

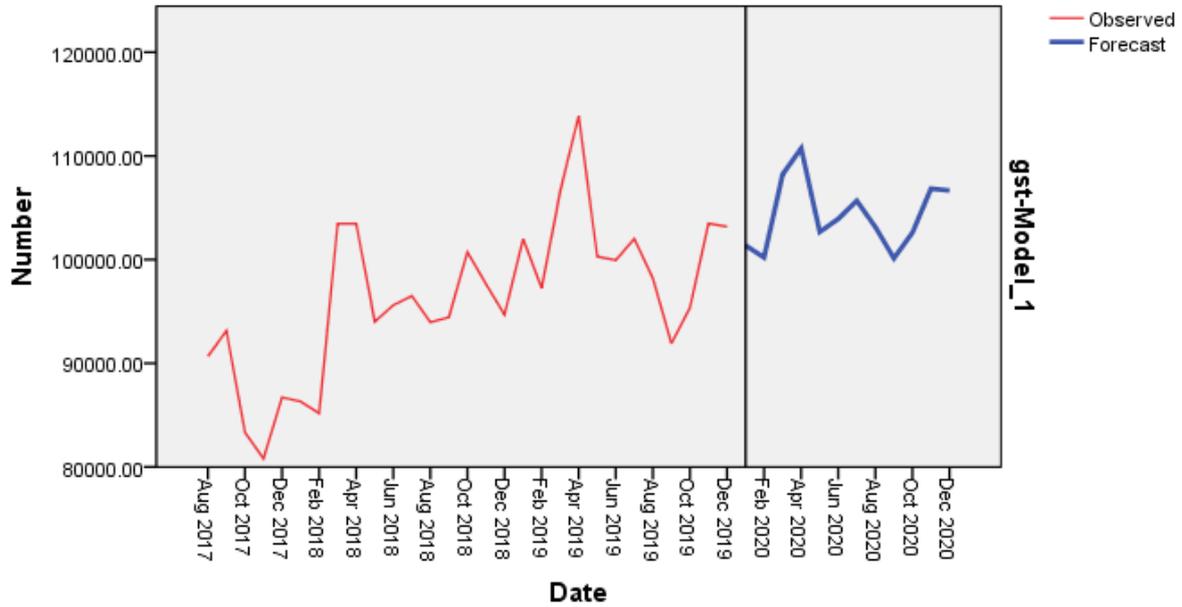


Table: 4

Month	Predicted_GST_Model_1_A	LCL_GST_Model_1	UCL_GST_Model_1
JAN 2020	106630.34	93720.50	119540.18
FEB 2020	104947.31	88079.84	121814.78
MAR 2020	106982.26	86744.63	127219.90
APR 2020	110618.64	87522.06	133715.21
MAY 2020	106002.14	80359.87	131644.41
JUN 2020	105917.96	77961.37	133874.55
JUL 2020	107035.66	76942.13	137129.18
AUG 2020	105944.29	73855.83	138032.74
SEP 2020	103294.12	69327.70	137260.55
OCT 2020	104310.50	68564.63	140056.37
NOV 2020	108748.05	71307.22	146188.88
DEC 2020	109310.41	70248.09	148372.73

It is observed from the above table that the Government expect high revenue on month of April 2020. On the other hand, low revenue on month of September 2020.

Conclusion:

The results of the study demonstrated that the effectiveness of time series model. The precise results of forecasting, total GST revenue for the F.Y.-2020–2021, which lay down the foundations for proper policy-making by the government of India. The results revealed that ARIMA model gives better-forecast values for the total tax revenues of India, Now, it can be seen that the forecast value of total GST revenues for India for F.Y.-2020–2021 is 12.8 lakh cores. The tax to G.D.P ratio is also very alarming, because of the percentage between 10.2% to 11.2% for the last ten years, where it is not comparable to the developed economies, and it is very low compared to the other South Asian developing countries such as India, Bangladesh, Sri Lanka, and China etc. The key important finding of our research is that the FY 2020-2021 has not changed much in GST revenue. Therefore, there is a strong need to improve that the tax collection system and the government should improve tax reforms of the Country.

References

- Aamir, M., Qayuum, A., Nasir, A., Hassain, S., Khan, K., & Butt. (2001). Determinants of tax revenue: Comparative study of direct taxes and indirect taxes of Pakistan and India. *International Journal*, 2, 171–178.
- Chaudhry, I., & Munir, F. (2010). Determinants of low tax revenue in Pakistan. *Pakistan Journal*, 439–452.
- Daba, D., & D.K, M. (2014). Tax Reforms and Tax Revenues Performance in Ethiopia. *Journal of Economics and Sustainable Development*, 5(13), 11-19.
- Doan, T., Litterman, R., & Sims, C. (1984). Forecasting and conditional projection using realistic prior distributions. *Econometric Reviews*, 3, 1-100.
- Eugene, N., & Chineze, E. (2016). Effect of tax policy on economic growth in Nigeria (1994–2013). *International Journal of Business Administration*, 50-58.
- Himani. (2016). Determinants of tax revenue in India. *International Journal of Research in Economics*, 6, 161–170.
- Lutkepohl, H. (1991). *Introduction to multiple time series analysis*. Springer-Verlag. Berlin.

- Mehrara, M., Pahlavani, M., & Elyasi, Y. (2011). Government revenue and government expenditure nexus in Asian countries: Panel cointegration and causality. *International Journal of Business and International Journal of Business and*, 199-207.
- Myles, G. (2000). Taxation and economic growth. fiscal studies. *The Journal of Institute for Fisca*, 21, 41–168.
- Nau, R. (2014). Forecasting with moving averages (Working Paper). *Fuqua School of Business, Duke*.
- Samuel, O. (2014). The impact of value added tax on revenue generation in Nigeria (Working Paper). *Olabisi Onabanjo University, Nigeria*.
- Streimikiene, D., Ahmed, R. R., Vveinhardt, J., Ghauri, S. P., & Zahid, S. (2018). Forecasting tax revenues using time series. *Economic Research-Ekonomska Istraživanja*, 31(1), 722-754.
- Zhang, H. (2013). Modeling and forecasting regional G.D.P. in Sweden using autoregressive models. *for Technology and Business Studies, Dalarna*.