Abstract:
The state of Jammu & Kashmir is one of the special category states of India, that faces a severe resource crunch on the one hand and an explosive public expenditure trend on the other hand. The inability of the state government to raise adequate resources of its own cast’s serious doubt about the tax efforts carried out by the government from time to time. Against this background, this paper tries to analyze the major long and short run determinants of tax revenue in the state of Jammu and Kashmir by applying recent econometric methods such as Autoregressive Distributed Lag (ARDL) and by taking a broader set of variables which comprises economic, political and demographic dimensions. The result shows that all the economic variables, except for the share of agriculture and the unemployment rate, have positive influence on the tax revenue. Regarding political stability variables, some like political crises and law and order are significant, while others like the election cycle were found to be insignificant. Interestingly, both the variables of the demographic dimension, viz., the seasonal break in population density and urban population, were found to be insignificant between 1984-85 to 2000-01 and significant from 2000-01 to 2013-14 to the changes in the tax revenue of the state.

Key words: Tax revenue, Economic, ARDL, Political stability, Population, integration

JEL Classification: H2, H7, H3, H71, H26, H23, E62

INTRODUCTION
The state of Jammu and Kashmir is one of the special category states of India, which is typically characterized by a greater dependence on agriculture. Around 70 percent of its population depends on agriculture as a main source of livelihood. The region is also unique with its great potential in tourism. Significant development has been witnessed in different spheres of economic life in recent years. Yet access to opportunities for a ‘reasonable minimum’ standard of living in the state is comparatively lower to that of other special category states of the country. The fiscal health of the state is by no means encouraging at all, where the states’ own tax revenue contributes hardly 19.7 percent of the total revenue receipts of the state. In the state where own tax revenue contributes no more than 13 percent of the state income, the aggregate government expenditure constitutes as high as 48.9 percent.
As a result, the state has developed a dependency syndrome and that is evident from an explosive cycle of public expenditure growth. Coupled with this, there is an increasing demand for grants-in-aid and other Central assistance to help bridge the gap of large budgetary deficits. This reflects an inadequacy on the part of the state government to generate enough resources to meet the changing volatile fiscal situation. There are number of reasons that can be attributed for this poor state of fiscal health of the state government. We believe that the major factors that have been responsible are (i) static tax base due to low level of economic activities which might have been due to level of infrastructural development, (ii) emergence of a parallel economy due to various tax preferences that the government accord from time to time and (iii) political and economic intolerance to the expanded economic activities, and the social unrest that the state economy experiences from time to time.

We believe that the repercussion from all these forces at work might have resulted in various leakages not only in tax generating capacity but also in narrowing down the tax base of various taxes in the state. If we are to assign a cause-effect relationship to this type of vexed problem then it can be argued that the failure on the part of the state government on the resource mobilization front, which has been mainly responsible for their low level of economic activities, low level of economic base and their final culmination in the form of social unrest.

In a modern welfare state, fulfilment of social desire to have a better quality of life is dependent not only on the capacity of the government to mobilize adequate resources but also on the degree of momentum of the economic activities that a state in question attains. Any jolts to this by the erratic behavior in the social, economic and political institutions of the society at large proves to be a hindrance not only to the expanded economic activities but also narrows down the tax base of the economy in question. The interplay of these two forces can be taken as a starting point for any systematic attempt to explain the social, economic and political implications of the tax effort of the state to attain a reasonable degree of sustainable economic growth with a scientific and reliable econometric model.

With this intension, Autoregressive distributed Lag (ARDL) and multiple regression models has been used for time series data for period of 30 years (1984-
2013) to explain the social, economic and political implications of the tax effort in the state of Jammu and Kashmir. The result shows that all the economic variables, except for the share of agriculture and the unemployment rate, have positive influence on the tax revenue. Regarding political stability variables, some like political crises and law and order are significant, while others like the election cycle were found to be insignificant. Interestingly, both the variables of the demographic dimension, viz., the seasonal break in population density and urban population, were found to be insignificant between 1984-85 to 2000-01 and significant from 2000-01 to 2013-14 to the changes in the tax revenue of the state. The results identify that Changes in political and economic variables have a larger impact on the level of Tax revenue due to the matter that most of the economic activates in the state are subjected to the peace condition and level of normalcy. The slow growth of economic activities and large exemption of taxes has also made these variables inelastic. On other hand demographic determinants are positively correlated with the growth of Tax revenue. The socio-economic and political characteristic prevailing in the state of Jammu and Kashmir is more or less same to most developing countries. The huge gap between revenue and expenditure, poor infrastructure, mass social and economic inequalities, unemployment, lack of technology, burden of debt and political instability are the common features of Jammu and Kashmir economy and so as of different developing and under developed countries. It is with all these forces, that the efficiency to generate revenue from own sources has reduced considerably over the years. Therefore, by analyzing the determinates of tax revenue in the state of Jammu and Kashmir with these broader dimension, we can generalize an idea how far the socio-economic and political setup of a region or an underdeveloped country can affect the growth in tax revenue.

With this background, the present study intends to make an in depth analysis of (i) the economic determinants of tax revenue of the state of Jammu and Kashmir. To identify (ii) the major political and demographic determinants of tax revenue in the state of Jammu and Kashmir, and (3) to analyze the tendency of the variables to bring the long run equilibrium in tax revenue.

2. Fiscal scenario of Jammu and Kashmir
As pointed out in the preceding paragraphs, the economy of the state depends mostly on traditional forms of occupation and agriculture still remains the pivotal of all other economic activities in the absence of desired level of industrialization. The indigenous traditional occupation of farming, animal husbandry, tourism and horticulture forms the backbone of the economy. Agriculture is the main source of livelihood in the state where 70 % of population ekes out their living from agriculture, and 49 % of total working force directly depends on this sector for their livelihood. The slow growth in agriculture and allied sectors is a major cause of concern. It is true that economic development in the modern times has come to be associated with industrialization, but Jammu & Kashmir has not been able to attract investments in this sector and remained an industrially backward state due to its unique economic disadvantages arising out of remoteness and poor connectivity, hilly and often inhospitable terrain, weak resource base, poor infrastructure, sparse population density, shallow markets and most importantly the political uncertainty. Contemporary political situation in Jammu and Kashmir is well understood by the electoral politics of the state since the assembly elections of 1983.

Over the last one decade, the average annual rate of growth of state domestic product has remained at 4.51 % in 2013-14, as compared to 5.19 % during the decade of 1990-2000. A disaggregate picture about pattern of growth in the state domestic product in the state shows that during the last decade, the state agriculture grew at an average growth rate of 3.21 % annually, while the average annual growth rate for the industrial sector stood at 2.10 % during 2000-2012, as compared to 3.69 %, and 2.55 % respectively during the decade 1990-2000. Over the years, there has been a tremendous expansion of the service sector in the state. The service sector has registered an average annual rate of growth of 9.38 % in 2013-14 as compared to 9.03 % in 2011-12. The per capita income of Jammu and Kashmir at constant prices in 2004-05 which was Rs 34424 in 2011-12, rose to Rs 35875 in 2013-14 as compared to Rs 7164 in 1990-91. The per capita income of the state has grown at an average annual rate of growth of 4.78 % during the period of 2000-2013. According to the latest comparable data, Jammu and Kashmir is ranked at the 21st position in terms of per capita income among all the Indian states.
The state has highest unemployment rate of 5.3 % (5.4 % for males and 3.5 % for females) as compared to its sister states under special category. At all India level the figures of unemployment for the states is 2.6 % (3.1 % for males and 3.0 % for females) and unemployment is more prevalent in urban areas than in rural areas of the state, which is unique.

With the expansion of the government activities, the magnitude of plan expenditure of the state government has increased tremendously, which in turn has given rise to the need for a rapid increase in revenue. It is expected that the sources of revenue should grow automatically at the required rate. But the experience of the state of Jammu and Kashmir negates the above proposition. As a result of which, this has created a widening gap between the state’s expenditure responsibilities on the one hand, and available resources on the other, thereby giving rise to the problem of attaining an appropriate degree of financial self-reliance on the part of the state government. The performance of the state on the resource mobilization front provides rather a poor and dismal picture. It is worth mentioning here that states own tax revenue and central share of taxes and duties are two main sources of total tax revenue of the state. The trend and growth of tax revenue in the state of Jammu and Kashmir can be predicted from figure 1.1 and 1.2 below.

The figures show the trend in growth of state tax revenue over last thirty years from 1984-85 to 2013-14 with both current and constant 2004-05 prices (using GDP deflator). The figure shows that over the years the tax revenue of the state has shown increasing trend in both current and constant prices but with a considerable fluctuation. It can be seen from the figure that the tax revenue of the state at current prices was growing very less in 80’s especially till 1994-95. It might be due to the low collection of taxes, mass tax evasion and tax exemption in this period due to slow economic activities in the state, slow growth of trade and businesses etc which was because of prevailing political turmoil in the state during this period which affect tax base and tax rates. (Refer Fig.1)

While as, a brisk trend in growth in tax revenue starts from 2000 onwards when the economic activities in the state start growing slowly and the political unrest has slow down as well. If we take look at current position of tax revenue of the state, it shows an upward trend, were tax revenue is increasing upwards; it might be due to the imposition of taxes which were exempted
in 90’s period, which increase the tax base of the state and thus increase the tax revenue. Similarly at constant 2004-05 prices a similar upward and downward trend can be predicted in the growth of tax revenue in the state. The slow and declining growth over certain years might be due to the social tension in the state, were the militancy has ruined each and every economic as well as social sector of the state.

Similarly, the annual growth of tax revenue over the years is also showing a fluctuation trend. The total tax revenue of the state was growing at 19.1 % per annum between the period 1984-85 to 1993-94, the growth in this period might be due to the ability of the state to mobilize its resources by different economic activities like tourism, industries, horticulture, trade etc. But during the period 1993-94 to 2003-04 the annual growth of tax revenue has decreased to 10.4 % per annum which might be due to severe conditions in the state, which disturb the whole economic setup of the state and most of the economic activities have come to a standstill. In the last 10 years from 2003-04 to 2013-14, the tax revenue of the state, has increased at 18.9 % per annum. And it might be due to the improving conditions in the state and growth of the economy through increasing industrial activities and trade in Jammu, and tourism and horticulture in Kashmir. The states own tax revenue has constantly shown a growing trend over the period of time. The annual growth rate of states own tax revenue was 11.03 % per annum in the first ten years of study period i.e. 1984-85 to 1993-94, which increased to 17.75 % per year in next ten years and further to 19.25 % per annum, over the period 2003-04 to 2013-14. It shows that the states own tax revenue is growing at the rate of 15.9 % per annum, over the period from 1984-85 to 2013-14, with increasing trend in growth

The main sources of states own tax revenue like, VAT, Services Tax, GST, Passenger tax, Registration fee, stamp duty, Toll and Excise duty, Vehicle tax and Electricity duty tax have fluctuated a lot over the last thirty years, due to changing political and economic status in the state. While as the central share of taxes and duties was growing in the first phase of the period at 26.65% per annum and it has reduced between 1993-94 to 2003-04 to 4.95 % per annum and increase to 18.44 % during 2004-05 to 2013-14. In last thirty years the central share of taxes and duties is growing at 16.33 % per annum while as the own tax revenue is growing at 15.9 % per annum.
Thus the overall tax structure of the state has gone through a difficult period which not only reduced the efficiency of state to collect revenue through taxes but also hampered the potential, by destruction of major sources of taxes revenue. It is only since last 10-12 years, that the state has entered into a phase of transformation and economic growth which opened new ways and base for growing revenue through taxes. But still due to earlier destruction of sources of revenue, the growth of revenue through taxes is very low. Therefore, all these observed trends noted above provide a solid ground for the necessity and the desirability of undertaking an analysis of the determinants of taxation of the state of Jammu and Kashmir, to have a proper understanding of the factors which have been responsible for pushing up and down the tax revenue or keeping the level of taxation rather at a minimal level on the other hand. Many institutional, economic, demographic and political variables affect fiscal outcomes. Further even with the emergence and growth of public choice as a new perspective from which to examine the operations of governments, the consensus view asserted by Dye in 1984 remained at least an implicit assumption of efforts to identify determinants of taxation.

It is evident from the above discussion that over the last thirty years, the basic macro-economic indicators of economic development has remained at a pathetically lower level. This provides enough evidence that the economic activities vis-à-vis the tax base of various taxes staggered at a low level of vicious circle. As a result, the state has not been able to generate sufficient revenue from its own resources and has been facing serious financial problems [41]. The problem became all the more serious due to the prevailing circumstances in the state affecting both revenue and expenditure. The state suffered from political dispute for a long period, since 1989 onwards, resulting in the erosion of the tax base, increase in expenditure due to destruction of infrastructure and various other factors related with disturbed law and order. Thus, having all those constraints in the economy and in the region, the importance of mobilizing the internal revenue for overall developmental process in the state has become a prominent issue of the state. Taxation is an important mechanism to generate and mobilize internal revenue and strengthen the financial system and attain financial self-sufficiency. Therefore, the paper is an attempt to look in to the intricate
relationship between a set of complex socioeconomic and political variable for determining the major determinants of tax revenue of the state to ascertain whether these variables have played any role in resource mobilization process of the state or they have been proved detrimental in the way of tax generating capacity of the state. Keeping consistency with the above mentioned objectives, the study intends to test the following hypotheses.

3. Hypotheses

1. Changes in political and economic variables may have a larger impact on the level of Tax revenue.
2. Demographic determinants are positively correlated with the growth of Tax revenue.

4. Review of literature

Over the years economists and researchers have found different factors that affect the growth of tax revenue. Among them the most important are factors from economic, social, demographic and political spheres. [54] in their study of determinants of taxation used panel data from 30 countries over the period 1990-95 and found that, the share of agriculture and mining in GDP has a negative impact on tax revenue. However, export share in GDP and per capita GDP are positively and significantly associated with tax revenue performance. [47] Found that per capita income and the ratio of trade to GDP are positively strong determinants of tax revenue, whereas, share of agriculture in GDP is negatively associated with tax revenue. [12] found that a tax rate is positively related to the population size of the communities even when controlling for density. [30] found that tax revenues in Turkey are significantly affected by agricultural, industrial sector share in GDP, foreign debt stock, monetization rate of the economy and urbanization rate, while the agriculture share in GDP found negatively associated with the tax revenue. The results also suggest that openness to foreign trade has no significant impact on tax revenues in Turkey. [55] found that tax evasion, agriculture ratio and population density determine the tax revenue in Uganda. He revealed that tax evasion is the most important factor which reduces the tax revenue in the country. [58] has empirically investigated the determinants of value added tax in Kenya. His study showed that GDP, change in level of tax, institution and demographic variables determine the VAT revenue in Kenya. [35] made an attempt to identify the obstacles of tax revenue
generation in developing countries. His study showed that the structure of economies, tax systems, patterns of political system, and low income of these countries are responsible for their low tax revenue generation. [36] explain in an empirical analysis of determinants of tax revenue in Nigeria that tax revenue tends to be significantly responsive to changes in income level, exchange rate and inflation rate. He concludes that macroeconomic instability and level of economic activities are the main drivers of tax buoyancy and tax effort in Nigeria. [10] found that the quality of institutions and resource revenues are strong determinants of tax ratio in GDP. His study finds that Per-Capita GDP and trade openness improves the tax ratio in GDP. He also identifies that the structure of value-added, agriculture, service and industry shares are strong determinants of the tax ratio of GDP. [18] found that the tax collection rate (especially direct taxes) in Armenia did not increase with the same pace as GDP. They also found that institutional quality, urbanization and shadow economic activity are the main factors behind low tax-to-GDP ratio in Armenia. [27] analyzed the determinants of tax revenue in developing countries where, he found that the structural factors such as per capita GDP, agriculture share in GDP, trade openness and foreign aid significantly affected tax revenue performance of an economy. He also showed that corruption, political stability and share of direct and indirect taxes also determines tax revenue in developing countries’. [25] external conflicts do not increase the fiscal capacity of the states, if the duration of the conflict is short or if the conflict does not involve many countries, as occurred in the case of the US invasion of Panama in 1989. [3] Finds that viable state and sustained peace is essential for construction of the Tax Revenue Base. [38] made an attempt to study the tax performance and its determinants of some Indian states by taking data for the period of 1967-68. They employed a multiple regression equation to measure the impact. They investigated the relation with the explanatory variables like per capita income, degree of urbanisation as measured by the ratio of urban population to total population, share of non-agricultural income in total state income and per capita developmental expenditure. [7] Found that the agriculture, export ratio and mining share in GDP as important variables of tax revenue determination. [1] Investigate the determinants of tax revenue, were he has used the direct and indirect taxes as an
explainatory variables. His study compares the determinants of tax revenue in India and Pakistan on these two variables. His results show that Pakistan is generating more tax revenue through indirect taxes whereas India from direct taxes. [51], [42] analyzed the tax efforts in poor states of India. They show that factors such as per capita SDP, proportion of urban population and degree of literacy have significant impact on the tax efforts or tax revenue in the poor states of India. [20] found that the government expenditure has a significant impact on the government tax revenue in India. [8] identify the main determinants of tax revenue with reference to twenty two states of India, by employing multiple regression models. Their study showed that per capita deficit, urban population, per capita expenditure and per capita income of the states has significant impact on tax revenue while as primary sector income, literacy rate, density of population, schedule cast population and political variables are not significant. [37] measure the horizontal imbalances between revenue and expenditure in India. Their study shows that high economic subsidies reduce the non-tax revenue in Gujarat. [19] Study the tax efforts of the state of Punjab for period of 1973-75. He considers four major economic variables to examine the determinants of tax revenue in Punjab. [43] analyzed and showed that increase in Income and a change in prices have significant impact on the growth of Tax revenue in Nagaland.

5. Data Sources and Methodology
The study tries to analyze the impact of different economic, political and
demographic components on the growth of tax revenue in the state of Jammu and Kashmir. In the study we intend to use the data set for the period, 1984-85 to 2013-14, (which is considered as an important period for changing the economy as well as political setup of state) for the variables like tax revenue in NSDP, per capita income, Indirect taxes [58], [1], total outstanding [57], [44], Share of Agriculture to NSDP [49]. [27], Share of Industries to NSDP, share of Services to NSDP, [54], [30], share of Exports to NSDP [7], rate of unemployment, Population density, [12], [55], Urban population [8], [34], Political crisis , [29], [22], Law and order, [3], [27], [9], and election cycle,[35] and [37].

The variables chosen for the study represent economic, political and demographic status of the state which by our understanding directly or indirectly affect the tax revenue or are important sources of tax revenue in the state. The state brought its revenue by laying taxes and duties on agriculture, manufacture and services sector in which services sector is highest contributor to the state economy and to taxes as well. Thus these three variables have impact on tax revenue. The state has high export of taxable primary products which generate bulk of revenue, so its share in taxes as well. Per capita income in the state has been increasing, so the money in the hands of the people increases, so higher opportunity of tax emerges. The economic activities have normally started to grow in the state, which results growth in income, and thus open sources to impose different indirect taxes. The rate of unemployment either reduces tax revenue or increases depend upon trend, the state is count in the highest unemployment regions thus its effect on tax revenue in state can be positive. Higher population density and urbanization means high income groups came into existence and thus affect tax revenue. The political stability in the state has always an important issue for running the public activities smoothly [9]; the state has gone through long period of political and law and order crisis which reduces the growing strength of economy and sources of tax revenue as well. Further, the year of election, bring more focus of favour groups to give many tax relaxations to gain their help in coming election.

The study uses time series data collected from RBI and other state government authorities. The variables has been converted into real prices using GDP deflator and also into natural log equations for time series so that the coefficients
represent the Elasticity [26]. As our prime aim is to understand the economic, political and demographic determinants of tax revenue thus three regression models have been used separately for each determinant in order to avoid multi-collinearity issue. We employ the autoregressive distributed lag (ARDL) approach [46] and [45], to test for existence of a relationship between economic variables and tax revenue and to obtain robust results [33], [1] and [5]. While as multiple regressions were used for political and demographic determinants like [55], [54] and [49]. Estimates provided by ARDL model avoid problems such as autocorrelation and endogeneity, they are unbiased and efficient. Autoregressive distributed lag (ARDL) is the combination of both autoregressive models and distributed lag models. So, a time series is not only a function of its lagged values but also the function of current and lagged values of one or more regressors. ARDL technique has several advantages and it has superiority over other econometric techniques which are used for long-run relationship (Ahmed, 2016). In this paper economic determinates has been divided in to two ARDL equations in order to avoid multi-collinearity issue which can affect the significance if the variable. The definition of Variables and the basic form of variables in two economic determinants equation and of political and demographic models is as under:

**Basic from of Economic determinants model**

**TAX REVENUE** = f(indirect taxes, income from Agriculture sector, income from services sector and value of exports)

(1)

**TAX REVENUE** = f(total outstanding of government, income from industry sector, Per capita income and rate of unemployment)

(2)

Where

Tax Revenue (Tr): The revenue collected by the state government through taxes, it is the total collection of direct and indirect taxes.

Indirect taxes (indtax): Revenue collected from Taxes levied on goods and services rather than on income or profit.

Income from agriculture (sagi): Net income generated by the state through Agriculture and allied sectors.

Income from services sector (sserv): Net income generated by the state through services sector

Value of Exports (sexpo): Monetary value of exports the state has generated through
export of goods and services in a financial year.

Rate of Unemployment (unemp): Rate of unemployment is the situation of unemployment in the state. It is the rate at which unemployment increases.

**Basic form of Political determinants model**

\[ \text{TAX REVENUE} = f(\text{Political crises, Law and order and election cycle}) \]

(3)

Where

Political crises (pcrises): The change in ruling from elected government to governor’s rule

Law and order (Law): Situation of strikes, protests and civilian killings in a financial year.

Election cycle (elecy): The year in which election was held in the state.

**Basic form of Demographic determinants model**

\[ \text{TAX REVENUE} = f(\text{Population density and rate of Urbanization}) \]

(4)

Where

Population density (podn): Number of people per sq km in a financial year

Rate of urbanization (urbn): Population living in urban centers likes towns and cities (Refer Table .1.1)

### 5.1 Estimation procedure

#### 5.1.1 Lag Length Criteria

The ARDL model allows each variable to have its own lag optimal lag length structure. In estimating the ARDL model used for economic determinants in this paper, we applied the Akaike Information Criterion (AIC) to arrive at the optimal lag structures for each of the variables in Equation (1) and (2) used in our analysis.

#### 5.1.2 Stationary test/Unit root test

Stationarity test of a time series is an important procedure to avoid spurious regression results. The stationary test is carried out to measure the reliability of the time series variables. The time series stationarity is a statistical characteristic of a series like its mean and variance [26], So if in a series, both mean and variance are constant over time then the series has no unit root or is stationary, otherwise if not constant over time, then the series has a unit root or is non stationary, and thus we need to change the series in to respective differences. The differencing procedure is set on observation as first difference and second difference on intercept, trend and intercept or without trend. In this paper Augmented Dickey Fuller (1979) and Phillips and Perron (1988) tests have been
used for stationary test. These test analyze the equations like

\[ X \quad \text{level} \]

\[ x_{1} \quad \text{1st-differenced value} \]

\[ x - x_{t} t-1 \]

\[ x \quad \text{2nd-differenced value} \]

\[ x - x_{t} t-2 \]

The hypothesis tested for each variable for stationarity and non-stationarity are:

The null hypothesis will be \( H_{0}: (\alpha_{0},) = (\alpha_{0}, 0, 1) \) (No– Stationarity)

The alternative hypothesis \( H_{1}: (\alpha_{0}, ) \neq (\alpha_{0}, 0, 1) \) (Stationarity)

After analysis if a series is stationary without difference or in other words is stationary at level it will be as I(0) form or integrated as order 0. On other hand if a series is stationary at 1st difference it will be designed as I(1) form or integrated as order 1. Similarly if series is stationary at 2nd difference it will be considered in I(2) or integrated as order 2.

5.3 Estimated models

5.3.1 Economic determinants model

As discussed, the study has been divided in to three econometric models to identify the significant variables from economic, political and demographic dimension which affect the tax revenue collection.

Autoregressive Distributed Lagged (ARDL) model has been conducted to know the economic determinants of tax revenue as per the stationarity results, while multiple regression method has been used for political and demographic determinants. Autoregressive Distributed Lagged (ADRL) is a modeling technique which allows each variable to have its own lag optimal lag length and adds error correction features to a multi-factor model to understand the long run as well as short run relationship among the variables after knowing that the variables are having integration order of either I(0) or/and I(1) and are having long run co-integration [56], [11], [40] and [32]. The study follows the approach adopted by [27], [33], and[6] to develop our model for the study. We have divided the economic variables further into two ARDL model equations in order to avoid the problem of multi-collinarity [30]. The subsequent ARDL models for equation (1) and (2) of economic determinants are shown below:
\[ \text{DLntr}_t = \alpha_1 + \delta_1 (\text{lnintr}_{t-i}) + \delta_2 + (\text{lnindtax}_{t-i}) + \delta_3 (\text{lnsagr}_{t-i}) + \delta_4 (\text{lnserv}_{t-i}) + \delta_5 (\text{lnexpo}_{t-i}) + \sum_{i=0}^{n} \beta_1 \text{DLntr}_{t-i} + \sum_{i=0}^{n} \beta_2 \text{Dindtax}_{t-i} \\
+ \sum_{i=0}^{n} \beta_3 \text{DSagr}_{t-i} + \sum_{i=0}^{n} \beta_4 \text{DServ}_{t-i} + \sum_{i=0}^{n} \beta_5 \text{Dexpo}_{t-i} + \epsilon_{1t} \]  

(5)

Where D is the difference level of the variable and ln is the natural log. Tr represents tax revenue, indtax represents indirect taxes, sagr denotes income from agricultural sector, serv denotes income from services sector and expo denotes value of exports in equation (5). While as outstand denotes total outstanding of debt, Pci denotes per capita income, sind represents income from industry sector and unemp denotes rate of unemployment in equation (6). \( \alpha_1 \) and \( \alpha_2 \) are the intercept coefficients of the two equations. \( \delta_1, \delta_2, \delta_3, \delta_4 \) and \( \delta_5 \) are the corresponding long run multipliers whereas \( \beta_1, \beta_2, \beta_3, \beta_4, \text{ and } \beta_5 \) are the short run dynamic coefficients of the respective ARDL model equation (5). Similarly \( \vartheta_1, \vartheta_2, \vartheta_3, \vartheta_4 \text{ and } \vartheta_5 \) are the corresponding long run multipliers whereas \( \gamma_1, \gamma_2, \gamma_3, \gamma_4 \text{ and } \gamma_5 \) are the short run dynamic coefficients of the respective ARDL model Equation (6). \( \epsilon_{1t}, \text{ and } \epsilon_{2t} \) are the white noise error terms of the two ARDL models. The hypothesis of both the equations is tested on probability value of t-statistics at 5% and 10% level of significance.

5.3.2 Bound testing for co-integration of economic determinants

The long-run relationship between variables from economic determinates and tax revenue is examined using the ARDL bounds testing procedure. The bound test
has been employed to analyze the presence of cointegration among the variables [46] and [45]. Bound testing can identify the long run relationship with a dependent variable followed by its forcing variables. The F-test statistic of bounds test for Equation (5) and (6) will be examined on the basis of critical value at 5% level of significance in order to establish long run relationship between the variables in these two equations.

The null hypothesis of “no cointegration” through ARDL bound testing in ARDL model Equation (5) and (6) is $\delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = 0$ and $\delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = 0$. The hypotheses are tested by computing the general F-statistics and comparing them with critical values [46] and [45].

After the ARDL bound testing for long run co-integration of ARDL model (5) and (6), If long run relationship exists between the economic variables in both the models, the long run parameters can be estimated by using the following models for both equation (5) and (6):

\[
\ln t_{\text{tr}} = \alpha_1 + \sum_{i=0}^{n} \beta_1 \ln t_{\text{tr}-i} + \sum_{i=0}^{n} \beta_2 \text{indtax}_{t-i} + \sum_{i=0}^{n} \beta_3 \text{Sagr}_{t-i} + \sum_{i=0}^{n} \beta_4 \text{Serv}_{t-i} + \sum_{i=0}^{n} \beta_5 \text{Smp}_{t-i} + \epsilon_{1t} \tag{7}
\]

\[
\ln t_{\text{tr}} = \alpha_2 + \sum_{i=0}^{n} \gamma_1 \ln t_{\text{tr}-i} + \sum_{i=0}^{n} \gamma_2 \text{outsatnd}_{t-i} + \sum_{i=0}^{n} \gamma_3 \text{Pci}_{t-i} + \sum_{i=0}^{n} \gamma_4 \text{Sind}_{t-i} + \sum_{i=0}^{n} \gamma_5 \text{unmp}_{t-i} + \epsilon_{2t} \tag{8}
\]

Where $\ln$ is the natural log of the variables, $\alpha_1 and \alpha_2$ are the intercept coefficients. $\beta_1, \beta_2, \beta_3, \beta_4, \text{ and } \beta_5$ and $\gamma_1, \gamma_2, \gamma_3, \gamma_4 \text{ and } \gamma_5$ are the long run multiplier coefficients of the respective
Variables in equation (7) and (8). \( \epsilon_{1t} \) and \( \epsilon_{2t} \) are the white noise error terms of the two ARDL models

Similarly after bound testing of ARDL model (5) and (6), the short-run dynamics can be found by estimating the following equations for economic determinants:

\[
D\ln tr_t = \alpha_1 + \sum_{i=0}^{n} \varphi_1 Dln tr_{t-i} + \sum_{i=0}^{n} \varphi_2 Din dtax_{t-i} + \sum_{i=0}^{n} \varphi_3 DSagr_{t-i} + \sum_{i=0}^{n} \varphi_4 DSServ_{t-i} + \sum_{i=0}^{n} \varphi_5 Dsxp_{t-i} + \prod ECT_{t-1} + \epsilon_{1t} \tag{9}
\]

\[
D\ln tr_t = \alpha_2 + \sum_{i=0}^{n} \partial_1 Dln tr_{t-i} + \sum_{i=0}^{n} \partial_2 Doutsatnd_{t-i} + \sum_{i=0}^{n} \partial_3 DPCi_{t-i} + \sum_{i=0}^{n} \partial 4 DSind_{t-i} + \sum_{i=0}^{n} \partial 5 Dunmp_{t-i} + \prod ECT_{t-1} + \epsilon_{2t} \tag{10}
\]

Where D is the difference level of the variable; ln is the natural log form of respective variable and, \( \alpha_1 \) and \( \alpha_2 \) are the intercept coefficients. Parameters \( \varphi_1, \varphi_2, \varphi_3, \varphi_4 \) and \( \varphi_5 \) and \( \partial_1, \partial_2, \partial_3, \partial_4 \) and \( \partial_5 \) are the short run coefficients of equation (9) and (10). The coefficient of ECM in both equations represents \( \prod ECT \) shows the speed of adjustment towards the long-run equilibrium. Coefficient of adjustment should be negative and statistically significant for convergence.

### 5.3.3 Political determinants model

The study uses OLS multivariate regression model, [49] and [1] to test the political determinants of tax revenue. The dummy variables have been chosen as explanatory political variables like Political crisis [16] and [22] were 0 is for the years, when there was political parties ruling, and 1 when there was Presidents rule in the state. Law and order, [3], were 0 when there were less than 500 civilian deaths and 1 when there were more than 500 civilian deaths in a year in the state, [29]. Finally election cycles were 0 for normal year and 1 for election year. The regression equation tested for Political determinants of tax revenue is shown below:
\[ Dlntr_t = \alpha_1 + \delta_1Pcrisis_t + \delta_2law_t + \delta_3elecy_t + \varepsilon_t \] (11)

Where \( D \) is difference level of the variable, \( ln \) is the natural log and \( \alpha_1 \) is the intercept of the model. \( \delta_1, \delta_2, \text{and } \delta_3 \) are the coefficients of Political crisis, law and order and election cycle. \( \varepsilon_t \) is the Error term of the model. The coefficients and the hypothesis of the model will be tested on probability value of t-statistic at 5 and 10% level of significance.

5.3.4 Demographic determinants

The determinants of demographic variables have structural breaks as the demographic variables have insignificant relationship with tax revenue up to certain period and significant relation in other period. Before going to analyze the determinants of the demographic variable, we will try to obtain the structural break point and then divide the period of study accordingly. Chow Breakpoint test has been used for the structural break.

5.3.5 Chow Breakpoint test

The chow test (1968) is used to test whether a single regression is more efficient than two separate regressions involving splitting the data into two sub-samples (Lee, 2008). The test is used to realize the structural break in a time series data [23]. The chow test is carried out first single regression equation on the full data. The equation tested for chow test will be

\[ Dlntr_t = \alpha_0 + \beta_1Dpodn_t + \beta_2Durb_t + \varepsilon_t \] (1)

After checking the structural break the above equation will be split into two data set equation on the bases of structural break point. The model will then be of two separate equations as shown below

\[ Dlntr_t = \alpha_1 + \gamma_1Dpodn_t + \gamma_2Durb_t + \varepsilon_t \] (2)

\[ Dlntr_t = \alpha_2 + \delta_1Dpodn_t + \delta_2Durb_t + \varepsilon_t \] (3)

Where \( \alpha_0, \alpha_1 \text{ and } \alpha_2 \) are the intercept of the Equations and \( \beta_1, \beta_2, \gamma_1, \gamma_2, \delta_1, \text{and } \delta_2 \), are the Coefficients of the variables in different equations. The chow test is estimated on the basis of null hypothesis which states that \( \alpha_1 = \alpha_2, \gamma_1 = \gamma_2, \text{and } \delta_1 = \delta_2 \). The chow test is thus estimated by obtaining residual sum of squared (RSS) of all the data set before and after structural break. Let \( RSS_0 \) is Residual
sum of square of combined data set, \( RSS_1 \) is residual sum of square of first data group and \( RSS_2 \) is the Residual sum of square of second data group. \( N_1 \) and \( N_2 \) are the number of observations in each group and \( K \) is the total number of parameter estimated (here we estimate 3 parameters).

Then the Chow test statistics will be

\[
\text{Chow Test statistic} = \frac{(RSS_0 - (RSS_1 + RSS_2))}{(K)} \bigg/ \frac{(RSS_1 + RSS_2)}{(N_1 + N_2 - 2K)}
\]

The test statistic is thus estimated with the F statistic on \((N_1 + N_2 - 2K)\) degrees of freedom and on Log likelihood ratio and compared with the probability value at 5% or 10% level of significance.

**Diagnostic tests**

In order to check the strength of our models estimated, different diagnostic tests have been carried out. Breusch-Godfrey Serial Correlation or LM Test was done for serial correlation of the model, ARCH Test (autoregressive conditional heteroscedasticity) has been carried for Heteroscedasticity. Similarly, the test for parameter stability of the model has been performed by the CUSUM statistics and the Normality test has been done through Jarque-Bera test. All the diagnostic tests are estimated through null hypothesis which are tested through the test statistic value of each test and the probability value at 5% level of significance.

**6. Results and Discussion**

**6.1 Unit root test**

The Augmented Dickey-Fuller test was conducted to pretest the variables for unit roots to verify that the variables are not integrated of an order higher than one. The purpose is to generate the results free of spurious regression. Before going for ADF test the Akaike Information Criterion were used to determine the optimal number of lags for each variable included in the test. Table 1.2 present the results of the unit root tests both at levels and 1st differences. *(Refer Table 1.2)*

The test results show that the ADF statistics or T-statistic for all the variables at the levels do not exceed the critical values at 5% level of significance which implies that all the variables are non stationary at levels. All the variables have to be checked at first differences. The ADF test carried out at first difference shows that T-statistic of ADF test is higher than their respective critical values at 5% level of significance, which implies that all the variables are stationary after first differences. Thus we conclude that all the variables, i.e, tax revenue, share of indirect taxes to total tax
revenue, total outstanding, per capita income, share of agriculture to NSDP, Share of Industries to NSDP, Share of Services sector to NSDP, value of Exports, unemployment rate, population density and urban population are having an integrated order on I(1), means that all the variables are stationary at 1st difference according to ADF test. Though our integrated order of the variables is I(1) we can use Johansen (1988) co integration test for estimating long run relationship. But in order to obtain robust results for long as well as short run, we can use ARDL method which apply bound test despite the order of integration is I(1) not I(0), [45]. The ARDL approach can be applied to time series variables irrespective of whether they are I(0), I(1), or mutually co-integrated [52]. Thus we have applied ARDL model to test the long and short run relationship of the variables under study.

6.2 Bound Testing

The ARDL bound test has been applied to estimate weather there exist any long run relationship between the variables in ARDL model (5) and (6). Table 1.3 shows the results of ARDL bound test of two ARDL model. (Refer Table 1.3) The table indicates that there is unique co integrating relationships between the economic variables in the two ARDL models (5) and (6). As the null hypothesis of the two tests is “no co integration” and it can be rejected only if calculated F statistic is higher than upper critical bound value. Calculated F-statistic of ARDL bound test for equation (5) is 6.260288 which is greater than critical value of upper bound at 1%, 5% and 10%, respectively. It implies that the independent variables, like indirect taxes, income from agriculture sector, income from services sector and value of exports in ARDL model equation (5) have long run relationship. So, the null hypothesis was rejected and alternative hypothesis was accepted. Similarly calculated F-statistic for ARDL bound test for equation (6) is 12.027 which is also greater that critical value of upper bound at 1%, 5% and 10% level of significance which implies that variables of ARDL model equation (6), like outstanding, per capita income from industry sector and rate of unemployment have long run association. These results indicate that in all relationships, between the variables in two ARDL models are the forcing variables that move first when a common stochastic shock hits the system. Therefore, our two
ARDL models for economic determinates of tax revenue, have long-run relationship, so we can now estimate the long run and short run estimates of the variables to obtain robust results. Also Johansen Co integration test has been carried out to know the long run relationship between the variables.

7. Results and discussion of the models
7.1 Economic determinants
As we discuss in the methodology section that in order to remove the problem of multi-collinarity we will split the economic variables into two ARDL model equations, to know the significant variable which affects the tax revenue in the state of Jammu and Kashmir. Having found long run relationships (i.e. cointegration) among tax revenue and various other economic variables, in the next step the long run and short run relationship are estimated using the selected ARDL model equation of (7) and (8) for long run estimates and (9) and (10) for short run estimates.

The estimates long run and short run results of ARDL model (5) are presented in table 1.4 in panel A and B. The lag lengths of (1,2,2,1,1) for independent variables are determined by Akaike Information Criterion(AIC) following the suggestion of [46]. Tests for models of Tax revenue as dependent variable and indirect taxes, income for agriculture sector, income from services sector and value of exports as independent variable, minimum of 1 lag for dependent variable has fixed to ensure lagged explanatory variables are present in the error correction model (ECM). (Refer Table 1.4) The long run estimates of variables like indirect taxes, income from agriculture sector, income from services sector and value of exports of equation (5) obtained from equation (7) in panel A, reveals that indirect taxes, income from services sector, income from agriculture sector and value of exports are the key determinants of tax revenue. The long run impact of indirect taxes has positive and significant impact on tax revenue as expected. 1% increase in indirect taxes will lead to 0.86% increase in tax revenue. Indirect taxes like sales tax, excise duty, stamp and registration duty etc are the taxes easily collected by the government over the years thus with increase indirect taxes the tax revenue increases. The result is in tune with the findings of [58] and is statistically significant at 1% level of significance. Agricultural income to NSDP is negatively related to tax revenue collection. 1%
percent growth in agriculture income to NSDP will reduce tax revenue by 0.193%. It is statistically significant at 1 percent level and indicates that more share of agriculture sector reduces the tax revenue. Agriculture has almost 29 percent contribution in GDP of Jammu and Kashmir but its contribution in tax revenue is almost 1 percent because of low tax on the income from agriculture sector. [56] and [9] support this negative relationship of income from agriculture sector to tax revenue.

The sign of income from services sector is positive and is statistically significant at 1% level of significance. It implies that in long run 1% increase in income from services sector increase the tax revenue by 0.30%. The results are in line with [30]. Similarly the value of exports also shows positive and significant relationship with tax revenue. It implies that 1% increase in value of exports in the state will increase the tax revenue by 0.343%. It reveals that with the increase of export value of goods in the state the tax revenue will also increase. These results are also supported by [49] and [27].

Next step is to estimates of short run dynamic coefficients of equation (5) obtained from equation (8). The short run dynamic results are provided Penal B in table 1.4. In terms of signs and significances, the results are generally consistent with the long run findings. The table reveals that all the variables are statistically significant in short run to produce change in tax revenue but the same lag impact differs in each variable.

The table shows that Indirect taxes at lag 1 (According AIC criteria) are significant determinants in the short run. The short run error coefficients show that previous year indirect taxes has positive and significant impact on the current year’s tax revenue at 1% level of significance. It shows that 1% increase in indirect taxes at lag 1 will increase the tax revenue at 0.96%. The share of agriculture income shows negative but has a significant impact on current year’s tax revenue at lag 1 at 5% level of significance but positive and insignificant at lag 2 at 5% level of significance. The short run results of error coefficient model shows that, at lag 1 of SAGR, 1% increase in SAGR in previous year will reduce the tax revenue of current year at -0.71%, and at lag 2, 1% increase in SARG will increase tax revenue by 0.07% but is insignificant at 5% level of significance.

Income from services sector and value of exports also shows positive and significant impact on tax revenue in short run. The
The coefficient of share of services sector to NSDP shows that it has positive and significant impact on tax revenue at both the time lags at 5% level of significance. It implies that, 1% increase in services sector income at lag 1 will increase the tax revenue by 0.129% and by 1% increase in services sector income at lag 2 will increase tax revenue by 0.14% as the variable is significant at 5% level of significance. The value of exports in NSDP also shows that it has a positive and significant impact on tax revenue in short run.

The results obtained for ARDL model (5) with ARDL model equation (7) and (8), are satisfactory in terms of Jammu And Kashmir State is concerned. As indirect taxes are major sources of tax revenue, so the effect of Indirect taxes will be more on tax revenue also the less tax base and exemption of various direct taxes over long period of time in the state, like commercial taxes, wealth taxes, property taxes etc have increase the importance of indirect taxes in the state. Also, the agriculture sector of the state is not taxed much, so increases in share will reduce tax revenue. As far as services sector of the state is concerned, it is the only growing sector of the economy but due to lot of constraints like infrastructure of the state and law and order problems, the sector also shows less coefficient to tax revenue, but as the SSERV variable has positive impact on tax revenue it is due to the tourism sector and telecom sector. The state is known for its handicraft and handloom works which generates goods of export quality thus as the share of exports to NSDP has increased over the years the tax revenue has also increased.

The error coefficient of the Error Correction Term (ECM) which is denoted by ecm(-1)) is negative(-0.7192) and statistically significant at 5% level of significance. It reveals the evidence of fast pace of response to bring equilibrium in tax revenue when there are shocks in short run. The negative coefficient of error correction model determines the speed of adjustment to long-run equilibrium by the independent variables. The negative coefficient is an indication that any shock that takes place in the short-run by the independent variables mentioned in above model would be corrected in the long-run. It shows that any fluctuation caused in previous years, or in the short run will bring equilibrium in long run at 71% or in other words it means that it will take at least two years to restore any disequilibrium in tax revenue. The rule of thumb is that, the larger the error correction
coefficient (in absolute term), the faster the variables equilibrate in the long-run when shocked [2]. The R^2 of equation (0.9878) suggests that 98% variation in the tax revenue is explained by the variables used in the model.

7.1.1. Diagnostic Tests

Various diagnostic tests have been carried to test the goodness of fit of the ARDL model equation (5). Breusch-Godfrey (LM Test) was carried out to know whether the model has the problem of serial correlation or not and ARCH test was done to check the heteroskedasticity of the model. Also normality test of Jerque Bera and CUSUM test are carried out to check the normal distribution assumption and strength of our model. Table 1.5 shows the results of diagnostic tests for ARDL model (5) followed by figure 1.3. (Refer Table 1.5 & Fig. 1.3) The diagnostic tests reveal no evidence of misspecification and, additionally, we find no evidence of autocorrelation and heteroskedasticity in the model. To test for structural stability we utilize the cumulative sum of recursive residuals (CUSUM) test. The results of CUSUM stability test in figure 1.1 indicate that the estimated coefficients of all models are stable. Also Durban Watson test statistic is close to 2, which shows that there is no problem of multi-collinearity.

The impact of other economic variables like total outstanding, per capita income, income from industry sector and rate of unemployment on tax revenue estimated by model (8) and their long and short run coefficients estimated by ARDL model (9) and (10) is shown in table 1.6. The long and short run dynamic coefficients are estimated in penal A and B. (Refer Table 1.6) The long run estimates of the economic variables provided by penal A shows that outstanding and per capita income has positive and significant impact on tax revenue while as income from industry and rate of unemployment has negative and significant impact on tax revenue collection in long run. The results of penal A reveals that total outstanding has positive and significant impact on Tax revenue in the long run and the variable is significant at 5% level of significance. The above equation shows that 1% increase in outstanding of the state will increase the tax revenue by 1.22%, which are valid results in line with [57]. It is a desirable result, because the increasing level of outstanding forces the government to impose new taxes and increase the tax base in order to repay the debt which increase the tax system
efficiency as the state has to make more efforts to reduce the outstanding.
Per capita income as the proxy of economic growth also shows positive and significant impact on tax revenue in long run. It implies that with increase in per capita income of the people by 1%, tax revenue increases by 1.45% and is significant at 1% level of significance. These results are in line with [54]. Surprisingly, income from industry sector shows negative and significant impact on tax revenue in long run. It reveals that 1% increase in income in industry sector reduces the tax revenue by -0.91% and the coefficient is significant at 1% level of significance. These results are against the findings of by [57] and [30]. It might be due to the industrial status of the state. The state has very poor and sick industrial sector. Due to the social conflict in 90’s the wide industrial base of the state has hit by vast destruction. Therefore huge tax holidays, tax exemptions, heavy subsidies and many more incentives has been given to industrial sector over the years to increase the industrial base of the state. It is interesting to know over last 2 decades there was no commercial tax, wealth tax and excises duty on the industrial sector of the state. Thus over the years with increase in income of industry sector to NSDP the tax revenue decrease because huge income of industry sector is not taxed.
Rate of unemployment shows negative and significant impact on tax revenue in long run. The penal A, shows that 1% increase in rate of unemployment reduce tax revenue by -0.49% and the coefficient is significant at 5% level of significance. These results are in line with [12] but against to [4] with increase in unemployment rate the sources of income reduce to the people which affect their level of income and thus taxation as well. Also with increasing rate of unemployment government has to give many subsidies and on different indirect taxes to benefit the unemployment classes. Penal B of table 1.6 also shows that short run dynamic results of the above mentioned variables. Like long-run, outstanding and per capita income shows positive and significant impact on tax revenue in short run as well and income from industry sector and rate of unemployment shows negative and significant impact on tax revenue in short run as well. Short run dynamics shows that increase of outstanding of debt and increase in per capita income in previous year will increase the tax revenue in current year while as increase in income in industry sector and increase in rate of unemployment in previous year will reduce
the current year’s tax revenue. In short run the coefficient of each economic variable is less elastic which show that 1% increase or decrease in value of independent variable will increase or decrease the tax revenue by less than 1%. While as in long run the coefficient was elastic for outstanding and per capita income which is positive sign for the tax system of the state.

The ecm(-1) coefficient in penalty B of table 1.6, when appearing with negative notation (expectedly), indicates the speed of error correction and the approach toward long term equilibrium. The coefficient of the ECM term for total tax revenues is -0.6493 which is significant at 1% level of significance. The negative coefficient indicates that 64% of an imbalance in a period of total tax revenues is modified in next period. So, the emergence of a momentum regarding the economic variables in table 1.4, maintains its effect on total tax revenues after one year.

7.1.2 Diagnostic Tests

Diagnostic test for ARDL model (6) has been carried out to in order to check whether our model has given the right results. Breusch-Godfrey (LM Test) was carried out to know whether the model has the problem of serial correlation or not and ARCH test was done to check the heterokidasticity of the model. Also normality test of Jerque Bera and CUSUM test are carried out to check the normal distribution assumption and strength of our model. Table 1.7 followed by figure 1.4 shows the results of diagnostic test for ARDL model (6). (Refer Table 1.7)

The diagnostic tests indicate that model has no serial correlation, no misspecification of functional form and no heteroscedasticity. Stability of the coefficients has been shown with the help of cumulative sum of recursive residuals (CUSUM) test. As CUSUM tests verify that estimated lines are inside the critical lines at 5 percent level of significance, so it shows the stability of the model. If calculated lines do not lie between critical bounds, then model will not be stable. In other words, model has no structural break and it can be applied for policy options. Durbin Watson results show that model does not suffer for autocorrelation.

8. Political determinants of Tax revenue

Another regression model was estimated to know the political determinants of tax revenue in the state of Jammu and Kashmir. The regression equation analyzed is shown below:
\[ DTAXREV = C(1)*CRISIS + C(2)*LAW + C(3)*ELECY + C(4) \]

The regression result of political variables is shown in Table 1.8 below. (Refer Table 1.8) The result of political determinants equation, where tax revenue was a dependent variable and political crisis, law and order and election cycle are independent variables, show that all the political variables have negative association with tax revenue which means that political stability in the state will have significant impact on tax revenue. But among the three political variables, Political crises and Law and order variables are statistically significant while as election cycle was found insignificant to produce change in tax revenue. If we look at the table political crisis has negative coefficient (-0.42093), and significant impact on tax revenue. It shows that 1% increase in political crises will lead to reduce tax revenue by -0.42%, the probability value is less than 10% level of significance. It implies that with change of political ruling in the state from elected government to governors or presidents rule, which is often seen in the state, the tax revenue decline by -0.420%. It is due to the issue that democratically elected party or ruling party has efficient management and machinery to collect taxes from different sources by implementing policies and to run the state efficiently, while as in governors ruling the bureaucrats only manage day to day affairs of the government and hardly engage in efficient policy making and efficient mechanism to improve tax system. The results are in line with [29] and [22]. Law and order (Number of civilian deaths in year) has also negative coefficient (-1.12577), but its probability value is less than 5% (0.0002) level of significance which means that it is a significant variable to produce change in dependent variable. And these results are in tune with the study of [3]. It implies that 1% increase in the law and order situation, or in other words, 1% increase in civilian deaths can reduce the tax revenue by -1.25%, which is an expected result. It is due to the factor that with increasing number of civilian deaths, the people protest, hartal and strikes become common, which results economic activities slow down, markets remain closed for longer period of time, business units cannot function properly due to the hartal and strikes, and most importantly during high law and order crises public authorities are not able to move to collect
taxes from different sources. Thus with increasing law and order problem has direct affect on functioning of economic activities and which in turn reduce tax revenue. Finally the election cycle was also found negative related to tax revenue as in tune with the study of [37], but as its probability value (0.3170) is greater than 5% level of significance, thus it is considered as insignificant variable to produce change in tax revenue. Thus by analysis of the political variables we found that political crises and law and order situation in the state has significant impact on tax revenue. The stability and accuracy of our model can be checked by $R^2$ of the model. The $R^2$ of the model is (0.787042) implies that, over the model 78% of variation in tax revenue is explained by the political variables mentioned above. Durbian Watson statistic is also close to 2 which imply that there is no problem of multi-collinearity. Similarly other diagnostic tests were carried out to prove the stability, normality and serial correlation and heteroskedasticity of our model. Table 1.8 also shows that the model doesn’t have problem of serial correlation as the null hypothesis of Breusch-Godfrey Serial Correlation LM Test is accepted, which implies that there is no serial correlation in the model as the probability value is greater than 5% level of significance. Similarly, the ARCH Test also shows that the model doesn’t have the problem of heteroskedasticity. Normality tests were carried out through Jarque-Bera test. It shows that the series in the model is normally distributed as probability value is greater than 5% level of significance.

9. Demographic Determinants of Tax revenue

In preliminary analysis we do not find any relationship between demographic variables like population density and urban population and tax revenue. We then try to check whether there is any structural break by which our results are not coming as per our expectation. We run Chow Breakpoint test to check any structural break in the series over the period. The result of Chow Breakpoint test is shown in table 1.6. (Refer Table .1.9) The null hypothesis that was tested by chow breakpoint test was that there is no structural break between the two series which have been divided in year 2000. The alternative hypothesis which was tested is that there is a structural break in the series from the date mentioned. The chow test is checked both either by F-statistic or by Log Likelihood ratio. The log likelihood ratio statistic (19.400) shows that its
probability value (0.012) is less than at 5% level of significance. Thus our null hypothesis is not accepted and we conclude that there is a structural break in the series from 2000, which was our alternative hypothesis too. Thus after coming to know that there is a structural break in the series, we have to divide our series into two break points and run the regression. The first series will be from 1984-85 to 2000-01, and the second will be from 2000-01 to 2013-14. The two regression equations are;

\[ \text{DTAXREV}_{2000:1} = C(1) \times \text{DURB} + C(2) \times \text{DPODN} \ldots \ldots \ldots (1) \]
\[ \text{DTAXREV}_{2000:2} = C(1) \times \text{DURB} + C(2) \times \text{DPODN} \ldots \ldots \ldots (2) \]

The regression result of two Breakpoint equations is shown in table 1.9a and 1.9b below. (Refer Table 1.9a) The regression result of first breakpoint equation shows that from the period 1984-85 to 2000-01 the demographic variables like population density and urban population are insignificant to produce any change in the tax revenue. The coefficients of these two variables in this period are 4.575545 and 0.721694 respectively, but the probability value is greater than 5% level of significance, which implies that the variables are insignificant to explain any change in tax revenue over the mentioned period. The intercept of the series is negative but is insignificant. The R² of the series is 0.751227 which is desirable and the Durbin-Watson test shows that the series does not have any problem of multicollinearity. In order to check the reliability and stability of our model we run Breusch-Godfrey Serial Correlation LM Test. It shows that the variables do not suffer from serial correlation as the probability value Obs*R-squared is more than 5% level of significance, thus we accept our null hypothesis that there is no serial correlation in the series. Similarly another hypothesis was checked for heterokidasticity, which assume that there is no heterokidasticity in the series. The hypothesis is accepted as the probability value of Obs*R-squared of ARCH test is greater than at 5% level of significance thus we accept our null hypothesis. In order to check the normality or whether the series is normally distributed, we run Jarque-Bera test with the hypothesis that the series is normally distributed. As per our expectation, the probability value of Jarque-Bera statistic is greater than 5% level of significance thus we accept our null hypothesis and conclude that the series is normally distributed.
As the regression results of first structural break shows that the demographic variables are insignificant to explain any change in tax revenue, we will thus proceed for second structural break to check whether the demographic variables explain any change in tax revenue over period from 2000-01 to 20013-14. (Refer Table 1.9b)

Table 1.9b shows the results of regression equation based on second break from 2000-01 to 2013-14. The results of the model shows that between the periods from 2000-01 to 2013-14, the demographic variables, like population density and urban population, have significant impact on the tax revenue as corroborated by [55] and [34]. The coefficients of the variables in the equation shows that 1% increase in population density between 2000-01 to 2013-14, increases the tax revenue by 7.656762 %, which is significant, as the probability value of the coefficient of population density is less than 5% level of significance (0.000). Similarly the coefficient of urban population shows significant impact, as 1% increase in urban population increases the tax revenue by 0.995428 %. The probability value of urban population coefficient is less than 10% level of significance (0.068) which implies that the urban population is a significant variable to explain change in tax revenue at 10% level of significance. The results are expected because in early period the rates of urbanization and population density were very low so they hardly affect the tax collection in the state. It is only since last 13, years that the rate of urbanization has increased because of heavy flow of people from hill areas to settle in plane areas after getting job and search of employment and other business activities, which increased the economic activities as the demand of various goods increased tremendously which helped in increase of tax revenue as well. Similarly the population density has also increased from 50 persons/sq km to 125 person/sq km, which results in more concentration of economic activities and more circulation of resources within the region, as the result the sources of taxation increase over the period. The intercept of the equation denoted as C shows negative and significant impact. It implies that if the variables have zero growth, there will be 0.42% decline in tax revenue. The $R^2$ of the model is quite satisfactory, as it explains 97% variation in tax revenue by demographic variables. The other tests that were carried out for forecasting the reliability of our model show significant results and suggest that our model has all
those characteristics which signify it a good and reliable model. The Breusch-Godfrey Serial Correlation LM Test, ARCH test and Normality test show that the series does not have the problems of serial correlation, Heterokidasticity and also the series is normally distributed as the probability value of all the tests is more than 5% levels of significance, which suggest accept the null hypothesis of all the tests mentioned.

Conclusion
The study tries to examine the economic, political and demographic determinants of tax revenue in the state of Jammu and Kashmir, over the period 1984-85 to 2013-14. The study finds very appealing results which can help to improve the tax structure in the state. The study finds that economic and political variables are most effective instruments which produce significant change in tax revenue in the short run as well as in the long run, while the demographic variables are having structural break, which laid impact on tax revenue after certain level. The study shows that from the economic point of view the variables like Indirect taxes, income from services sector to NSDP, total outstanding, Value of exports and PCI are highly positive and significant variables to produce change in tax revenue in long run as well as in short run. While as surprisingly, income from industry sector to NSDP, rate of unemployment and share of agriculture has been found negative and significant determinant of tax revenue in long run as well in short run as well. Similarly the political determinants of tax revenue shows that political crisis and law and order has negative and significant impact on Tax revenue growth, while law election cycle has positive but insignificant impact on tax revenue which we were expecting. From demographic determinates we find structural break were the demographic determinants are insignificant to explain change in tax revenue up to year 2000, but after the period the demographic variables like population density and urbanization are positive and are having significant impact of tax revenue of the state. The political stability in terms of law and order and political ruling in the state has carried a big role in generating revenue through taxes in the state. it has been seen a small law and order problem or change in political ruling has reduce the efficiency of tax revenue over the years. Similarly the economic indicators have the potential to generate sufficient amount of growth to tax revenue of the state. Thus, by analyzing the
tax structure of the state through different economic, political and demographic variables, we accept the null hypothesis that change in economic and political determinants have a larger impact on the level of tax revenue and demographic determinants are positively correlated with the growth of Tax revenue. Thus our study will recommend to the policymaker of the state that more and more factors of economic variables should be brought under taxation as the state has large number of economic activities which have not been tapped for taxation yet and has been given lot of tax exemptions and tax holidays to certain sectors. These sectors are performing very well from last few years like tourism, industry, telecommunication, marketing, and business, so these sectors are still either not taxed or under-taxed which can help to improve the tax system if proper and appropriate tax will be imposed on them. Also state should take more care of law and order situation in the state to free and smooth progress of economic activities which will help to improve the existing tax structure of the state.

References


**Data sources**


**Public Finance Data:** Budgetary reports of Government of Jammu and Kashmir, Ministry of finance, various volumes of State finance reports, Reserve bank of India, Government of India, various


LIST OF TABLES:

Summery statistic of variables
Table 1.1: Summery statistics

<table>
<thead>
<tr>
<th>Variables</th>
<th>Definition of variables</th>
<th>At level 5%</th>
<th>P value</th>
<th>1st difference Stationary I(1)</th>
<th>t-statistic</th>
<th>5%</th>
<th>P value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>taxrev</td>
<td>Total tax revenue</td>
<td>-3.48</td>
<td>-3.57</td>
<td>0.559</td>
<td>-5.86</td>
<td>-3.58</td>
<td>0.0003</td>
</tr>
<tr>
<td>Indtax</td>
<td>Share of indirect taxes</td>
<td>-1.42</td>
<td>-2.96</td>
<td>0.555</td>
<td>-5.92</td>
<td>-3.58</td>
<td>0.0002</td>
</tr>
<tr>
<td>outstand</td>
<td>Total outstanding</td>
<td>-2.03</td>
<td>-3.57</td>
<td>0.556</td>
<td>-5.41</td>
<td>-3.58</td>
<td>0.0008</td>
</tr>
<tr>
<td>Pci</td>
<td>Per capita income</td>
<td>-2.97</td>
<td>-3.57</td>
<td>0.156</td>
<td>-6.01</td>
<td>-2.97</td>
<td>0.0000</td>
</tr>
<tr>
<td>sagr</td>
<td>Share of Agr. in nsdp</td>
<td>-1.96</td>
<td>-3.57</td>
<td>0.640</td>
<td>-5.94</td>
<td>-3.58</td>
<td>0.0002</td>
</tr>
<tr>
<td>sind</td>
<td>Share of ind. in nsdp</td>
<td>-2.37</td>
<td>-3.57</td>
<td>0.385</td>
<td>-5.90</td>
<td>-2.97</td>
<td>0.0000</td>
</tr>
<tr>
<td>sserv</td>
<td>Share of serv in nsdp</td>
<td>-2.37</td>
<td>-3.57</td>
<td>0.385</td>
<td>-5.90</td>
<td>-2.97</td>
<td>0.0000</td>
</tr>
<tr>
<td>Sxpo</td>
<td>Share of exp in nsdp</td>
<td>-2.71</td>
<td>-3.58</td>
<td>0.237</td>
<td>-2.26</td>
<td>-1.96</td>
<td>0.0252</td>
</tr>
<tr>
<td>unemp</td>
<td>Rate of unemployment</td>
<td>-2.55</td>
<td>-3.57</td>
<td>0.302</td>
<td>-4.68</td>
<td>-3.58</td>
<td>0.0043</td>
</tr>
<tr>
<td>podn</td>
<td>Population density</td>
<td>-1.34</td>
<td>-2.96</td>
<td>0.596</td>
<td>-5.61</td>
<td>-3.58</td>
<td>0.0005</td>
</tr>
<tr>
<td>urb</td>
<td>Urban population</td>
<td>-0.42</td>
<td>-3.57</td>
<td>0.981</td>
<td>-5.37</td>
<td>-3.58</td>
<td>0.0008</td>
</tr>
</tbody>
</table>

*MacKinnon (1996) p.value @ 5%
### Table 1.3: ARDL Bounds Test

**Null Hypothesis: No long-run relationships exist**

<table>
<thead>
<tr>
<th>Equation</th>
<th>F- Test Statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-lnTAXREV, lnINDTAX, lnSAGR, lnSSERV, lnSSXPO</td>
<td>6.260288**</td>
</tr>
<tr>
<td>6-lnTAXREV, lnoutstand, lnPCI, lnIND, lnUNEMP</td>
<td>12.027**</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Asymptotic critical value bounds</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>I0 Bound</strong></td>
</tr>
<tr>
<td>---------------</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>3.29</td>
</tr>
</tbody>
</table>

Sources: Calculated by Author, **, significant at 5% level of significance

### Table 1.4: Determinants of tax revenue: ARDL Model for Equation 5

**Dependent variable: Tax revenue (lntr), ARDL (1,2,1,1)**

<table>
<thead>
<tr>
<th>Regressor</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>LNINDTAX</td>
<td>0.86883</td>
<td>0.02341</td>
<td>37.1153</td>
<td>0.000</td>
</tr>
<tr>
<td>LNSAGR</td>
<td>-0.1933</td>
<td>0.04711</td>
<td>-4.1043</td>
<td>0.0007</td>
</tr>
<tr>
<td>LNSSERV</td>
<td>0.30587</td>
<td>0.04556</td>
<td>6.71332</td>
<td>0.000</td>
</tr>
<tr>
<td>LNSSXPO</td>
<td>0.34371</td>
<td>0.00663</td>
<td>5.18579</td>
<td>0.0001</td>
</tr>
<tr>
<td>c</td>
<td>-0.1552</td>
<td>0.06077</td>
<td>-2.5532</td>
<td>0.0206</td>
</tr>
</tbody>
</table>

**Penal b: Error correction representation for the selected ARDL for equation 5**

| D(lnINDTAX)   | 0.96057 | 0.02267 | 42.3641 | 0.000 |
| D(lnSAGR)     | -0.7109 | 0.04183 | -7.4328 | 0.0458|
| D(lnSAGR(-1)) | 0.07587 | 0.04308 | 1.76126 | 0.0962|
| D(lnSSERV)    | 0.12916 | 0.03895 | 3.3161  | 0.0041|
| D(lnSSXPO)    | 0.1415  | 0.04916 | -2.8786 | 0.0104|
| ECM(-1)       | -0.7192 | 0.16016 | -4.4938 | 0.0024|

**R-Squared** 0.98783  **R-Bar-Squared** 0.98519  **F-Stat.** 0.000  **Akaike info criterion** -5.330528

Sources: Calculated By Author, *, ** Significant at 5% and 10% level of significance
### Table 1.5: Diagnostic test for ARDL model (5)

<table>
<thead>
<tr>
<th>Test</th>
<th>Obs*R-squared</th>
<th>Prob. *</th>
</tr>
</thead>
<tbody>
<tr>
<td>Durbin – Watson</td>
<td>2.690094</td>
<td>N/A</td>
</tr>
<tr>
<td>Breusch-Godfrey LM test for serial correlation</td>
<td>4.720491</td>
<td>0.0944</td>
</tr>
<tr>
<td>ARCH LM test for Heteroskedasticity</td>
<td>1.362201</td>
<td>0.2432</td>
</tr>
<tr>
<td>Jarque-Bera test for Normality</td>
<td>0.761225</td>
<td>0.683443</td>
</tr>
</tbody>
</table>

*Sources: Calculated by Author, * 5% level of significance

### Table 1.6: Determinants of tax revenue: ARDL Model for Equation 6

**Dependent variable: Tax revenue (lntr), ARDL (1,1,0,1,1)**

<table>
<thead>
<tr>
<th>Regressor</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob. *</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Penal A: Estimated Long Run Coefficients</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LNOUTSTAND</td>
<td>1.227421</td>
<td>0.27446</td>
<td>4.47209</td>
<td>0.0002</td>
</tr>
<tr>
<td>LNPCI</td>
<td>1.456487</td>
<td>0.19894</td>
<td>7.32123</td>
<td>0.0000</td>
</tr>
<tr>
<td>LNSIND</td>
<td>-0.914277</td>
<td>0.20037</td>
<td>-4.563</td>
<td>0.0002</td>
</tr>
<tr>
<td>LNUNEMP</td>
<td>-0.493836</td>
<td>0.15235</td>
<td>-3.2416</td>
<td>0.0041</td>
</tr>
<tr>
<td>c</td>
<td>-9.732538</td>
<td>1.14266</td>
<td>-8.5175</td>
<td>0.0000</td>
</tr>
<tr>
<td><strong>Penal B: Error correction representation for the selected ARDL for equation 6</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D(lnOUTSTAND)</td>
<td>0.14164</td>
<td>0.17337</td>
<td>0.81701</td>
<td>0.4235</td>
</tr>
<tr>
<td>D(lnPCI)</td>
<td>0.76669</td>
<td>0.19944</td>
<td>3.84418</td>
<td>0.001</td>
</tr>
<tr>
<td>D(lnIND)</td>
<td>-0.2282</td>
<td>0.12172</td>
<td>-1.8747</td>
<td>0.0755**</td>
</tr>
<tr>
<td>D(lnUNEMP)</td>
<td>-0.0626</td>
<td>0.09082</td>
<td>-0.6897</td>
<td>0.4983</td>
</tr>
<tr>
<td>ECM(-1)</td>
<td>-0.6493</td>
<td>0.06334</td>
<td>-10.252</td>
<td>0.000</td>
</tr>
</tbody>
</table>

**R-Squared** 0.692019  **R-Bar-Squared** 0.568827
**F-Stat.** 0.000823  **Akaike info criterion** -1.634580

**Durbin-Watson stat** 2.194907

*Sources: Calculated By Author, *, ** Significant at 5% and 10% level of significance

### Table 1.7: Diagnostic test for ARDL model(6)

<table>
<thead>
<tr>
<th>Test</th>
<th>Obs*R-squared</th>
<th>Prob. *</th>
</tr>
</thead>
<tbody>
<tr>
<td>Durbin – Watson</td>
<td>2.194907</td>
<td>N/A</td>
</tr>
<tr>
<td>Breusch-Godfrey LM test for serial correlation</td>
<td>0.830038</td>
<td>0.6603</td>
</tr>
<tr>
<td>ARCH LM test for Heteroskedasticity</td>
<td>0.642556</td>
<td>0.4228</td>
</tr>
<tr>
<td>Jarque-Bera test for Normality</td>
<td>1.648732</td>
<td>0.438513</td>
</tr>
</tbody>
</table>

*Sources: Calculated by Author, * 5% level of significance

N/A: Test does not have Probability value
Table 1.8: Summary of regression results for political variables

\[ DTAXREV = C(1) \times CRISIS + C(2) \times LAW + C(3) \times ELECY + C(4) \]

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRISIS</td>
<td>-0.42093</td>
<td>-1.47935</td>
<td>0.0698**</td>
</tr>
<tr>
<td>LAW</td>
<td>-1.12577</td>
<td>-5.66481</td>
<td>0.0002*</td>
</tr>
<tr>
<td>ELECY</td>
<td>-0.29969</td>
<td>-1.05323</td>
<td>0.3170</td>
</tr>
<tr>
<td>C</td>
<td>8.809681</td>
<td>62.69166</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

R-squared | 0.787042 | Adjusted R-squared | 0.723155 |
Log likelihood | -3.45501 | Durbin-Watson stat | 1.393177 |

Breusch-Godfrey Serial Correlation LM Test

F-statistic | 0.407772 | Probability* | 0.678209 |
Obs*R-squared | 1.295169 | Probability* | 0.523308 |

ARCH Test

F-statistic | 0.000136 | Probability* | 0.990911 |
Obs*R-squared | 0.00016 | Probability* | 0.989893 |

Normality test

Jarque-Bera* | 1.15598 | Prob* | 0.561413 |

Sources: Calculated by us, * at 5% level of significance, **10% level of significance

Table 1.9: Result of structural break of demographic variables

Chow Breakpoint Test: 2000

<table>
<thead>
<tr>
<th>Test</th>
<th>F-statistic</th>
<th>Probability*</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>F-statistic</td>
<td>1.445729</td>
<td>Probability*</td>
<td>0.279244</td>
</tr>
<tr>
<td>Log likelihood ratio</td>
<td>19.40063</td>
<td>Probability*</td>
<td>0.012858</td>
</tr>
</tbody>
</table>

Sources: calculated by us *at 5% level of significance
Table 1.9a: Regression results of first breakpoint equation of demographic determinants of Tax revenue

\[ \text{DTAXREV} = C(1) \times \text{DURB} + C(2) \times \text{DPODN} \]

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>DPODN</td>
<td>4.575545</td>
<td>0.907717</td>
<td>0.3794</td>
</tr>
<tr>
<td>DURB</td>
<td>0.721694</td>
<td>0.161593</td>
<td>0.8739</td>
</tr>
<tr>
<td>C</td>
<td>-24.0757</td>
<td>-0.56342</td>
<td>0.5821</td>
</tr>
<tr>
<td>R-square</td>
<td>0.751227</td>
<td>Log likelihood</td>
<td>6.512639</td>
</tr>
<tr>
<td>Adjusted R-square</td>
<td>0.744259</td>
<td>Durbin-Watson stat</td>
<td>1.248633</td>
</tr>
</tbody>
</table>

Breusch-Godfrey Serial Correlation LM Test:

- F-statistic: 0.235096 | Prob: 0.794051
- Obs*R-squared: 0.640991 | Prob: 0.725789

ARCH Test:

- F-statistic: 0.251318 | Prob: 0.783056
- Obs*R-squared: 0.003153 | Prob: 0.956226

Normality test

Jarque-Bera: 3.882069 | Prob*: 0.143555

Sources: calculated by us; * at 5% level of significance

Table 1.9b: Regression results of Second Breakpoint equation of demographic determinants of Tax revenue

\[ \text{DTAXREV} = C(1) \times \text{DURB} + C(2) \times \text{DPODN} \]

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PODN</td>
<td>7.656762</td>
<td>0.896556</td>
<td>8.54019</td>
<td>0.000</td>
</tr>
<tr>
<td>URB</td>
<td>0.995428</td>
<td>0.853123</td>
<td>1.166805</td>
<td>0.068</td>
</tr>
<tr>
<td>C</td>
<td>-42.6499</td>
<td>9.069758</td>
<td>-4.70243</td>
<td>0.0006</td>
</tr>
<tr>
<td>R-square</td>
<td>0.979179</td>
<td>Log likelihood</td>
<td>12.82084</td>
<td></td>
</tr>
<tr>
<td>Adjusted R-square</td>
<td>0.975393</td>
<td>Durbin-Watson stat</td>
<td>1.542995</td>
<td></td>
</tr>
</tbody>
</table>

Breusch-Godfrey Serial Correlation LM Test:

- F-statistic: 0.251318 | Prob: 0.783056
- Obs*R-squared: 0.003153 | Prob: 0.956226

ARCH Test:

- F-statistic: 0.003153 | Prob: 0.951329
- Obs*R-squared: 0.003726 | Prob: 0.951329

Normality test

Jarque-Bera: 0.234967 | Prob*: 0.889155

Sources: calculated by us; * at 5% level of significance
LIST OF FIGURES:

Fig. 1.1: Trend in Tax revenue

Sources: Calculated by Author

Figure 1.3: Stability test for ARDL model (5)
Figure 1.4: stability test for ARDL model