Tax Policy and Economic Growth in the Developing and Developed Nations

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ABSTRACT

Fiscal policy is a policy that tries to achieve certain economic goals through instruments such as changes in government expenditure and taxation. The financial policy uses two instruments of government revenue (tax) and government spending (spending) to influence the economy. And in the economic literature, they consider economic growth to be equal to GDP. The impact of financial policies on economic growth is a matter of many economists. The source of finance used by the government of majority of the world countries is mainly tax revenue. Tax paid by the public is an effective instrument for developing financial policy by the nations. This study aims to investigate the impact of financial policy (tax) on GDP of the developed and developing countries using the panel data technique. The data is collected from World Bank database for the period 2008-2016. The results of analysis revealed that there is a negative and significant relationship between the logarithm of the ratio of tax revenues and GDP in the developed countries; however, there is no significant relationship between tax revenues and economic growth in developing countries.

Keywords:

Tax Policy, Tax Revenue, Economic Growth, GDP, Panel Data

1. Introduction

In the economic literature, gross domestic product (GDP) has been considered the measure of economic growth. Almost all countries aim to achieve higher economic growth and suitable conditions are also required to achieve this goal. One of the most important determinants of economic growth of a country is governments' tax policy.Setting levels of taxation is one of the significant factors to drive the economic policy of nations.

The expansion and diversification of economic activities and the growing role of governments to create and expand public services, social security, the expansion of government commitments in the economic and social spheres, and efforts to achieve economic growth and fair distribution of income depend significantly on indirect taxes and receive tax payments. Accordingly, tax policies can influence economic development signfifcantly.

The government gets most of its expenditure through tax revenue and resource allocation decisions according to the national priorties higly depend on the the amount of tax collected. Also, economic planning is conducted through evaluating the level of imaginable resources required for future investment based on revenues earned through tax. Tax may affect economic choices and ultimately economic growth via its impact on return of physical and human capital.

In most developed countries, the level of taxes has risen significantly over the course of the current century, (level of

taxes have been increased from about 5–10 per cent of GDP at the turn of the century to 20–30 per cent at present). Such a significant increase in taxes has raised questions concerning the impact of tax structure on economic growth (Lee and Gordon, 2005).

In this paper we shall try to describe how taxes revenue impact on GDP of the developed and developing countries separately?

2. Literature Review

In their paper entitled "The Impact of Taxes and Government Consumption Expenditure on Economic Growth of Selected MENA Islamic Countries," Asghari and Zonnouzi (2013) investigated the effect of taxes and Government Consumption Expenditure on economic growth of selected Islamic countries from MENA region during 1995-2011, using Panel Smooth Transition Regression (PSTR) model. The results indicate that taxes and government consumption expenditure have negative impact on economic growth. As threshold of GDP for government consumption expenditure and taxes increases, the positive effects of investment and export revenues on economic growth decrease.

In their paper, "An Investigation of the Relationship between Taxation and Economic Growth (The Case Study: Iran, OPEC and OECD Countries)," Faramarzi and et al (2015) investigated the relationship between the taxes and economic growth in Iran, OPEC and OECD. The results of this research for Iran during 1963-2011 indicated that there is no significant causal relationship between taxes and economic growth. The results also in 26 OECD member countries during 1998 to 2011 indicate a long-term causal relationship between taxes and economic growth and taxes has negatively affected the economic growth. However, these results from Pedroni and Kao tests also indicate negative causalrelationship between taxes and economic growth in OPEC selected countries during 1994-2011 which is the result of the oil-dependent economy.

In their paper, Poulson & Kaplan explored the impact of tax policy on economic growth in the states within the framework of an endogenous growth model. Regression analysis was used to estimate the impact of taxes on economic growth in the states from 1964 to 2004. The analysis revealed a significant negative impact of higher marginal tax rates on economic growth.

In his paper, Matthew Ocran (2009) examined the effect of fiscal policy variables including, government gross fixed capital formation, tax revenue and government consumption expenditure as well as budget deficit, on economic growth in South Africa during 1990 to 2004. Quarterly data was used in the estimation with the aid of vector regressive modeling technique. The outcome indicated that there is a positive relationship between government consumption expenditure and establishment of gross capital investment entities and economic growth; however, there is a negatve relathionship between government consumption expenditure and economic growth.

In their paper, Canicio & Zachary (2014), the effects of government tax revenue growth on economic growth were investigated for Zimbabwe during the period of 1980-2012. The study applied the Granger Causality test, Johansen's cointegration test and vector autoregressive model to serve the purpose. Findings of this study clearly revealed that there is an independence relationship between economic growth and total government tax revenue with 30% speed of adjustment in the short run towards equilibrium level in the long run. This implies that there is fiscal independence between tax revenue and growth. Investigating the short-run and long-run relationship between the tax revenue and economic growth in Zimbabwe reveled that taxes affect the allocation of resources and often distort the economic growth.

Gondor & Ozpence (2014) conducted an empirical study on fiscal policy in crises time in Romania and Turkey. Providing some empirical basis for the argument, they reveal that pro-cyclical fiscal policy does not assist in dampening the GDP shocks. Being focused on empirical, contextualized analysis, their study concentrates on the cyclical dynamics of macroeconomic aggregates and only offers conjectures as to the reasons behind the behavior of fiscal policy and its influence on the macroeconomic output.

Binti Saidin et al., (2016) studied the role and impact of tax in economic growth in 27 selected Asian countries for 5 year time period (2011-2015) using panel data. The relationship between the dependent variables (GDP per capita and FDI rate) and independent variables (individual income tax, corporate tax, and consumption tax) was investigated in order to identify the role of tax in economic growth. Descriptive analysis and regression analysis will be adopted to analyze the data. Their research verified the negative relationship between personal income taxes and economic growth while there is a significant relationship between personal income taxes and foreign direct investment rate. They also found out that there is a negative relationship between corporate taxation and the dependent variables of the research.Ojong et al, (2016) examined the impact of tax revenue on the Nigerian economy during the period 1986–2010.In their study, they examined the impact of company income tax and the effectiveness of non oil revenue on the Nigerian economy. Ordinary least square (OLS) of multiple regression models was used to establish the relationship between dependent and independent variables. The finding revealed that there is a significant relationship between petroleum profit tax and the growth of the Nigeria economy; however, there is no significant relationship between company income tax and the growth of the Nigeria economy .

In their paper, Ahmad et al., (2016) examined the relationship between total tax revenues and economic growth in Pakistan using annual time series data from 1974 to 2010. Auto Regressive Distributed Lag (ARDL) bounds testing approach for co-integration, was applied to estimate, the long run and short run relationship, among the variables. The results showed that total tax revenues have negative and significant effect, on economic growth, in long run. Due to one percent upsurge in total taxes, economic growth would be reduced by -1.25 percent.

Eugene and Chineze (2016) studied the impact of taxation policies on the overall economic growth of Nigeria during the period 1994-2013 using OLS method. The results of the study confirmed the positive impact of a tax on Nigeiran economic growth.

Babatunde et al., (2017) investigated the impact of taxation on the economic growth during the period 2004-2013 in 16 African states using Panel Data. The results revealed a significant and positive relationship between tax revenues and GDP and tax revenues accelerates the economic growth of African states. The results also cinfirmed a positive and significant relationship between foreign direct investment and economic growth while there is a negative and significant relationship between inflation and economic growth.

In their paper, Egbunike et al., (2018) examined the effect of tax revenue on economic growth of Nigeria and Ghana during the period 2000-2016 (for 17 years). Researchers used multiple regressions as tools of analysis. The results confirmed a positive impact of tax revenue on the gross domestic product (GDP) of Nigeria and Ghana.

3. Methodology

3.1.Research Hypotheses

The research hypotheses would be as follows:

1) Tax policies impact on economic growth of the developed countries efficiently.
2) Tax policies impact on economic growth of the developing countries efficiently.

3.2. Research Population

Research Population includes almost all Member States of the United Nations. Published on November

4, 2010 by the Human Development Report Office of the United Nations Development Programme (UNDP), The Human Development Report is is an annual milestone that displays the Human Development Index in different countries. The states of the list include 167 (out of 192) UN members together with Hong Kong and China. 24 Member States of the UN have been excluded in this research due to lack of sufficient information on the human development index.

Human Development Index is a relative estimation by which the health dimensions, life expectancy, the education dimension and, in general, the standard of living dimensions are assessed. The assessment is conducted based on the level of walfare among children and minors and the results can be used to evaluate the imoact of economic policy on standards of living, as well as the degree of development. The HDI was developed by Pakistani economist Mahbub ul Haq, and an Indian economist Amartya Kumar Sen, and was further used to measure the country's development by the United Nations Development Program (UNDP).

All Member States (169) being studied in this investigation are ranked into two groups including the developing and developed countries, and random selection method is applied to choose sample states from each group.

1) 42 states are chosen from the developed countries
2) 127 states are chosen from developing countries

Sample population include 29 states (15 developed countries and 14 developing countries) selected based on the access to their data on the World Bank data base. The current study covers the period from 2008 to 2016.

3.3. Model and Research Variables

The research model is designed as follows:

$$Y=AE^{\alpha 1} D^{\alpha 2} G^{\alpha 3} C^{\alpha 4} X^{\alpha 5} e^{ut} \qquad (1)$$

Where Y is GDP, A is coefficient, E is the ratio of tax revenues to GDP, D is the ratio domestic credits granted to the private sector, G is the ratio of government expenditure to GDP, C is the capital stock, X is the import and exports ratio to GDP, u_t is a error term. Expressed in logarithm form, the specification can be rewritten as:

$$LY_{it}=LA+\alpha_1 LE_{it}+ \alpha_2 LD_{it}+ \alpha_3 LG_{it}+ \alpha_4 LC_{it}+ \alpha_5 LX_{it}+u_t \qquad (2)$$

Where t is index of time-year and i stands as cross-country.

4. Results

4.1.Descriptive Statistics

Descriptive statistics are brief descriptive coefficients that summarize, classify and describe a given data set. In fact, this type of analysis describes the data and research information, and provides a general plan or pattern of data for faster and better use. Descriptive statistics provides information about central parameters and the distribution of research data. In general, descriptive statistics can be used to describe the characteristics of a category of information which in turn contributes to better understanding the results of a test. Furthermore, it can facilitate the comparison of the results of the test with other tests and observations. The descriptive statistics of the main variables of the model using Eviews software are as follows.

Table 1 shows descriptive statistics of study variables. Mean is the most commonly used measure of central tendency representing the balancing point of a data distribution and is a good indicator of the centrality of the data. Another descriptive parameter is the standard deviation, which indicates the dispersion of the data. Also, the minimum and maximum parameters in the table above show the range of data variations. The median is the middle point of data, of which half of the data is smaller and half larger than the data.

Standard deviation (SD) is the most commonly used measure of dispersion. It is the average squared distance to the mean measuring the spread of data about the mean. Skewness is a measure of the asymmetry or symmetry of the probability distribution of a real-valued random variable about its mean. If the distribution is symmetric, then the mean is equal to the median, and the distribution has zero skewness. For a unimodal distribution, negative skew commonly indicates that the tail is on the left side of the distribution, and positive skew indicates that the tail is on the right.

The kurtosis of any univariate normal distribution is 3.

Distributions with large kurtosis represent tail data exceeding the tails of the normal distribution while distributions with low kurtosis represent tail data that is generally less extreme than the tails of the normal distribution. Kurtosis represents the height of a distribution and it measures maximum values in either tail. For example, in the distribution t, where the dispersion of the data is greater than the normal distribution, the height of the curve is shorter than the normal curve.

The Jarque–Bera test is applied to testing the normality. The large value of Jarque–Bera indicates that the distribution is more distanced from normal distribution. A value of 0 Jarque–Bera indicates the data is normally distributed. The data does not come from a normal distribution, if Jarque–Bera value is lower than the 5% significance level. If the value is greater than 5%, the data are normally distributed.

Table 1. Descriptive statistics of study variables

Statistics	Country	LY	LE	LD	LG	LC	LX
Mean	Developed	27.17	2.79	0.09	-1.72	25.63	-0.16
	Developing	26.53	2.84	-0.35	-1.89	25.40	-0.27
Median	Developed	26.84	2.68	0.18	-1.68	25.49	-0.17
	Developing	26.50	3.18	-0.19	-1.47	25.58	0.18
Maximum	Developed	30.45	3.32	0.92	-1.32	28.85	1.48
	Developing	29.88	7.55	3.89	2.88	29.06	4.70
Minimum	Developed	23.86	2.07	-2.09	-2.41	21.76	-1.47
	Developing	22.76	-1.41	-4.63	-6.22	21.45	-4.31
Std.Dev.	Developed	1.62	0.33	0.63	0.22	1.68	0.79
	Developing	1.77	2.24	2.30	2.32	1.76	2.20
Skewness	Developed	0.00	-0.12	-2.16	-1.09	-0.19	0.37
	Developing	-0.35	-0.50	-0.40	-0.49	-0.27	-0.27
Kurtosis	Developed	2.82	1.71	7.97	4.64	2.74	2.27
	Developing	2.62	2.38	2.18	2.28	3.01	2.39
Jarque-Bera	Developed	0.16	9.6	244	42.19	1.27	6.10
	Developing	3.42	7.29	6.92	7.90	1.61	3.53
Probability	Developed	0.91	0.00	0.00	0.00	0.52	0.04
	Developing	0.18	0.02	0.03	0.01	0.44	0.17
Sum	Developed	366	377	12.35	-233	3460	-21
	Developing	3343	358	-44	-238	3201	-35
Observations	Developed	135	135	135	135	135	135
	Developing	126	126	126	126	126	126

Source: Author"s computation using E-views 8.0 (2016).

4.2. Unit Root Test (tets of stationarity)

Prior to the analysis of a time series, a unit-test must be performed to find out whether the series is stationary**.** Therefore, tets of stationarity or unit root test is performed for model variables. The results are analyzed using the Eviews software. Levin-Lin-Chu unit-root test is performed for the developing and the developed countries. The results for the panel unit root test are presented below.

4.3.Unit root test analysis

Since the probability value (p value) for the unit root tests for all countries is less than 0.05, it can be concluded that series is stationary the unit root hypothesis is rejected. So with a very low probability of spurious regression, that provides misleading statistical evidence of a linear relationship between independent non-stationary variables, it can be concluded that variables has no unit root, and the regression model for countries can be made.

Table 2. The result of panel unit root test

Variable	Country	Statistics	Prob	Result
LY	Developed	-6.76	0.00	stationary
	Developing	-8.76	0.00	stationary
LE	Developed	-3.10	0.00	stationary
	Developing	-6.84	0.00	stationary
LD	Developed	-33.52	0.00	stationary
	Developing	-6.48	0.00	stationary
LG	Developed	-4.57	0.00	stationary
	Developing	-4.42	0.00	stationary
LC	Developed	-6.12	0.00	stationary
	Developing	-4.42	0.00	stationary
LX	Developed	-15.75	0.00	stationary
	Developing	-4.69	0.00	stationary

Source: Author"s computation using E-views 8.0 (2016).

4.4. Estimation of Regression Model and Hypothesis Testing

Using Eviews software, regression analysis is used to test the hypothesis. To do so, first, regression coefficients in a regression model were estimated and the research model was tested based on interpretion of the estimations. The model is defined as follows:

4.5. Model

$$LY_{it}=LA+\alpha_1LE_{it}+\alpha_2LD_{it}+\alpha_3LG_{it}+\alpha_4LC_{it}+\alpha_5LX_{it}+u_t \quad (3)$$

Chow test or Limer's F-statistics is used to determine which one of the pooled or panel models are appropriate for estimating the regression models of research. In studies of time-series data, before estimating a model, test should be performed to select fixed effects pattern against random effects pattern.

4.6. Testing the Pooled or Panel Model

Various tests are used in order to determine the type of panel data model. The most general test is the F-Limer test for using the fixed effects model against the estimated model of pooled data.

Pooled data analysis is conducted when we have time series of cross sections with the same y-intercept, while Panel data refers to samples of the same cross-sectional units observed at multiple points in time with different y-intercepts. In the following, the F-limer test will be checked to choose between pooling and panel data.

Panel date models are divided into two sets of assumptions: the random effects model and the fixed effects model. In the fixed effects model, the individual-specific effect is a random variable that is allowed to be correlated with the explanatory variables. In the random effects model, the individual-specific effect is a random variable that is uncorrelated with the explanatory variables. Therfeore, test should be performed to select fixed effects pattern against random effects pattern before estimating a model .Chow test or Limer's F-statistics is performed to determine which one of the pooled or panel models are appropriate for estimating the regression models of research.

4.7. F Limer Test

F Limer Test is used to choose between methods of paneling and pooled data. In F Limer Test, H0 is sameness of cross from origins (pooled data method) that is situated in front of non-sameness of cross from origins (paneling data method). If according to the obtained result H0 is accepted, pooled data model is the preferred method and combined regression model (pooled) is statistically verified. Thus, research hypothese are tested using pooled method. However, if the H0 hypothesis is rejected, the panel data method is accepted and the research hypotheses are tested using the panel data method. The results of F Limer test analyzed by EViews software are as follows:

Table 3. The result of F Limer test

Country	T-statistic	Prob	Result
Developed	161.95	0.00	Panel model (with fixed or random effects).
Developing	237/82	0.00	Panel model (with fixed or random effects).

Source: Author"s computation using E-views 8.0 (2016).

If possibility of F-test is less than significance level of ≤0.05, null hypothesis for pooled data model (regression without fixed or random effects) is rejected. Therefor, the appropriate pattern to estimate the models is associated with either fixed or random effects and using pooled model can be rejected. As the results indicate, the panel model data is used for all the models.

4.8. Hausman Test

Now we turn to conducting the Hausman test to see whether a fixed-effects or random effects model is more appropriate for the data that we consider. When the individual-specific effect is a random variable that is uncorrelated with the explanatory variables, H0 is confirmed. H1 is confirmed when model fixed-effects model is appropriate and individual-specific effect is a fixed variable that is correlated with the explanatory variables. Using Hausman test, the panel data model should be testet to reject or confirm fixed-effects or random effects model. The Hausman test results are as follows:

Table 4. Hausman Test Results

Country	T-statistic	Prob	Result
Developed	161.95	0.00	The model does not have random effects (it has fixed effects).
Developing	237.82	0.00	The model does not have random effects (it has fixed effects).

Source: Author‟s computation using E-views 8.0 (2016).

As Table 4 shows, based on the calculated probability value for the Hausman test, the p-value is less than 0.05 and we find out that the random effects model must be rejected to estimate the model. Accordingly, the test results indicate that all models have cross-sectional fixed effects for all the countries included in the panel data.

4.9. Model Estimation

Estemiated model and coefficents for the developed countries are as follows:

Table 5. Regression model for the developed countries

Variable	Coeff	Std.Err	t-stat	Prob
LE	-0.062195	0.071721	-3.509566	0.0007
LD	-0.049772	0.027485	-1.810892	0.0732
LG	-0.425644	0.058488	-7.277509	0.0000
LC	-0.132006	0.018854	7.001587	0.0000
LX	0.012356	0.015789	-0.782580	0.4357
C	24.16489	2.072057	11.66227	0.0000
AR(1)	0.986085	0.028928	34.08743	0.0000
R-squared		0.999964		
Adjusted R-squared		0.999956		
Durbin-Watson stat		1.940467		
F-statistic		136136		
Prob(F-statistic)		0.0000		

Source: Author‟s computation using E-views 8.0 (2016).

4.10. Analysis of regression model for the developed countries

The F-statistic and p value for general model are 136136 and 0.0000, respectively, indicating the significant model (as p value of the statestics is less than 0.05). The commonly used goodness of fit is the coefficient of determination which is the square of the correlation (r) between predicted y scores and actual y scores; thus, it ranges from 0 to 1. If the the coefficient of determination is close to 1, model fits the data well, while the negative values will likely happen if R^2 is close to zero indicating that model does not fit the data well. In the above table, the coefficient of determination is 0.99, which indicates that the model fits the data well. Testing the residuals from least squares regressions, Durbin & Watson statistic values in the range of 1.5 to 2.5.

4.11. Hypothesis testing for the developed countries model

The first hypothesis of this study is as follows:

Tax policies impact on economic growth of the developed countries efficiently.

Given that the coefficient of LE variable in the model is significant (since p value is less than 5%), this hypothesis is confirmed. In other words, if the tax revenues increase by one percent, economic growth in the developed countries is reduced by as much as 6 percent.

However there is no significant relationship between LD variable and economic growth, there is a negative and significant relationship between government spending and economic growth. More precisely, an increase in government expenditure by 1% would decreas economic growth by 42%. The LC coefficient is also negative. This indicates that one percent increase in the capital stock results in decrease of economic growth by thirteen percent. Indeed, there is no significant relationship between LX (import and export) and economic growth. Hence, the estimated regression model for the developed countries is as follows:

LY= LA+ 24.16489 -0.062195 LE- 0.425644 LG – 0.132006 LC

Accordingly, estimating the alpha coefficients (LA) for the developed countries, a regression model for predicting GDP in sample countries would be possible. The alpha coefficients for the sample countries are presented in the table below:

Table 6. Alpha coefficient for the developed countries

Row	COUNTRY	Effect	Row	COUNTRY	Effect
1	Australia	1.37	8	Germany	1.48
2	United States	2.33	9	Ireland	-1.38
3	Japan	1.83	10	Singapore	0.96
4	Argentina	0.36	11	Korea, Rep.	1.57
5	Norway	-0.37	12	Luxembourg	-1.40
6	Austria	-0.88	13	Spain	0.06
7	Netherlands	0.00	14	Greece	-2.38
			15	Cyprus	-3.56

Source: Author"s computation using E-views 8.0 (2016).

4.12. Estimation of Model for Developing Countries

Based on the estemiated model and coefficents for developing countries are as follows:

Tabel 7: Regression model for developing countries

Variable	Coeff	Std.Err	t-stat	Prob
LE	-0.064069	0.037354	-1.715160	0.0897
LD	-0.118027	0.039297	-3.003460	0.0034
LG	-0.657112	0.039639	-16.57720	0.0000
LC	0.119555	0.023298	5.131659	0.0000
LX	-0.158067	0.028824	-5.483845	0.0000
C	22.99882	0.613588	37.48249	0.0000
AR(1)	0.942886	0.019815	47.58562	0.0000
R-squared		0.999890		
Adjusted R-squared		0.999868		
Durbin-Watson stat		2.019479		
F-statistic		44110		
Prob(F-statistic)		0.0000		

Source: Author"s computation using E-views 8.0 (2016).

4.13. Analysis of regression model for developing countries

The F-statistic and p value for general model are 44110 and 0.0000, respectively, indicating the significant model (as p value of the statestics is less than 0.05). The commonly used goodness of fit is the coefficient of determination which is the square of the correlation (r) between predicted y scores and actual y scores; thus, it ranges from 0 to 1. If the the coefficient of determination is close to 1, model fits the data well, while the negative values will likely happen if R^2 is close to zero indicating that model does not fit the data well. In the above table, the coefficient of determination is 0.99, which indicates that the model fits the data well. Testing the residuals from least squares regressions, Durbin & Watson statistic values in the range of 1.5 to 2.5.

4.14. Hypothesis testing for developing countries model

The second hypothesis of this study is as follows:
Tax policies impact on economic growth of developing countries efficiently.

Given that the coefficient of LE variable in the model is not significant (since p value is more than 5%), this hypothesis is rejected. In other words, there is a not a significant relathionship between the tax revenues and economic growth of developing countries. There is a significant relationship between the LD variable (the credits granted to the private sectors) and economic growth. That is, if LD increases by 1%, the economic growth in developing countries decreases by 11%.

There is a negative and significant relationship between government spending and economic growth. More precisely, an increase in government expenditure by 1% would decreas economic growth by 65%. The LC coefficient is also signifiant. This indicates that 1% increase in the capital stock results in decrease of economic growth by 11%. Actually, there is negative and significant relationship between LX (import and export) and economic growth. An increase in import and export of the developing countries gevornment by 1%, the ecponomic growth decreases by 15%
Hence, the estimated regression model for the developed countries is as follows:

LY=LA+22.99882- 0.1180 LD – 0.6571LG + 0.1195 LC – 0.158 LX

Consequently, estimating the alpha coefficients (LA) for developing countries, a regression model for predicting GDP in sample countries would be possible. The alpha coefficients for the sample countries are offered in the table below:

Table 8. Alpha coefficient for the developed countries

Row	COUNTRY	Effect	Row	COUNTRY	Effect

1	Turkey	-1.03	8	Peru	-0.61
2	Malaysia	-0.05	9	China	2.12
3	Brazil	1.35	10	Egypt, Arab Rep.	-0.90
4	Lebanon	-1.86	11	Indonesia	0.23
5	Thailand	0.38	12	Philippines	0.37
6	Mauritius	-3.01	13	India	1.43
7	Mexico	0.72	14	Iran	-0.43

Source: Author"s computation using E-views 8.0 (2016).

Model Fit Analysis

4.15. Linear Independence of Variables (Variance inflation factor-VIF)

The correlation coefficient table was used to study the existence or non-existence of linearity between independent variables. Since correlation coefficient can be used when two predictor variables in a multiple regression have a non-zero correlation, which is called collinearity, variance inflation factor (VIF) test was conducted to exam multicollinearity. The test results analyzed by Eviews software are as follows:

Table 9. Variance inflation factor (VIF) test

Variable	VIF- Developed Countries	VIF- Developing Countries
LE	1.29	94.95
LD	1.16	1.78
LG	3.8	83.58
LC	3.17	2.31
LX	1.94	68.32

Source: Author"s computation using E-views 8.0 (2016).

If the VIF exceeding 10, you can assume that the regression coefficients are poorly estimated due to multicollinearity. However, the VIF value less than 10 indicates low correlation among variables and it is considered acceptable. Variance inflation factor (VIF) test results revealed that nonlinear correlations among variables for the developed countries but multicollinearity exist among variables for the developing countries which don't fit well.

4.16. White's test for Heteroskedasticity

The following are results of White's test for Heteroskedasticity:

Table 10. Heteroskedasticity test

Country	Chi-Sq. statistic	Prob	Result
Developed	116.36	0.0000	There is no uniformity of variance.
Developing	46.3	0.0000	There is no uniformity of variance.

If the test statistics are greater than the critical value then we reject the null hypothesis of constant variance in favor of heteroscedasticity. The test showed that the value of the F statistic is significant (the p-value is smaller than 0.05). This means that there is evidence of heteroscedasticity in the model, so the null hypothesis is rejected. The following change has been administrated to correct the model with evidence of heteroscedasticity (this also has been done for the previously estimated model): Specifying a method for computing coefficient covariances, Cross-section weights (PCSE) option has been selected form the Eviews menue when the panel model is running. This will change the method of calculating the coefficient standard errors and thus the t-statistics and p-values are corected for Heteroskedasticity.

4.17. Normality of the Model Residuals

The histogram plot of the model residual for the developed countries is as follows:

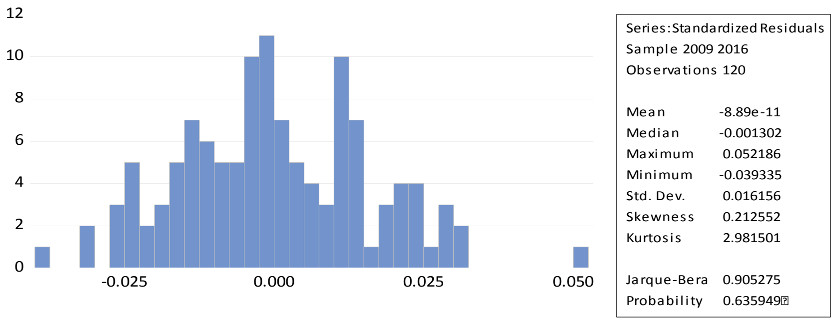

Figure 1. Histogram plot of the model residual for the developed countries

The almost bell-shaped plot of the histogram in the figure above and the Jarque–Bera statestics indicate that the model gives an adequate fit to the data and the typical assumption of normally distributed residuals is satisfied (as the Jarque–Bera statestics is more than 0.05). Accordingly, the model prediction for the developed countries is fitted to the data effectively and the results are reliable.

The histogram plot of the model residual for the developing countries is as follows:

Histogram plot of the model residual for developing countries is almost bell-shaped, as it is obvious in the figure above, and the Jarque–Bera statestics indicate that the model gives an satisfactory fit to the data and the typical assumption of normally distributed residuals is contented (as the Jarque–Bera statestics is not less than 0.05). Therefore, the model prediction for the developing countries is adequetly fitted to the data and the results are reliable.

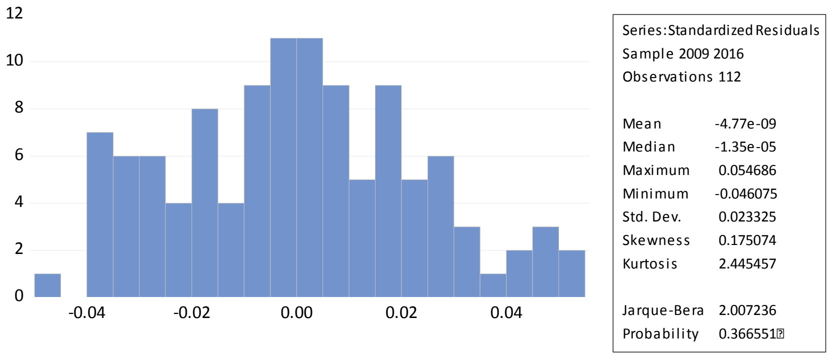

Figure 2. Histogram plot of the model residual for the developing countries

5. Discussion and Conclusions

This study examined the impact of tax revenues on GDP (economic growth) in the developed and developing countries. The dependent variable is GDP while tax revenue is independent variable for this study and all these variables are expressed in logarithm form. The control variables considered are: domestic credits granted to the private sectors, on going government expenditures, capital stock, and imports and exports.The results of analysis showed that there is a negative and significant relationship between the logarithm of the ratio of tax revenues and GDP in the developed countries; however, there is no significant relationship between tax revenues and economic growth in developing countries.The results also showed no significant relationship existed between the domestic credits granted to the private sectors and economic growth in the developed countries, while there is a significant and negative correlation between the domestic credits granted to the private sectors and economic growth in developing countries. The results indicate that there is a negative ans significant correlation between government expenditure and economic growth in both developing and the developed countries, although much stronger correlation exists in developing countries.The relationship between capital stock and economic growth in the developed countries is a significant and negative, while there is a positive and significant relationship in developing countries. Finally, the results revealed no significant relationship between total sum of import and export in the developed countris with economic growth, whereas this relationship in the developing countries is negative and significant.

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