



**Macroeconomic Environment and Taxes Revenues in Pakistan:
An Application of ARDL Approach**

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Abstract

Taxation intends to raise the necessary funds for government expenditures, redistribution of income and stabilization of the economy, influence the allocation of resources and to overcome the externalities. Taxation is also supportive of the process of stable economic growth. This study has examined the impact of macroeconomic situations on tax revenues in the case of Pakistan over the period of 1975 to 2016. The study has very interesting results as unemployment has a positive and significant impact on tax revenues. There is a positive and significant relationship between money supply tax revenues. Inflation has negative and significant relation with tax revenues in the case of Pakistan. The study shows that Pakistan needs a sound macroeconomic environment for enhancing tax revenues. A country with stable macroeconomic situations would create greater opportunities for investment and more jobs are created. This would further enhance purchasing power on the part of consumers and bearing taxes burden become easy for them. Moreover, there is a dire need of tax education to the masses.

Keywords: taxes, inflation, unemployment

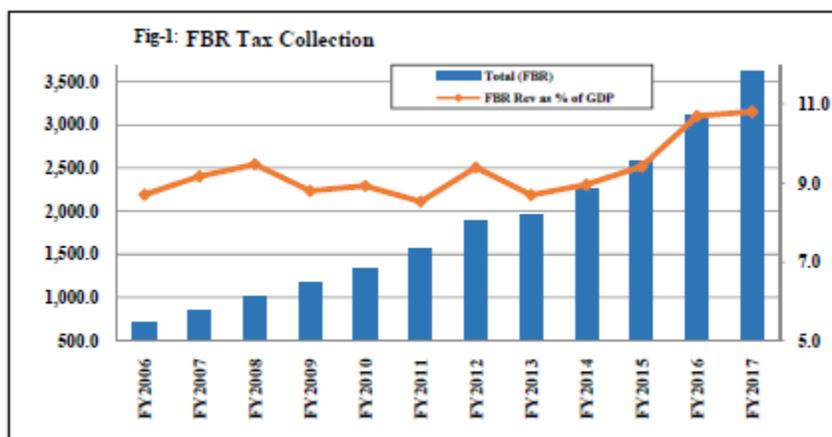
JEL Codes: H2, E31, E24

I. Introduction

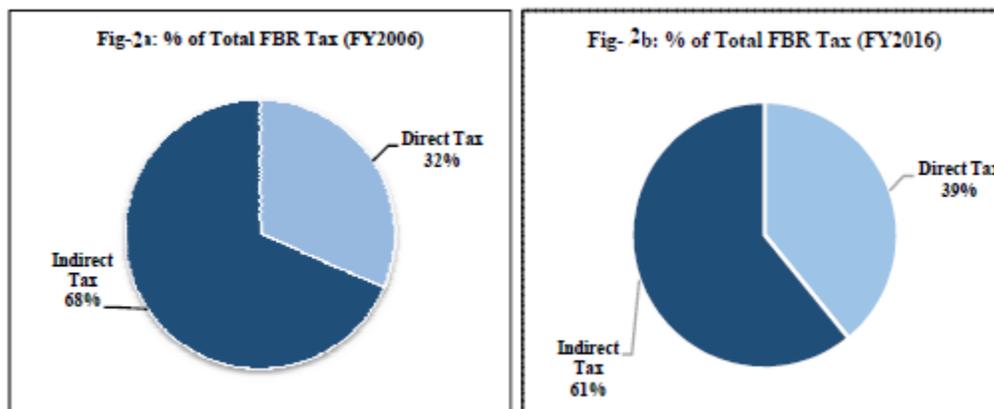
Simply, taxes are defined as the payments, which are imposed by a government on its citizens to facilitate its spending, taxes are the main source of government revenues. Taxes are neither voluntary payments from the people, nor the donations. Instead, taxes are imposed payments by the government. The domestic resources of many societies are limited and a rise in government expenditures creates a reduction in private spending. Taxation is one of the main ways of transferring resources from the private sector to the public sector, but tariffs, aid and borrow from others countries are some alternative sources. The government sets laws for the punishment of nontax payer. The main purpose of taxes is to establish a welfare society by providing protection to lives, properties, human rights and other public services, etc. Taxes are levied on different rate, so taxpayers are curious to know about the tax rate on income while paying direct taxes. Hence tax payers in developed countries demand for the government to show the expenditures of tax income. Taxation has its limits, but it can be exceeded at the time of emergency by charging consumers directly, or borrowing etc. The government often uses other ways of raising resources, but taxation is usually the most important and easiest source of government revenue.

In the past, Pakistan's economy has faced enormous challenges for longstanding structural issues. Particularly, problems in the energy sector, security related issues and unsuitable investment climate along with persistent fiscal imbalances. Consequently, the average growth rate remains less than 3 percent between FY2009 and FY2013. However, during the period of the incumbent government, the country has been successful in revitalizing the economy through a combination of stabilization and structural reforms. Improvements in resource mobilization were good until the year 1991-92. After that, it has become a story of continual decline i.e. Total revenues as a percentage of GDP went down from 19.1 percent in 1991-92 to 16.1 percent in 1997-98. The tax-to-GDP ratio declined from 14.3 percent in 1988-89 to 12.7 percent in 1997-98. During this period, the direct taxes-to-GDP ratio is increased from 2.2 per cent to 4.1 per cent, the indirect taxes-to-GDP ratio declined from 10 percent to 7.5 percent - the major decline due to less customs duties. The ratio of non-tax revenues to GDP has been enhanced. In absolute terms, the increase in tax and non-tax receipts in relation to GDP was almost equal. The minimum target for the tax-to-GDP ratio has increased by one percentage every year until it reaches 17 percent of the GDP. Given the revenue performance during the July, 1998 - April 1999 period, no improvements are expected.

Over the years, Pakistan has a narrow tax base, massive tax evasion and administrative weaknesses in developing an efficient tax system. Consequently, Pakistan has failed to boost tax collection, which is necessary to create enough fiscal space essential for infrastructure, education, healthcare and social assistance. Until FY2015, the overall tax to GDP ratio varied between 9.1 and 11.0 percent of GDP, however, by the FY2016 overall tax collection as a percentage of GDP improved significantly and reached 12.6 percent of GDP. A significant rise in total tax collection during FY2016 is largely attributed by improving collection under Gas Development Surcharge (GDS), Gas Infrastructure Development Cess (GIDC) and Petroleum Levy. The collection under these heads scaled up on account of higher sales of oil and gas products. Total tax revenue by FBR as a percentage of GDP has also witnessed a remarkable improvement and it stood at 10.7 percent in FY2016. The improvement in FBR tax to GDP ratio has been on account of considerable reduction in tax concessions and exemptions, increased withholding taxes on non-filers of income tax returns and improvements in tax compliance and enforcement. Fig-1 and Fig-2. Give an overview of tax collection in Pakistan.



Source: Federal Bureau of Statistic, Government of Pakistan



Source: Federal Bureau of Statistic, Government of Pakistan

Like many other developing countries, Pakistan's tax structure is heavily reliant on indirect taxes. Nevertheless, in recent year, Pakistan's tax structure has seen a great transition from indirect to the direct tax system as a result of various tax reforms. In FY2006, indirect taxes constituted 68 percent of the total FBR tax collection, while the direct taxes were only 32 percent.

II. Literature Review

There are a number of studies which examine the determinants of taxes, but most relevant and recent studies are selected here as a literature review. An extensive number of studies analyze the empirical relationship between economic growth and tax collection [Kneller et al. (1999), Creedy and Gemell (2006), Widmalm (2001), Schwellnus and Arnold (2008), Vartia (2008), Lee and Gordon (2005)]. Kneller et al. (1999) also identify a depressing effect of 'distortionary taxes', which include taxes on income and property. Moreover, government's productive expenditures stimulate economic growth. Gemell et al. (2008) and Arnold (2008) confirm the findings of Kneller et al. (1999). Kormendi (1983) and Cardia (1997), Blanchard and Perotti (2002), Perotti (1999), Romer and Romer (2007) analysis the relationship between tax collection and economic growth. Although these studies use different econometric methods for empirical analysis, but they have same findings. These studies find that economic activities and revenue collection have a negative relationship. Gale and Orszag (2004) mention that rising taxes put negative impact on consumption pattern of masses.

Lotz and Morss (1967) analysis the situations of tax revenue as percentage of GNP in the case of developed and developing countries. Openness and per capita GNP are used as explanatory variables. The results of the study show that tax collection has a positive relationship with openness and per capita GNP. Tanzi (1987) found the same type of findings in case of developing countries. Chelliah et al. (1975) examine the relationship of taxes as percentage of GNP with share of agriculture, the share of exports and share of mining, and data 47 countries from 1969 to 1971 are used for empirical analysis. The estimates reveal that agriculture's share has a negative relationship with tax collections, whereas export and mining have a positive relationship with tax collections. Tait et al. (1979) uses data from 1972 to 1976 from same countries. The findings of this study follow the findings of Chelliah et al. (1975). Bird (1976) and Ahmad and Stern (1991) also mention that the increased percentage of agriculture in GDP reduces tax collections. The developing countries have a number of political issues in this negative relationship which are out of control by running government. Leuhold (1991) and Stotsky and WoldeMariam (1997) analysis the relationship between tax collection and agriculture income, mining income and exports in the case of African countries. The estimates reveal that agricultural income has an inverse relationship with tax collection, but exports and mining have a positive relationship with tax collections.

Following the tax collection trends of OECD countries, Widmalm (2001), Schwellnus and Arnold (2008) and Vartia (2008) analysis the relationship of tax collection and economic activities. Widmalm (2001) estimates a negative relationship between budget revenue collections by income taxes and growth in economic activities. These findings are contradictory to the traditional predictions about the negative effect of indirect taxes on the economy. The empirical results of Schwellnus and Arnold (2008) and Vartia (2008) also find a negative effect of corporate taxes on

the productivity of firms and industries. These findings are based on the data from firms and industries across OECD countries. Lee and Gordon (2005) found a significant negative correlation between statutory corporate tax rates and economic growth of 70 countries during 1970-1997.

Teera (2002) analyzes the impact of taxation system and structure of taxation on tax revenues in the case of Uganda. For empirical analysis the data from 1970 to 2000 is used for this purpose. The study finds that tax evasion, population density and agriculture income affect tax revenues. The results reveal that per capita GDP has negative relationship with tax revenues. Tax evasion and openness have significant negative impact on tax revenues. Foreign aid has a positive relationship with tax revenues in the case of Uganda. Bahl et al., (2003) examines the determinants of tax revenues by using data of OECD and less developed economies. The results reveal that non-agricultural share of GDP, openness and the rate of population growth have positive and significant relationship with tax revenues. Ahsan and Wu (2005) examined the tax share in GDP for developed and developing countries for 1979-2002 and found negative and significant relation of agriculture's share, GDP per capita, and population growth with tax collection while trade share of GDP has positive and significant relation with tax collection but corruption has negative and insignificant relation the tax collection.

Kemal (2007) analyses the long-run relationship between the underground economy and the formal economy. Results show that underground economy is causing the formal economy, but not the vise-a-versa. The study suggests that by reducing the number of legal documentations, strengthening the institutions, better governance, decrease the number of regulations and restrict smuggling through tariff rationalization to cut down tax evasion can increase tax collections. Lutfunnahar (2007) identified the determinants of taxes and revenue performance of Bangladesh along with 10 other developing countries for 15 years through a panel data analysis. The results show that international trade, broad money, external debt and population growth are significantly determining tax collection. The study concludes that Bangladesh and other developing countries have low tax collections and these nations are not utilizing their full capacity of tax revenue and therefore they are financing budgetary imbalance through deficit financing.

Mahdavi (2008) uses the advanced estimation techniques with an unbalanced panel data for 43 DCs over the period 1973-2002 including Pakistan. The results show that aid had a negative effect on non-tax revenue, while the agriculture sector share has a positive but an insignificant relationship with tax collection. The trade sector share has a positive effect and economically active female has a net adverse but insignificant effect on tax collection, while the old-age portion of the population shows a negative association for both income and sales tax. Extent of urbanization and literacy rate both show a positive effect on tax collection. Population density, monetization and inflation rate have a negative impact on tax collections. Ehrhart (2009) by using the panel of 66 developing countries over the period 1990-2005, estimates that democracy influence domestic tax revenue, properly correcting for the endogeneity of democracy with an original instrument. The study finds a strong evidence that the political regime in a country influence the extent to which domestic tax reforms are implemented and higher domestic revenues achieved. Ahmad and Mohammad (2010) examined the determinants of tax buoyancy of 25 developing countries over the period of 1998 to 2008. For empirical analysis the pooled least square method is used. The agriculture sector has a negative effect on tax collection and services sector has positive and significant effect on tax collection. Monetization and budget deficit have a positive influence on tax collection while growth in grants has negative impact on tax buoyancy.

III. Theoretical Model

The main objective of economic theory is to construct economic models that define the economic behavior of an individual and society as a whole. Normally, an economic model represents real economic situations of different units in the presence of some assumptions and abstractions. These abstractions depend on the purpose for which the economic model has been constructed. The basic objective behind the construction of an economic model is to analyze and predict. The predicting power, provided information, realism and simplicity of assumptions and generality decide the validity of an economic model (Ali, 2015; Ali and Rehman, 2015). This study examines the impact of macroeconomic environmental on tax revenues in the case of Pakistan over the period of 1975-2016. By following the study of Lotz and Morss (1967), Chelliah (1971), Tait et al., (1979), Chelliah et al., (1975), Leuthold (1991), Tanzi (1991), Stotsky and WoldeMariam (1997), Ghura (1998), Piancastelli (2001), Eltony (2002) and Bird et al., (2006), the model of this study becomes as:

$$TR_t = f(UN_t, INF_t, FDI_t, M2_t) \quad (1)$$

TR= taxes revenues

UN = unemployed labor

INF = inflation rate (CPI)
 FDI= Foreign Direct Investment
 M2 = Broad money
 t = time period (1975-2016)

For finding the responsiveness of dependent variable by independent variables, the econometric function the model becomes as:

$$LTR_t = \alpha_0 + \alpha_1 LUN_t + \alpha_2 LINF_t + \alpha_3 LFDI_t + \alpha_4 LM2_t + u_t \quad (2)$$

u = white noise error term

The data for all variables is taken from various issues of Pakistan economic survey and World Development Indicators database maintained by the World Bank.

IV. Econometric Methodology

Econometric tools for macroeconomic models are one of the most important aspects within the quantitative economic analysis. In most of macroeconomic data, the involvement of time trend makes the time series data non-stationary and the regression results of this data may be spurious. Nelson and Plosser (1982) mention that mostly time series data of macroeconomic variables have a unit root problem. They conclude that existence or non-existence of unit root helps to check the authenticity of the data generating process. In the literature, several unit root tests are available for making data stationary. For this purpose, the study uses Augmented Dickey-Fuller (ADF) unit root test (1981). The general forms of the ADF can be written as:

$$\Delta X_t = \delta X_{t-1} + \sum_{j=1}^q \phi_j \Delta X_{t-j} + e_{1t}$$

$$\Delta X_t = \alpha + \delta X_{t-1} + \sum_{j=1}^q \phi_j \Delta X_{t-j} + e_{2t}$$

$$\Delta X_t = \alpha + \beta t + \delta X_{t-1} + \sum_{j=1}^q \phi_j \Delta X_{t-j} + e_{3t}$$

X_t is a time series for testing unit roots, t is the time trend and e_t is error term having white noise properties. If $j=0$, it represents the simple DF test. The lagged dependent variables in the ADF in the area regression equation are included until the error term becomes white noise. For checking the serial correlation of error terms LM test is used the null and alternative hypothesis of ADF unit roots are:

$H_0: \delta = 0$ non-stationary time series; series have a unit root problem.

$H_a: \delta < 0$ stationary time series.

Applying OLS and computing τ statistic of the estimated coefficient of X_{t-1} and comparing it with the Dickey Fuller (1979) critical τ values, if the calculated value of τ statistic is greater than the critical value then rejects the H_0 . In this case the time series data is stationary. On the other hand, if we fail to reject H_0 , the series is non-stationary. In this way of applying this procedure on all variables, we can easily find their respective orders of integration.

IV.I. Auto Regressive Distributed Lag Model (ARDL) Approach to Cointegration

In literature, a number of cointegration tests for econometric analysis are available. Most famous and traditional cointegration tests are the residual based Engle-Granger (1987) test, Maximum Likelihood based on Johansen (1991/1992) and Johansen-Juselius (1990) tests. The ARDL bound testing approach presented by Pesaran and Pesaran (1997), Pesaran and Shin (1998), and Pesaran et al., (2001). This study uses ARDL bound testing method for examining cointegration among the variables. The functional form of the model becomes as:

$$\Delta \ln Y_t = \beta_1 + \beta_2 t + \beta_3 \ln Y_{t-1} + \beta_4 \ln X_{t-1} + \beta_5 \ln Z_{t-1} + \dots + \sum_{h=1}^p \beta_h \Delta \ln Y_{t-h} + \sum_{j=0}^p \gamma_j \Delta \ln X_{t-j} + \sum_{k=0}^p \phi_k \Delta \ln Z_{t-k} + \dots + u_{it}$$

At first the study will find the direction of the relationship among the variables in case of Pakistan by applying the bounds test using Wald test. This study uses different proxies for social progress as dependent variable and every model has different control variable with macroeconomic instability.

H0: $\beta_3 = \beta_4 = \beta_5 = 0$ (no cointegration among the variables)

HA: $\beta_3 \neq \beta_4 \neq \beta_5 \neq 0$ (cointegration among variables)

If there exists long-run cointegration relationship among the variables, then for the finding short-run relationship the study uses the Vector Error Correction Model (VECM). The VECM is explained as under:

$$\Delta \ln Y_{it} = \beta_1 + \beta_2 t + \sum_{h=1}^p \beta_h \Delta \ln Y_{it-h} + \sum_{j=0}^p \gamma_j \Delta \ln X_{t-j} + \sum_{k=0}^p \phi_k \Delta \ln Z_{it-k} + \omega ECT_{t-1} + u_t$$

V. Empirical Results and Discussion

This study is examining the impact of macroeconomic situation on tax revenues in the case of Pakistan over the period of 1975 to 2016. This study uses tax revenues as dependent variable, whereas M2, inflation rate, unemployment rate and foreign direct investment are taken as independent variables. Table 1 presents the descriptive statistics of the model. The results of the table 1 reveal that tax revenues, inflation rate and the unemployment rate are negatively skewed. The maximum and minimum values of these variables give the range. Standard Deviation also tells about the scatterness (spread) of the values. M2 and foreign direct investment are positively skewed. The results show that all variables of the model have positive Kurtosis. The values of Skewness and Kurtosis reveal that all the variables are statistically insignificant which means the model is normally distributed. The estimated values of the Jarque-Bera indicate that all the variables have zero mean and finite covariance, this confirms that variables are normally distributed.

Table 1: Descriptive Statistics

	LTR	LM2	LINF	LUN	LFDI
Mean	12.50882	3.791321	2.074488	1.041518	-0.562915
Median	12.67569	3.774388	2.112277	1.680828	-0.510826
Maximum	14.90825	4.075292	3.039965	2.112635	1.308333
Minimum	9.651430	3.516545	1.069573	-1.078810	-2.302585
Std. Dev.	1.520032	0.123959	0.479321	1.002758	0.899965
Skewness	-0.179375	0.308345	-0.302642	-0.584019	0.017161
Kurtosis	2.008030	2.631770	2.698818	1.732129	2.73527
Jarque-Bera	1.808147	0.838336	0.742752	4.829194	0.085260
Probability	0.404917	0.657594	0.689785	0.089403	0.958266
Sum	487.8438	147.8615	80.90503	40.61920	-21.95370
Sum Sq.Dev.	87.79892	0.583897	8.730436	38.20990	30.77764
Observations	43	43	43	43	43

Table 2 reports the correlation matrix of variables, the results reveal that tax revenues have positive and significant correlation with the unemployment rate, M2 and foreign direct investment, whereas the inflation rate has negative but insignificant correlation with tax revenues in the case of Pakistan. The unemployment rate has positive and significant correlation with M2 and foreign direct investment. The results reveal that the unemployment rate and inflation rate have negative and insignificant correlation. M2 has positive and insignificant correlation with inflation rate, whereas M2 has positive and significant correlation with foreign direct investment. The inflation rate and foreign direct investment have positive, but insignificant correlation with each other. The overall estimated results show that most of the variables in the model have positive and significant correlation when dependent variable. The results of the correlation matrix show that there is no problem of multicollinearity among the explanatory variables.

Table 2: Pairwise Correlation

Variables	LTR	LUN	LM2	LINF	LFDI
LTR	1.00000				
LUN	0.88***	1.00000			
LM2	0.79659***	0.59968***	1.0000		
LINF	0.025883	-0.069822	0.135658	1.000000	
LFDI	0.770948***	0.75988***	0.73110***	0.202564	1.00000

This study applies ADF unit root test for examining stationarity of the variables. The results of unit root tests are reported in table 3. The results of the ADF unit root test show that the inflation rate is stationary at level. The results of the ADF test reveal that M2 broad, unemployment rate, tax revenues and foreign direct investment are stationary at I(1). Hence there is a mixed order of integration which is a suitable condition for applying ARDL cointegration approach.

Table 3: Unit root results

Variables	ADF	Stationarity
LINF	-4.48***	I(0)
LM2	-5.25***	I(1)
D(LTR)	-3.66**	I(1)
D(LUN)	-4.83***	I(1)
D(LFDI)	-5.48***	I(1)

The results of the ARDL bound testing method are provided in table 4. The results reveal that calculated F statistics (18.61397) are greater than the upper bound (3.49) value at 5 percent. So, the null hypothesis of no cointegration is rejected, which confirms cointegration among the variables of the model. The calculated F statistics have verified the existence of cointegration among the variables of the model. Now the long-run relationship between tax revenues, inflation rate, unemployment rate, M2 broad money and foreign direct investment can be examined.

Table 4: ARDL Bounds Testing Approach

Critical value	F statistics 18.61397	
	Lower Bound	Upper Bound
95%	2.56	3.49
90%	2.2	3.09

The long run results of the study are reported in table 5. The coefficient of unemployment is positive, so it shows that there is a positive and significant relationship between unemployment and tax revenues. This main reason behind this positive relationship between unemployment and tax revenues is that population of Pakistan is rising very rapidly. So unemployed labor and tax revenues are rising at the same time. Although rising population raises government revenues, but that rise is less than the rise in the unemployment rate in case of Pakistan. These results are consistent with the findings of Malthus (1798) population growth theory. There is a positive and significant relationship between M2 and tax revenues. Keynesian theory suggests that the supply of money increases formal transaction activities and increase tax revenues. The estimated results are consistent with the findings of Chaudhry and Munir (2010). Inflation

has negative and significant relation with tax revenues in the case of Pakistan. These results are consistent with the findings of Mahdavi (2008), Ehrhart (2009) and Chaudhry and Munir (2010). Rising inflation reduces the purchasing power of the people and they left less for taxes. The estimated results show that foreign direct investment has negative and insignificant relationship with taxes revenues.

Table 5: Long run Results

Regressors	Coefficients	T-Ratios	Prob
LUNE	0.8453	-3.329	0.0026
LM2	8.6451	4.0405	0.0004
LINF	-0.8396	-2.6611	0.0444
LFDI	-0.4517	-1.11467	0.2752
C	-20.0726	-2.38017	0.0249

After findings the long run relationship among the variables of the model. Now with the help of error correction model we can find the short run relationship among the variables. The results of short run dynamic are shown in table 6. The results show that unemployment and M2 has positive and significant relationship with taxes revenues in the case of Pakistan. In case of short, inflation has a positive and significant relationship with taxes revenues. Foreign direct investment has positive and significant relationship with taxes revenues. The results show that the value of ECM is negative and significant which is theoretically correct. This show that short run disequilibrium will be converging in long equilibrium. This process needs 9 years and 9 months to converge in the long run equilibrium path.

Table 6: Short run Dynamics

Regressor	Coefficients	Standard-error	T-Ratio (Prob)
LUN	0.125913	0.060798	2.070988 (0.0484)
LM2	0.694993	0.196964	3.528534 (0.0016)
D(LNINF)	0.102525	0.037043	2.767693 (0.0103)
LFDI	0.060362	0.026228	2.301436 (0.0296)
ECM(-1)	-0.111443	0.010738	-10.378206 (0.0000)

Table 7: Breusch-Godfrey Serial Correlation LM Test: (Diagnostic Test)

F-statistic	21.65484	Prob. F(1,32)	0.3544
Obs R-squared	22.42843	Prob. Chi square F(3,32)	0.1248

Heterokedasticity Test: ARCH (Diagnostic Test)

F-statistic	1.769119	Prob. F(3,32)	0.1729
Obs R-squared	5.121371	Prob. Chi square (3)	0.1631

The estimated results show of the diagnostic tests reveals that there is no serial correlation between the variables of the model. The results also show that there is no problem of heteroscedasticity and the model is having a correct functional form.

VI. Conclusions and Suggestions

This study has examined the impact of macroeconomic situations on tax revenues in the case of Pakistan over the period of 1975 to 2016. This study uses tax revenues as dependent variable, whereas as inflation rate, unemployment rate, M2 and foreign direct investment as independent variables. ADF unit root test it used for checking the stationarity of the variables. The ARDL bound testing method is used for analyzing cointegration among the variables of the model. The results of the unit root test reveal that there is a mixed order of integration among the variables of the model. The results of the study show that unemployment has a positive and significant impact on tax revenues. There is a positive and significant relationship between M2 and tax revenues. Inflation has negative and significant relation with tax revenues in the case of Pakistan. Rising inflation reduces the purchasing power of the people and they left less for taxes. The estimated result shows that foreign direct investment has negative and insignificant relationship with tax revenues. This show that if the government of Pakistan wants to increase tax revenues it must get sustainable level of inflation rate at the same time reduced level of unemployment. A country with stable law and order situation would mean greater investment being brought in, more jobs being created, resulting in greater purchasing power on the part of the consumers who effectively have to pay tax. Moreover, there is a dire need of tax education to the masses.

References

- Ahmad, E., & Stern, N. (1991). *The theory and practice of tax reform in developing countries*. Cambridge University Press.
- Ahmed, Q. M., & Mohammed, S. D. (2010). Determinant of Tax Buoyancy: Empirical Evidence from Developing Countries. *European Journal of Social Sciences*, 13(3).
- Ahsan, S. M., & Wu, S. (2005). *Tax Structure and Reform in China, 1979-2002*. Mimeo, Department of Economics, Concordia University, Canada.
- Ali, A. (2015). *The impact of macroeconomic instability on social progress: an empirical analysis of Pakistan* (Doctoral dissertation, National College of Business Administration & Economics Lahore).
- Ali, A., & Rehman, H. U. (2015). Macroeconomic Instability and Its Impact on Gross Domestic Product: An Empirical Analysis of Pakistan. *Pakistan Economic and Social Review*, 53(2), 285-316.
- Arnold, J. (2008). Do Tax Structures Affect Aggregate Economic Growth?
- Bahl, R., Smoke, P., & Solomon, D. (2003). Overview of the local government revenue system. *Chapter, 3*, 71-93.
- Bird, R. M. (1976). Assessing tax performance in developing countries: a critical review of the literature. *FinanzArchiv/Public Finance Analysis*, (H. 2), 244-265.
- Bird, R. M., Martinez-Vazquez, J., & Torgler, B. (2006). Societal institutions and tax effort in developing countries. *The Challenges of Tax Reform in a Global Economy*, 283.
- Blanchard, O., & Perotti, R. (2002). An empirical characterization of the dynamic effects of changes in government spending and taxes on output. *the Quarterly Journal of economics*, 117(4), 1329-1368.
- Cardia, E. (1997). Replicating Ricardian equivalence tests with simulated series. *The American Economic Review*, 65-79.
- Chaudhry, I. S., & Munir, F. (2010). Determinants of Low Tax Revenue in Pakistan. *Pakistan Journal of Social Sciences (PJSS)*, 30(2).
- Chelliah, R. J. (1971). Trends in taxation in developing countries. *Staff Papers*, 18(2), 254-331.
- Chelliah, R. J., Baas, H. J., & Kelly, M. R. (1975). Tax Ratios and Tax Effort in Developing Countries, 1969-71. *Pression fiscale et effort fiscal dans les pays en développement, 1969-71*. *Coefficientes y esfuerzo tributarios en los países en desarrollo, 1969-71*. *Staff papers*, 22(1), 187-205.
- Creedy, J., & Gemmell, N. (2006). *Modelling tax revenue growth*. Edward Elgar Publishing.
- Dickey, D. A., & Fuller, W. A. (1979). Distribution of the estimators for autoregressive time series with a unit root. *Journal of the American statistical association*, 74(366a), 427-431.
- Dickey, D. A., & Fuller, W. A. (1981). Likelihood ratio statistics for autoregressive time series with a unit root. *Econometrica: Journal of the Econometric Society*, 1057-1072.
- Economic survey of Pakistan. Various issues. *The government of Pakistan, Islamabad*.
- Ehrhart, H. (2009). The political economy determinants of domestic tax mobilization in developing countries.
- Eltony, N. (2002, September). Measuring tax effort in Arab countries. Economic Research Forum for the Arab Countries, Iran & Turkey.
- Engle, R. F., & Granger, C. W. (1987). Co-integration and error correction: representation, estimation, and testing. *Econometrica: journal of the Econometric Society*, 251-276.
- Gale, W. G., & Orszag, P. R. (2004). Budget deficits, national saving, and interest rates. *Brookings Papers on Economic Activity*, 2004(2), 101-187.
- Gemmell, N., Kneller, R., & Sanz, I. (2008). Fiscal policy impacts on growth in the OECD: Are they long-run? *Nottingham: University of Nottingham*, 2007.-33 p.
- Ghura, M. D. (1998). *Tax revenue in Sub-Saharan Africa: Effects of economic policies and corruption* (No. 98-135). International Monetary Fund.
- Johansen, S. (1991). Estimation and hypothesis testing of cointegration vectors in Gaussian vector autoregressive models. *Econometrica: Journal of the Econometric Society*, 1551-1580.
- Johansen, S. (1992). Testing weak exogeneity and the order of cointegration in UK money demand data. *Journal of Policy modeling*, 14(3), 313-334.
- Johansen, S., & Juselius, K. (1990). Maximum likelihood estimation and inference on cointegration—with applications to the demand for money. *Oxford Bulletin of Economics and statistics*, 52(2), 169-210.
- Kemal, M. A. (2007). Fresh assessment of the underground economy and tax evasion in Pakistan: causes, consequences, and linkages with the formal economy.
- Kneller, R., Bleaney, M. F., & Gemmell, N. (1999). Fiscal policy and growth: evidence from OECD countries. *Journal of Public Economics*, 74(2), 171-190.
- Kormendi, R. C. (1983). Government debt, government spending, and private sector behavior. *The American Economic Review*, 73(5), 994-1010.

- Lee, Y., & Gordon, R. H. (2005). Tax structure and economic growth. *Journal of public economics*, 89(5-6), 1027-1043.
- Leuthold, J. H. (1991). Tax shares in developing economies a panel study. *Journal of development Economics*, 35(1), 173-185.
- Lotz, J. R., & Morss, E. R. (1967). Measuring "tax effort" in developing countries. *Staff Papers*, 14(3), 478-499.
- Lutfunnahar, B. (2007). *A Panel Study on Tax Effort and Tax Buoyancy with Special Reference to Bangladesh*. Working Paper 715: Policy Analysis Unit (PAU) Research Department Bangladesh Bank.
- Mahdavi, S. (2008). The level and composition of tax revenue in developing countries: Evidence from unbalanced panel data. *International Review of Economics & Finance*, 17(4), 607-617.
- Malthus, T. (1798). *An essay on the principle of population* (J. Johnson, London).
- Nelson, C. R., & Plosser, C. R. (1982). Trends and random walks in macroeconomic time series: some evidence and implications. *Journal of monetary economics*, 10(2), 139-162.
- Perotti, R. (1999). Fiscal policy in good times and bad. *The Quarterly Journal of Economics*, 114(4), 1399-1436.
- Pesaran, H. H., & Shin, Y. (1998). Generalized impulse response analysis in linear multivariate models. *Economics letters*, 58(1), 17-29.
- Pesaran, M. H., & Pesaran, B. (1997). *Working with Microfit 4.0: interactive econometric analysis; Windows version*]. Oxford University Press.
- Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of applied econometrics*, 16(3), 289-326.
- Piancastelli, M. (2001). *Measuring the Tax Effort of Developed and Developing Countries: Cross Country Panel Data Analysis-1985/95*.
- Romer, C. D., & Romer, D. H. (2007). *Do tax cuts starve the beast: The effect of tax changes on government spending* (No. w13548). National Bureau of Economic Research.
- Schwellnus, C., & Arnold, J. (2008). *Do Corporate Taxes Reduce Productivity and Investment at the Firm Level? Cross-Country Evidence from the Amadeus Dataset* (No. 641). OECD Publishing.
- Stotsky, M. J. G., & WoldeMariam, M. A. (1997). *Tax effort in sub-Saharan Africa* (No. 97-107). International Monetary Fund.
- Tait, A. A., Grätz, W. L., & Eichengreen, B. J. (1979). International comparisons of taxation for selected developing countries, 1972-76. *Staff Papers*, 26(1), 123-156.
- Tanzi, V. (1987). The response of other industrial countries to the US Tax Reform Act. *National Tax Journal*, 40(3), 339-355.
- Teera, J. (2002). *Tax performance: a comparative study*. Bath, UK: University of Bath. *Economics working paper*.
- Vartia, L. (2008). How do taxes affect investment and productivity?
- Widmalm, F. (2001). Tax structure and growth: Are some taxes better than others? *Public Choice*, 107(3-4), 199-219.
- World Development Indicators. Databases maintained by World Bank.