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Research Paper

The Impact of Revenue Gap on Economic Growth: A Case Study of Bangladesh

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ABSTRACT

Purpose: The revenue of a country is the indispensable component with which an economy is managed and run. The purpose of the study was to inquire the relationship between revenue gap and economic growth of the economy of Bangladesh. This study investigated the impact of revenue gap on the economy of Bangladesh.

Methodology: In order to explore the impact of revenue gap on the economic growth of Bangladesh, the data was taken from national revenue board of Bangladesh and World bank covering the time period 1972-2010. Stationarity of the data was assessed by the unit root test or Dickey-Fuller (DF) test. Autoregressive distributed lag (ARDL) model was used to establish the relationship between revenue gap and economic growth. The Akaike's Information Criterion (AIC) and Bayesian Information Criteria (BIC) were used to identify the best ARDL model. The error correction model (ECM) was used to establish the co-integrating relationship between the variables

Findings: It is evident from the findings of this study that there is a significant relationship between revenue gap and the economic growth of the Bangladesh. The coefficient of revenue gap (RG) to gross domestic product (GDP) is found -2599198 and p value is 0.004 (<0.05) which indicates the revenue gap has significant negative effect on economic growth of Bangladesh. It is also exhibited that there is a significant positive relationship between foreign direct investment (FDI) and the growth of the economy of Bangladesh. The coefficient of FDI to GDP is 826945.3 and p value is 0.001 (<0.005) that indicates the FDI has a positive significant effect on the economic growth of Bangladesh.

Research limitations: This study focuses only on the impact of revenue gap on the economic growth of Bangladesh. It is found that revenue gap affects economic growth but economic growth is also affected by numerous factors. Moreover, the study has not identified the threshold level above which revenue gap will be harmful for the economic growth. So, this is one of the limitations of the study which paves the way of further research.

Originality/Value: This study investigates the impact of revenue gap on the economic growth of Bangladesh using autoregressive distributed lag (ARDL) model and error correction model (ECM). To the best of the researcher's knowledge, there has been no study conducted in this concern.

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Keywords: Revenue; Revenue Gap; Foreign Direct Investment; Economic Growth; Time Series; Autoregressive Distributed Lag Model; Error Correction Model.

1. Introduction

A region's Gross Domestic Product (GDP) is one of the ways to measure the size of its economy. The GDP of a country is the total market value of all final goods and services produced within a country in a given period of time. The revenue availability and its mobilization is the essential factor with which an economy is managed and run (Ilyas and Siddiqi 2010). The government revenue is the total money received from the taxation, fees, fines, intergovernmental grants or transfer, sales of securities, resource rights as well as mineral rights and any kind of national sales. The economic growth of a country is the average proliferation of income of that country. Economic growth is likely to not only upsurge the per capita income of a country but also supposed to rise the welfare and living standard of its citizens (Hsing 2004). The economic growth of a country is highly reliant on its revenue that is income generated from sales of goods or services or any other use of capital or assets before any costs are deducted.

Tax is a principal appliance of the government to fulfill expenditures and it helps in gaining persistent growth targets. The extent of tax gap that occurs as a consequence of tax avoidance, tax evasion, smuggling, corruption, and through the parallel hidden economy and so on (Ilyas and Siddiqi 2010). The type of taxes can help in predicting growth pattern of a country and the overall tax burden is substantial in explaining variations in economic growth (Marsden 1983). So in modern economic growth era, tax is an important source of revenue for any government but few citizens adopt diverse means of avoiding taxes and consequently revenue is missed from the pool of the national revenue. That is why there arise a gap between targeted revenue and collected revenue. An underground economy not only be labeled with illegality even if many of the activities are legal, taxes are skirted (Schneider and Frey 2001). If revenue gap that is the difference between the target revenue and the revenue which is collected is increase then economic growth will naturally be decreased. It is naturally assume that the targeted revenue is larger than the revenue which is collected for developing countries like Bangladesh. Revenue is also related to the household income. State and local tax systems are regressive, placing higher tax rates on low-income households than on high income households.

The long-run per-capita income growth rate can influence by technical progress but tax policy can affect long-run income levels, not long-run growth rates (Kim 1998). At the time of making national budgets, a country set plans revenue targets to be achieved. But far ahead when the financial records are closed, the actual collections of revenue through taxes or non-tax would customarily be unalike as compared to the initial estimates and targets set to be reached. This gap of revenue distorts the whole system and the economy, worrying all the major economic indicators. As Bangladesh is an emerging country in south Asia with lower middle income class, adjustment of this gap is crucial. No such research has been done so far to investigate the impact of revenue gap on the economic growth of Bangladesh. In this study, an effort with up to date methodology was given to assess the impact of revenue gap or missing revenue on the economy of Bangladesh. The findings of this study hope will help the policy makers of Bangladesh to take proper initiatives to reduce the revenue gap and attain the targeted budget.

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2. Literature review

Several studies have been accomplished to elucidate the relationship between revenue gap and economic growth. The most relevant and important studies with regard to the subject of revenue gap or missing revenue, taxes and tariffs have been studied in the literature review section. If revenue gap increase then economic growth will be decrease as revenue gap has been considered to have negative impact on economic growth. Few modern endogenous growth models revealed the theoretical possibility that government tax policy can influence long-run growth rates (Jones and Manuelli 1990, King and Rebelo 1990), Lucas Jr (1990), (Rebelo 1991, Yuen 1991). These endogenous growth models indicates that growth pace depends on the net rate of return from investment, which depends on tax rates. A number of under developing and developed countries are used to tax increase targeted at high income households (Thompson 2012). Some income remain untaxed for the subsistence of the underground economy as definite indirect taxes are evaded (Pyle 1989). The effect of consumption taxes, taxes on capital and on various factors of output for Taiwanese economy was examined by Wang and Yip (1992). The tax is also depends on the gross income of the citizens in a fiscal year but in under developing countries, income inequality of citizens is very high. Using panel data from 1973 to 2015, Munir and Sultan (2017) applied fixed effect model referred that fertility rate, government consumption expenditure, per capita GDP, agricultural rector, urban population and globalization were the key macroeconomic factors of income inequality in India and Pakistan. Deyshappriya (2017) did the same type of study using panel data from across 33 Asian countries from 1990 to 2013 and confirmed the relationship between GDP and income inequality is reversed in the referred Asian countries.

The impediments on taxing personal income in developing countries are several including measuring income, administrative capability, low literacy rate and poor accountancy, economic structure dominated by agriculture and unregistered enterprises making difficult to tax incomes directly (Burgess and Stern 1993). These difficulties are liable to produce more gap between targeted revenue and collected revenue and so affect economic growth of developing countries. Robinson, Yùnez-Naude et al. (1999) analyze and interpreted the effects of changes in tariffs, direct and indirect taxes on revenue, prices, wages and welfare using general equilibrium models. The interpretation estimated that the impact of transformation from direct tax to indirect tax is worthy for a developing country where tax-GDP ratio is 9.2 percent (2007-2008) in Bangladesh.

The international tax havens help depositors to give away taxes and get away with black money (Maingot and Mitchell 2002). This tax havens backing parallel black economies providing peaceful havens for the black money (Ilyas and Siddiqi 2010). Later Maingot and Mitchell (2002) promulgates that punitive measures against safe havens of black money like Switzerland, Guernsey-Gibraltar, Monaco may be put in place worldwide. The rules and regulations of banking concerning strict secrecy of the depositor's information, the working of safe havens like Switzerland etc., affect the economies of developing countries which were occupied mostly by the peoples of colour. The extent and impact of tax evasion utilizing the neoclassical pattern of theory of tax evasion and proved that the higher the rate of tax imposed the greater will be the tax evasion as the expected return to risk prone tax payers increased (Beckmann and Klaus 2003). Kemal (2010) assessed the underground economy and tax evasion of Pakistan for 29 years and showed that each year underground economy and evasion of tax is increased by 1.83 %

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as percent of the GDP. The extent of the underground economy and tax evasion is increase with the increase of investment and larger business activity and shrinkage when business is stumpy (Kemal 2010). A most relevant study of the theory of tax evasion was done by Sandmo (2005). He testified that the unreported income remain undiscovered when the angle of the tax payer is maximized. As Bangladesh is still developing country thus the tax system grimly necessities further structural reform for long term basis which would augment the ability of Bangladesh to raise adequate revenue.

Revenue gap encumbers economic growth and eventually per capita income will remain low particularly in developing countries like Bangladesh. The more the per capita income the more the higher level of economic growth which indicates a higher capacity to pay taxes as well as a greater proficiency to charge and accumulate tax revenue (Chelliah 1971). The underground economy and tax skirting affect the GDP of a country negatively and missing revenue creates severe complications to fulfill the budget deficit (Yasmin and Rauf 2004). The missing revenue or tax evasion can be assessed by the difference between what a taxpayer owes as per the statutory tax rates and what the tax administration actually collects in a financial year which is linked with the size of the underground or black economy. But sometimes the collected revenue is greater than the targeted revenue in Bangladesh but it is few. This study objective is to assess whether the revenue gap has effect on economic growth in Bangladesh or not. The secondary data was used in this study which is from national revenue board of Bangladesh and the World Bank covering the time period 1972-2010. The autoregressive distributed lag model (ARDL), the error correction model (ECM), Akaike's Information Criterion (AIC) and Baysian Information Criteria (BIC) were used to verify the objective. This study in addition to the above literature review which shed the light on the relationship between revenue gap and economic growth.

3. Data source and methodology

Data is a crucial element in any research. In this study, the secondary data was used which is from national revenue board of Bangladesh and the World Bank. The data is of time series type covering the time period 1972-2010. The revenue gap or missing revenue was used as an explanatory variable which is measured by the difference between targeted revenue and collected revenue. Per capita GDP was used as an explained variable which is taken a proxy for economic growth. Foreign Direct Investment (FDI) to real GDP ratio is taken as an explanatory variable in the model to avoid the problem of functional biasedness. Foreign direct investment (FDI) is a key driver of international economic integration that can provide financial stability, promote economic development and enhance the well-being of societies. To see the impact of revenue gap as a ratio of GDP on economic growth, the model is developed as:

$$PGPD_t = \alpha_0 + \alpha_1(\frac{RG}{GDP})_t + \alpha_2(\frac{FDI}{GDP})_t + \epsilon_t \quad (1)$$

where α_0 is intercept that is constant, $PGDPt = \frac{GDP}{Population}$ is per capita gross domestic product and taken as growth variable and it is also a foremost parameter of standard of living of a country RGt is revenue gap, $FDIt$ is foreign direct investment, α1 and α2 are coefficients of RG to GDP ratio and FDI to GDP ratio respectively and ϵ_t is usual error term and assumed to be independent from all the independent variables.

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To find an appropriate model so that the residuals are as small as possible and exhibit no pattern, autoregressive distributed lag model (ARDL) is used. The ARDL model is a regression equation is used to predict current values of dependent variable based on both the current values of explanatory variables and its lagged values. The starting point for an ARDL model is an assumed structure of the form (Gujarati 2009) as:

$$y_t = \delta + \theta_1 y_{t-1} + \cdots + \theta_p y_{t-p} + \delta_0 x_t + \delta_1 x_{t-1} + \cdots + \delta_q x_{t-q} + v_t \qquad (2)$$

The equation (2) is termed as ARDL (p,q) model. Here y_t is the value at time period t of the dependent variable y, δ is the intercept, δ_i's are the lag weights placed on the value i periods previously of the explanatory variable x and θ_i are the lag weights placed on the value i periods previously of the dependent variable y .

To examine the co-integration, the error correction model is used that is to examine the relationship between two non-stationary variables. The variables share a common trend and tend to move together in the long run. The error correction model is of the form

$$\Delta y_t = \delta_0 + \delta_1 x_t + \delta_2 u_{t-1} + s_t \qquad (3)$$

where Δ as usual denotes first difference, $u_{t-1}$is the estimated one period lagged value of the residuals from the regression, which is the empirical estimate of the equilibrium error term and s is the error term with the usual properties. The ARDL (1,1) model is as

$$y_t = \delta + \theta_1 y_{t-1} + \delta_0 x_t + \delta_1 x_{t-1} + v_t \qquad (4)$$

and performing some manipulation, the equation (4) becomes

$$\Delta y_t = -(1 - \theta_1)(y_{t-1} - \beta_1 - \beta_2 x_{t-1}) + \delta_0 \Delta x_t + \delta_1 x_{t-1} + v_t \qquad (5)$$

The levels of y and x are linearly related. Let $\alpha = (1 - \theta_1)$ and the parameters of the equation can be estimated by nonlinear least squares method.

The stationarity of the variable can be assessed by plotting the variable against time domain. If the plot reveals any upward and downward trend then there exist non stationarity, otherwise stationary. Stationarity of a series can also be assessed by the unit root test or Dickey-Fuller (DF) test. One other important method of making a non-stationary series to stationary is differencing.

4. Results and discussion

The time plot as well as the autocorrelation function (ACF) and partial autocorrelation function (PACF) of the possibly transformed data are considered. If the time plot displays the data are scatter horizontally around a constant mean or equivalently, the ACF and PACF drop to or near to zero quickly which indicates that the data are stationary. If the

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plot is not horizontal or the ACF and PACF do not drop to zero, non stationarity is implied.

Comparision of the stability in variance of PGDP and LPGDP from the time plots suggest that both the time plot of per capita gross domestic product and log of per capita gross domestic product have a upward trend that is the variables are not stationary (Figure-1). To make the data stationary, first difference of log of per capita gross domestic product was implied and plotted again (Figure 2 and 3). The plots are revealed that the first differencing has made the data approximately stationary.

Figure 1 – Comparison between the time plot of per capita gross domestic product (PGDP) and the time plot of log of per capita gross domestic product (LPGDP)

Figure 2 (a) - The ACF of first difference of the log of per capita gross domestic product

Figure 2 (b) - The PACF of first difference of log of per capita gross domestic product (FDLPGDP).

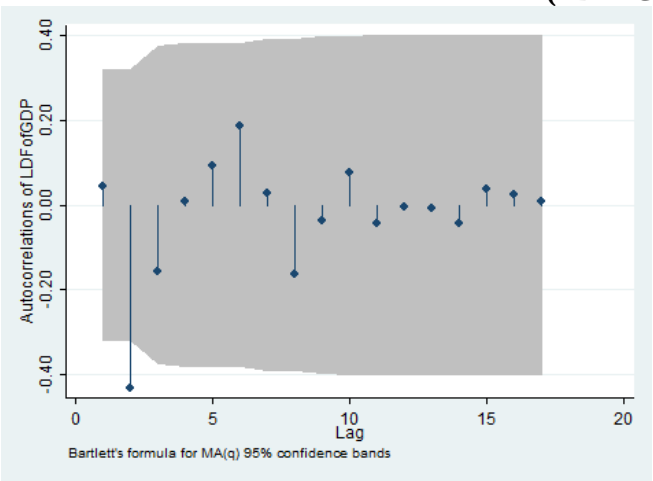

Figure 2 (a)

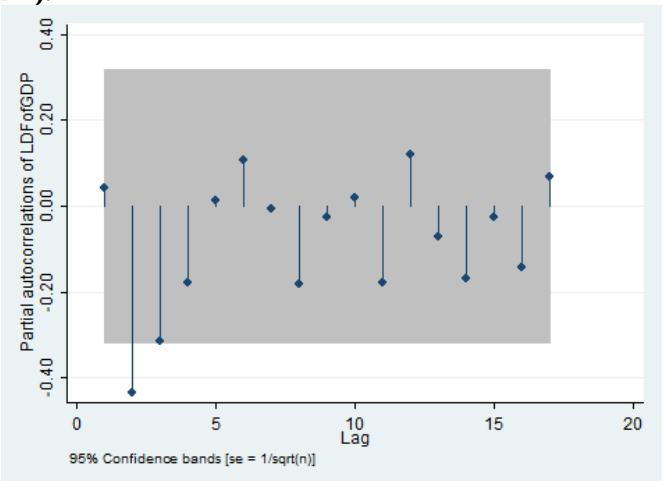

Figure 2 (b)

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Figure 3 (a) – The time plot of RG by GDP in taka.
Figure 3 (b) – The time plot of FDI by GDP in taka.

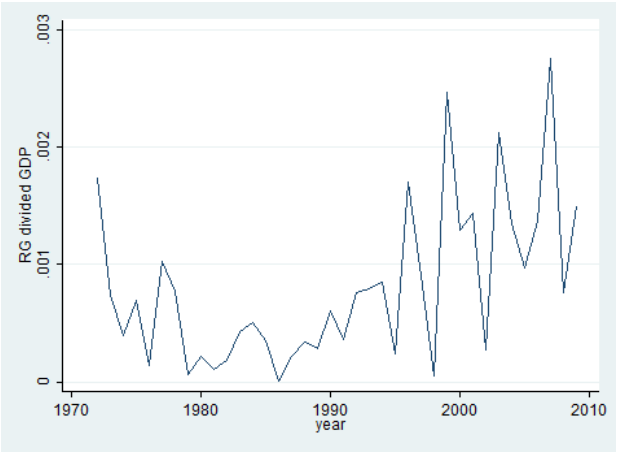

Figure 3 (a)

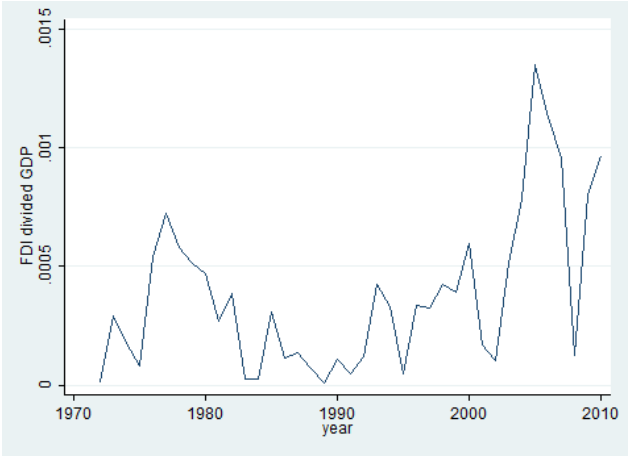

Figure 3 (b)

The unit root test also suggests about the stationarity or non-stationarity of data. Table-1 shows that Dickey-Fuller test statistic is-1.805 and the p-value is 0.3779. Also, Perron test statistic is -1.744 and the p-value is 0.4086 which suggest that the data are not stationary. So, it is necessary to take difference of log (PGDP) for making data stationary.

Table 1 – Unit root test at different level for log(PGDP)

Variables	**DF/ ADF test for log of PGDP**			
	Test statistic, Z(t)	**1% critical value**	**5%critical value**	**10%critical value**
Log(PGDP)	-1.805	-3.662	-2.964	-2.614
MacKinnon approximate p-value for Z(t) = 0.3779				
Variables	**PP test for log of PGDP**			
	Test statistic	**1% critical value**	**5% critical value**	**10% critical value**
Log(PGDP)	Z(rho) =-3.742	-18.084	-12.916	-10.460
	Z(t)= -1.744	-3.662	-2.964	-2.614
MacKinnon approximate p-value for Z(t) = 0.4086				

The first differencing of the log of per capita GDP ensures the stationarity of data as Dickey-Fuller test statistic is -5.767 and the p-value is 0.0000 and Perron test statistic is -6.297 and the p-value is 0.0000 (Table-2).

Table 2 – Unit root test at different level for ΔLPGDP

Variables	**DF/ ADF test for $\Delta LPGDP$**			
	Test statistic, Z(t)	**1%critical value**	**5%critical value**	**10% critical value**
*O*LPGDP	-5.767	-3.668	-2.966	-2.616
MacKinnon approximate p-value for Z(t) = 0.0000				
Variables	**PP test for *O*LPGDP**			
	Test statistic	**1% critical value**	**5% critical value**	**10% critical value**
*O*LPGDP	Z(rho) = -30.510	-18.016	-12.884	-10.440
	Z(t)= -6.297	-3.668	-2.966	-2.616
MacKinnon approximate p-value for Z(t) = 0.0000				

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Table-3 reveals that Dickey-Fuller test statistic is -4.865 and the p-value is 0.000. Table-4 indicates that the calculated Dickey-Fuller test statistic is and the p-value is 0.00343.

Table 3 – Unit root test at different level for RG/GDP

Variables	**DF/ ADF test for $\frac{RG}{GDP}$**			
	Test statistic, Z(t)	**1% critical value**	**5 % criticalvalue**	**10% critical value**
$\frac{RG}{GDP}$	-4.865	-3.668	-2.966	-2.616
MacKinnon approximate p-value for Z(t) = 0.0000				
Variables	**PP test for $\frac{RG}{GDP}$**			
	Test statistic	**1% critical value**	**5% critical value**	**10% critical value**
$\frac{RG}{GDP}$	Z(rho) = -34.916	-18.016	-12.884	-10.440
	Z(t)= -5.052	-3.668	-2.966	-2.616
MacKinnon approximate p-value for Z(t) = 0.0000				

Table 4 – Unit root test at different level for FDI/GDP

Variables	**DF/ ADF test for $\frac{FDI}{GDP}$**			
	Test statistic, Z(t)	**1% critical value**	**5 %critica value**	**10% critical value**
$\frac{FDI}{GDP}$	-2.126	-3.662	-2.964	-2.614
MacKinnon approximate p-value for Z(t) = 0.00343				
Variables	**PP test for $\frac{FDI}{GDP}$**			
	Test statistic	**1% critical value**	**5% critical value**	**10% critical value**
$\frac{FDI}{GDP}$	Z(rho) = -7.226	-18.084	-12.916	-10.460
	Z(t)= -2.057	-3.662	-2.964	-2.614
MacKinnon approximate p-value for Z(t) = 0.00343				

To select the best model among the plausible models the Akaike's Information Criterion (AIC) and Bayesian Information Criteria (BIC) is used.

AIC = −2logL + 2m, where L is the maximum likelihood and m is the number of terms estimated in the model.

The best model is recognized that has minimum AIC value which is useful in comparision with another model fitted to the same data set. The plot of ACF and PACF can give a primary guess about the parameter p and q for ARDL model. By using Granger causality test, the lag values can be found. Table-5 confirms that the AIC value for the model ARDL (3, 1, 0) is minimum. So this model is the best model.

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Table 5 – The AIC and BIC values of ARDL model for per capita GDP, RG/GDP and FDI/GDP

Model	AIC	BIC
ARDL(1,1,0)	712.98	719.53
ARDL(1,0,1)	693.45	699.9
ARDL(1,2,0)	694.98	701.42
ARDL(1,0,2)	675.27	681.61
ARDL(2,0,1)	694.59	700.92
ARDL(1,3,0)	673.94	680.27
ARDL(3,1,0)	**666.25**	**672.47**
ARDL(1,1,1)	713.73	720.28
ARDL(1,2,1)	695.83	702.28
ARDL(1,1,2)	693.52	699.96
ARDL(2,1,1)	719.37	725.81
ARDL(1,1,3)	672.67	679.01
ARDL(3,1,1)	701.97	708.31
ARDL(1,1,2)	693.52	699.96
ARDL(1,2,1)	695.84	702.28
ARDL(1,2,2)	692.68	699.12
ARDL(2,1,2)	716.68	723.12
ARDL(2,2,1)	719.34	725.78
ARDL(1,3,2)	673.25	679.22
ARDL(1,2,3)	672.88	679.22
ARDL(3,2,1)	704.98	711.32

5. Empirical Results

The study used annual time series data in empirical analysis covering the period 1972-2010. The annual variables are per capita GDP as a proxy for economic growth, revenue gap to GDP ratio and foreign direct investment (FDI) to GDP ratio. The first step of the time series analysis is to investigate the properties of the series individually by graphically, the DF/ADF and PP Unit Root tests. Variables including their log versions was found non-stationary initially and made them stationary using first differencing. The estimated long run coefficients when target variable is PGDP shown in Table-6.

Table 6 – Estimated long-run coefficient

The ARDL(3,1,0) model selected based on Schwarz Bayesian

Regressors	Coefficient	Standard Error	t-statistic	p> |*t*|	95% confidence interval
RG	-2599198	822569.7	-3.16	0.004	[-4276840 , -921556.3]
$\overline{GDP}$ *FDI*	826945.3	231677	3.57	0.001	[354437 , 1299454]
$\overline{GDP}$ Constant	3062.062	2300.247	1.33	0.193	[-1629.323 , 7753.447]

It is evident from the above table is that the revenue gap has significant negative effect on economic growth as coefficient of revenue gap (RG) to GDP is negative that is -2599198 and P-value is below 0.05 (0.004). Also FDI has significant positive effect on

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economic growth as coefficient of FDI to GDP is positive that is 826945.3 and P-value is below 0.05 (0.001).

6. Conclusion

This study is an effort to assess the impact of revenue gap or missing revenue in the economy of Bangladesh. To investigate the impact of revenue gap on economic growth in Bangladesh, the data was taken from national board of revenue (NBR), Bangladesh and from the World Bank covering the time period 1972-2010. While planning or making the budgets, nations set revenue targets to be achieved. But at the end of fiscal year, the actual collections of revenue through taxes or even the non-tax revenue collection would invariably be different as compared to the initial estimates and targets set to be achieved. This revenue gap distorts the whole system and the economy disturbing all the major macro-economic indicators.

This study therefore aims to analyze the reasons and to assess the extent of tax gap. The autoregressive distributed lag (ARDL) model was used to establish the relationship between revenue gap and economic growth and the error correction model (ECM) was used to establish co-integrating relationship between the variables. The coefficient of revenue gap (RG) to GDP is negative (-2599198) and P-value is below 0.05 (0.004) which indicates the revenue gap has significant negative effect on economic growth. But the coefficient of FDI to GDP is positive (826945.3) and P-value is below 0.05 (0.001) that indicates the FDI has a positive significant effect on economic growth. The econometric results suggest that if the gap between targeted revenue and actual collected revenue is high, it affects economic growth negatively and significantly.

This study focuses only on the impact of revenue gap on the economic growth of Bangladesh. It is found that revenue gap affects economic growth negatively but economic growth is also affected by several reasons such as unemployment, wage, GDP growth, urbanization, political risk, literacy rate, trade and so on. Additionally, the study has not identified the threshold level above which the revenue gap will be harmful for the national economy. So, this is the major limitation of the study which paves the way of further research.

However, the study suggests policy adjustments to reduce the strength of revenue gap. Revenue is a global problem and requires a global solution, which indicates a need for continuous effort to reduce the degree of revenue gap through the implementation of policies. The citizens of Bangladesh should be encouraged to pay tax so that revenue gap is minimize. The government of Bangladesh should take proper steps so that revenue gap can be minimized and also should take necessary initiatives to increase foreign direct investment. This study will help the policy makes of Bangladesh to undertake proper initiatives so that the revenue gap is reduced as less as possible.

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