Determinants of Tax Revenue of Bangladesh: A Time-Series Analysis of the Ongoing Collection Deficit

1. Introduction:

Tax revenue is the government's income collected by exerting taxes on income, profits, goods and services, and other specific items for financing public expenditures (Waterman, 2002). Tax revenue earned by the government has a relationship with savings and economic growth (Gemmell, 1988). Efficient taxation is a source of huge revenue for the government (Kotsogiannis, 2010). Increasing government expenditures decline tax revenue, which restricts governments from providing public facilities (Cagé & Gadenne, 2018). Admittedly, there are many sources for the government to earn tax revenue, among which trade openness, manufacturing, and gross domestic product have a positive relation to taxation, whereas inflation has insignificant effects on taxation (Saptono & Mahmud, 2021). The industrial sector, GDP (Gross Domestic Product), and public investment in education positively affect tax revenue, but the agricultural sector and foreign direct investment hurt tax revenue (Castro & Camarillo, 2014).

Infant mortality can be reduced by increasing public revenue, but in developed countries, the infant mortality rate is low, meaning that the government has a low chance to earn money from paying taxes on the death of a newborn child (Hall et al., 2021). Average life expectancy has a negative correlation with tax revenue because retired people don't pay taxes to the government, but the government provides non-wage benefits including welfare facilities to the aging population (Long & Scott, 1982). Manufacturing, trade openness, and gross domestic product have positive effects on tax revenue, whereas inflation negatively affects tax revenue (Kitessa & Jewaria, 2018). Inflation often leads to changes in the taxation system, but governments rely on other factors for revenue at a particular inflation rate (Tanzi, 1978). Though in many studies, foreign aid and grants showed a negative relation with tax revenue, a significant and positive relationship exists between foreign aid and tax income (Clist & Morrissey, 2011). In developing countries, manufacturing, trade openness, and gross domestic product positively influence tax revenue, but agriculture and urbanization are not considered under taxation (Mahdavi, 2008).

Considering the recent tax-revenue collection deficit in Bangladesh, the study aims to detect the determinants of tax revenue which has a significant role in financing government expenditures. The study is somehow distinct from other studies. Admittedly, fewer studies investigated the determinants of tax revenue, paying attention to the uninterrupted tax revenue collection deficit. Therefore, it is expected that the outcomes of the study may be helpful for government bodies and policymakers to capture the desired tax revenue in the next coming days.

Table 1: Tax Revenue Data

Time Period	Tax-GDP ratio	Tax-revenue collection (In trillion taka)	Original tax collection target (In trillion taka)
2005	7%	0.084	0.35
2006	7.00%	0.34	0.37
2007	6.90%	0.38	0.45
2008	7.70%	0.48	0.69
2009	7.50%	0.53	0.61
2010	7.80%	0.62	0.75
2011	8.70%	0.8	0.92
2012	9%	0.95	0.95
2013	9.00%	1.07	1.67
2014	8.60%	1.16	1.82
2015	8.50%	1.29	1.49
2016	7.30%	1.52	2.03
2017	7%	1.78	2.48
2018	7.70%	2.09	2.96
2019	7.60%	2.3	3.25
2020	7%	2.22	3.29
2021	7.65%	2.7	3.3
2022	7.30%	3.25	3.7
2023	7.20%	3.25	4.78
2024	7.40%	3.83	4.63
2025	7.40%	3.89	5.67

******Source of data: Ministry of Finance**

Figure 1

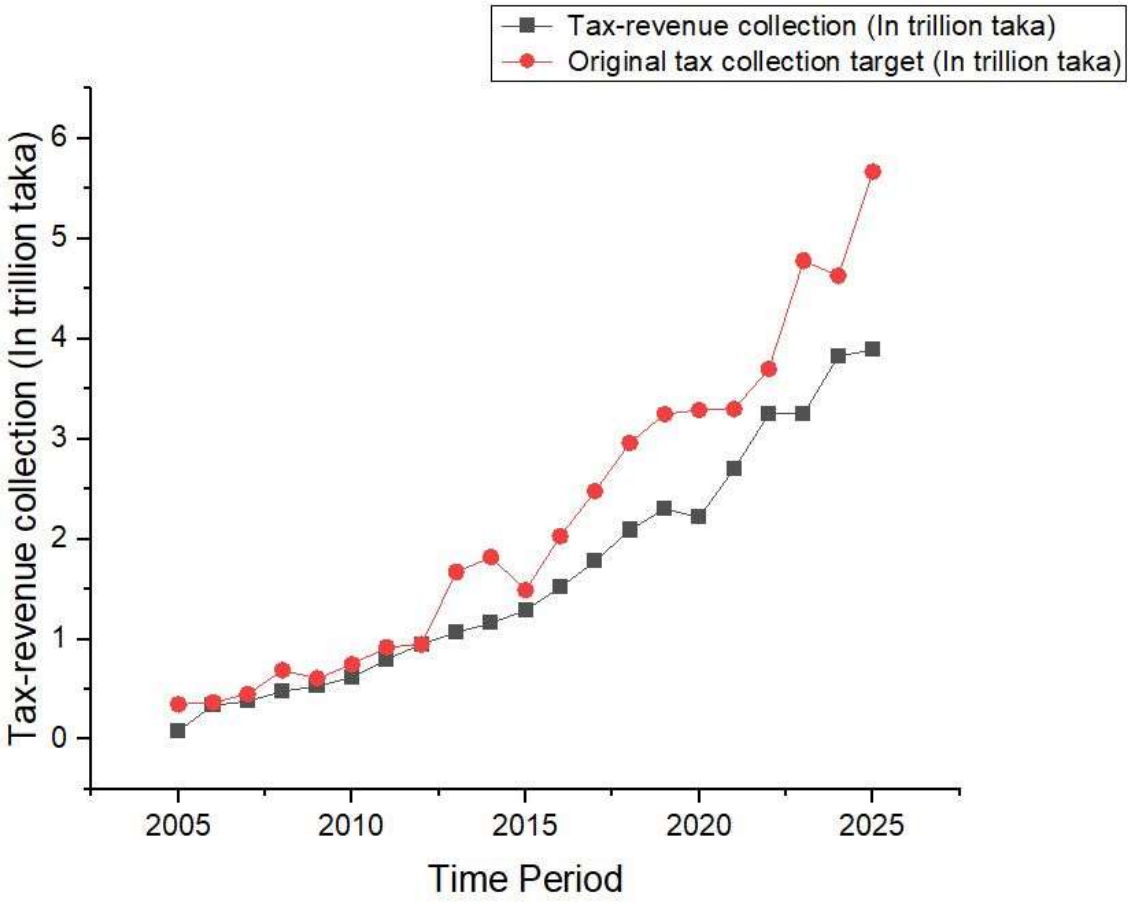


Figure 1, which is plotted by following the data of **Table 1**, illustrates a trend of tax revenue deficit in the outgoing fiscal years. It is observed that there is a huge discrepancy between the original tax revenue collection target and the tax revenue that was collected by the government. In the year 2024 to 2025, tax revenue collection stood at 3.83 trillion, but the targeted amount was 4.63 to 5.67 trillion taka. Therefore, there was a shortage of 1.04 trillion, which is equivalent to 500 billion.

2. Literature Review

2.1 Theoretical Foundation of Tax Revenue

There are many theories of taxation. Among all the theories, the benefit theory, normative public sector theory, and the ability-to-pay theory are very much common. The benefit theory, which is used for evaluating the efficiency of taxation and fiscal policy, was established by Knut Wicksell in 1896. According to this theory, citizens, who enjoy public goods and services, pay taxes to the government (Hines Jr, 2000). For availing of public benefits, people must be paying taxes that can finance government expenditures and ensure sustainability between public and private services (Fullerton, 1982). However, in many parts of the world, resources are wasted just by inefficient and improper taxation systems (Gamponia & Mendelsohn, 1985). Normative theory or public expenditure theory indicates public concern over the taxation system (Tresch, 2022). A particular amount of tax is set up following the public expenditure and by analyzing this public expenditure, the tax collection process is determined, which in turn achieves our microeconomics

goals (Samuelson, 1958). The oldest and most dominant one is the the-ability-to-pay theory which considers taxation as a medium of sacrifice. Sacrifice comes from the money of taxation which has positive effects on the economy and social development (Kendrick,1939). This theory clearly defines that paying taxes to the government is contingent upon the amount of income (Kimmel, 1961). The higher income the individuals have, the higher amount of tax they pay to the government. In contrast, individuals, who don't have enough income pay a lower amount of tax (Rayman, 2013).

2.2 Objectives of Taxation

There are many objectives of taxation. The primary objective is to contribute to economic development, as money earned by the government from taxation is spent for not only accomplishing basic activities but also many mega projects (Ofoegbu et al., 2016). Taxation leads to employment opportunities because the government uses tax revenues to hire new employees and creates new jobs for unemployed people (Palokangas, 1987). Keeping the market price of general commodities stable is one of the objectives of taxation because the government pays higher taxes on some specific products for reducing public consumption and control market prices (Benigno & Benigno, 2003). Taxation has an immense role in confirming equality in our society. Admittedly, the government imposes an unlimited tax on people who have high incomes and less on people who belong to lower socioeconomic backgrounds. Exactly in the same way large businesses and corporate organizations provide taxes in huge volumes to the government for helping infant organizations (Larsen & Oats, 2019).

2.3 Summary of Previous Studies

Lower-income countries face difficulty in getting a substantial amount of tax revenue because of serious trade deficits (Morrissey et al., 2016). There is a debate over whether tax revenue increases or not, when foreign aid comes, but tax revenue often declines following a surge in foreign aid (Thornton, 2014). The Ageing population in lower-income countries creates difficulty in getting a substantial amount of tax revenue because when people become older, they stop paying taxes to the government (Ball & Creedy, 2014). Aging people increase social expenditures while mitigating potential sources of tax revenue (Carone et al., 2007). In recent times, Foreign Direct Investment (FDI) has been linked to tax avoidance plans and it distorts tax revenues in countries that are going through industrialization (Hong & Smart, 2010). Gross Domestic Product (GDP) has a positive relation with tax revenue in the long run as per the Keynesian description (Idris & Ahmad, 2017). Institutional quality, government expenditure, and tax revenue coming from international trade, customs, and duties lead to economic growth in the long run and short run (Arvin et al., 2021).

Foreign Direct Investment (FDI) has not always had a negative relation with tax revenue because in developing countries FDI causes a significant increase in tax revenue (Camara, 2022). Whether income inequality increases or decreases due to the impact of inflation is a moot point since no study identified the actual effects of inflation on tax revenue (Süssmuth & Wieschemeyer, 2022). Most countries don't impose a tax on their agricultural goods. Till now as compared to the agricultural sector, it is much easier to collect tax from the manufacturing sector (Gupta, 2007). Countries vary in their infant mortality rates and developed countries have much lower infant mortality rates than developing countries. That is the reason why tax revenue has a negative correlation with the infant mortality rate in developed countries (Svejnar, 2002). In developed countries, the literacy rate is high and educated people pay a significant amount of tax to the government (Castro & Camarillo, 2014).

3. Methodology

3.1 Research Model

Using a linear regression model for time series data, a study was conducted, where the relationship between higher study and economic development was shown with excellent statistical analysis (Hamdan et al., 2020). The Time series regression model was used to show the determinants of tax revenue (Ayenew, 2016). Focusing on their models along with other studies, we prepared the following linear regression models.

$$\mathrm{TR_t} = \beta_0 + \beta_1\mathrm{GDP_t} + \beta_2\mathrm{Trade_t} + \beta_3\mathrm{FDI_t} + \beta_4\mathrm{INF_t} + \beta_5\mathrm{INFMOR_t} + \beta_6\mathrm{LEP_t} + \beta_7\mathrm{FD_t} + \beta_8\mathrm{FG_t} + \beta_9\mathrm{AGR_t} + \beta_{10}\mathrm{MFR_t} + \beta_{11}\mathrm{PIE_t} + \varepsilon_t \ldots\ldots (1)$$

β_0 is an intercept (It can be positive or negative and there is no proper explanation regarding intercept in econometrics).

ε is an error term.

t is the non-fiscal year (21 observations from 2005 to 2025).

TR (Tax Revenue) is the main source of government income. Total tax revenue as a percentage of GDP clarifies the amount of a country's output collected by the government for reducing debt, and deficit and accomplishing infrastructural developments (Gordon, 1985). TR is the dependent variable in our model 1.

GDP (Gross Domestic Product) is the value of all the final goods and services produced in an economy within a particular time. GDP, which is an independent variable in model 1, influences tax revenue (Cristi Spulbar et al., 2021).

Trade is the sum of total export and import as a percentage of GDP. Government levies a huge amount of tax on some particular goods to restrict imports. Besides, the government also earns money from paying taxes on exported goods and services, as lower public revenue can be eradicated by trade and an efficient tax structure (Gnangnon, 2021). Trade is an independent variable in model 1.

FDI (Foreign Direct Investment) indicates the business and ownership of foreign people in another country. FDI, which is an independent variable in model 1, plays an important role in creating employment opportunities, economic growth, and sustainability, but in developing countries, the impact of FDI on tax revenue is not clear because a higher amount of tax discourages foreigners to set up business in other countries (Shafiq et al., 2021).

INF (Inflation) is an increase in the prices of general commodities. Due to high inflation, people can’t pay taxes properly. Inflation is an independent variable in model 1. By keeping inflation at a fixed rate, the government can promote the collection of tax revenue (Lucotte, 2012).

INFMOR (Infant Mortality Rate) is calculated by the deaths per 1,000 live births of infants. Exerting tax on the death of a child or even a person is a matter of altercation and argument (Roeleveld, 2012). INFMOR is an independent variable in model 1.

LEP (Average Life Expectancy) has both adverse and positive effects on tax revenue. In general, a huge amount of budget is required for retired persons who are not paying taxes (Moeis et al., 2022). LEP is an independent variable in model 1.

FD (Foreign Debt), which is called external public debt, is measured as a percentage of GDP. When the government faces currency depreciation resulting from huge foreign debt, a larger amount of tax is imposed on consumers (Jin et al., 2021). FD is an independent variable in model 1.

FG (Foreign Grants) indicates capital, technological equipment, goods, and services that are provided by a country for the benefit of another country. FG is an independent variable in model 1. Foreign grants have a significant negative relation with tax revenue (Diaz-Sanchez et al., 2022).

AGR is the proportion of value added in agriculture. It is a difficult task to pay taxes on agricultural goods (Stotsky, 1997). AGR is an independent variable in model 1.

MFR is the proportion of value added in manufacture. MFR is a source of earning a larger amount of money for the government by exerting taxes (Yamazaki, 2022). MFR is an independent variable in model 1.

PIE is the public investment in education as a percentage of GDP. Public investment in education, which is an independent variable in model 1, can improve the tax collection process (Martínez et al., 2022).

3.2 Method of the Study and Data Sources

We Collected the recent fiscal year data from the Ministry of Finance to show the overall condition of tax revenue collection which is represented in **Table 1**. It is important to mention that for showing the statistical relationship among variables, we collected data from 2005 to 2025. Therefore, the sample size (N) was 21. The reason behind the collection of non-financial year data from 2005 to 2025 was their availability on the website of the Bangladesh bank and world bank. Data before 2005 and after 2025 were not available in any other sources. However, after collecting data from 2005 to 2025, we used Augmented Dicky-Fuller Test, Johansen's Cointegration Test, and multiple linear regression to identify the determinants of tax revenue in Bangladesh We removed some particular variables from the study to ensure a rigorous and authentic statistical analysis. Most of the data came from the website of the world bank. Without data manipulation and working in favor of any political party, we highlighted the actual and authoritative result. Data sources and information about the variables of **Model 1** are discussed briefly in **Table 2**.

Table 2: Definitions of the Variables

Variable	Definition	Source
TR	The percentage of total tax revenue to GDP (%)	The World Bank
GDP	The total market value of all the final goods and services	The World Bank
Trade	Sum of exports and imports as a percentage of GDP (%)	The World Bank
FDI	Direct investment by foreigners	The World Bank
INF	Inflation rate (%)	The World Bank
INFMOR	The number of deaths per 1000 live births	The World Bank
LEP	The average life expectancy of people	The World Bank
FD	Foreign Debt	The World Bank
FG	Foreign Grants	The World Bank
AGR	Value added in agriculture as a	The World Bank

	percentage of GDP (%)	
MFR	value added in manufacturing as a percentage of GDP (%)	The World Bank
PIE	Public investment in education as a percentage of GDP	The World Bank

Table 2 illustrates the definitions and potential sources of all the variables of **Model 1**. Data of all the mentioned items were collected from 2005 to 2025. Moreover, GDP, FDI, FD, and FG were evaluated in USD billion.

Table 3: Descriptive Statistics

Variables	N	Minimum	Maximum	Mean	STD
TR	17	0.06%	0.09%	0.08%	0.00883
GDP	17	$69.44 billion	$416.26 billion	$182.2624 billion	101.5389
Trade	17	0.26%	0.48%	0.38%	0.06962
FDI	17	$0.46 billion	$2.83 billion	$1.6318 billion	0.72346
INF	17	0.04%	0.28%	0.07%	0.0541
INFMOR	17	23	65	43.3335	12.01238
LEP	17	67 years	73 years	70.2941 years	1.57181
FD	17	$18.41 billion	$48 billion	$26.5624 billion	9.10333
FG	17	$1.03 billion	$6.79 billion	$2.6406 billion	1.62222
AGR	17	0.12%	0.19%	0.15%	0.02373
MFR	17	0.15%	0.22%	0.18%	0.02592
PIE	17	0.09%	0.21%	0.14%	0.03032

Table 3 indicates the minimum, maximum, mean, and standard deviation of all the variables mentioned in **Model 1**. Concerning mean value, GDP is 182.26 billion dollars, Trade is 37.71 percent of GDP, and TR is 7.7 percent of GDP. In addition, the mean FDI is 1.63 billion dollars, whereas FG is 2.64 billion dollars. The average PIE is 14 percent of GDP, but FD is too high around 26.56 billion dollars. The average INF is 7 percent. Furthermore, almost 15.41 and 17.78 percent value of GDP is added to AGR and MFR respectively. It is observable that the LEP of Bangladeshi people is almost 70 years, whereas INFMOR is approximately 43 per 1000 people.

4.1 Augmented Dicky-Fuller Test for Stationary

Checking stationary is very much important for time series data. Macroeconomic data often have a unit root, which in turn leads to spurious regression. Therefore, reducing unit root or non-stationary characteristics of data is a precondition of further analysis (Granger & Newbold, 1974). The augmented Dicky-fuller test is the updated version of the simple Dicky-fuller test and is used by most scholars and econometricians (Mushtaq, 2011)**.** It considers extra lag to avoid autocorrelation. The three significant levels (1%, 5%, and 10%), t-statistics, and the three common ways (level, first difference, and second difference) exist in this test. When the calculated t value exceeds the critical value at any level following one of the three ways, the unit root takes place. In contrast, when the calculated t value is much smaller than the critical value at all the levels following one of those three ways, data become stationary, endorsing no sign of unit root (Dickey & Fuller, 1979). P value is also considered to evaluate the stationary and non-stationary nature of data. Akaike info criterion was adopted during the test. Following the augmented Dicky-fuller test, the study examined the stationary nature of all the variables of **Model 1**. The stationary results of **Model 1** are delineated in **Table 4.**

Table 4: Stationary

Variables	t-statistics	Level of Significance	Critical value	P value	Remark
TR	-4.79	1% 5% 10%	-4.72 -3.79 -3.32	0.042	Stationary at second difference
GDP	-4.11	1% 5% 10%	-3.99 -3.09 -2.69	0.041	Stationary at second difference
Trade	-5.04	1% 5% 10%	-4.05 -3.11 -2.71	0.001	Stationary at second difference
FDI	-3.95	1% 5% 10%	-5.12 -3.42 -3.12	0.051	Non-stationary
INF	-3.21	1% 5% 10%	-5.12 -3.93 -3.43	0.112	Non-stationary
INFMOR	-4.54	1% 5% 10%	-4.15 -3.09 -2.69	0.002	Stationary at second difference
LEP	-13.83	1% 5% 10%	-4.21 -3.17 -2.78	0.000	Stationary at second difference
FD	-6.76	1% 5% 10%	-4.11 -3.21 -2.75	0.001	Stationary at second difference
FG	-8.57	1% 5% 10%	-4.01 -3.09 -2.69	0.000	Stationary at second difference
AGR	-5.72	1% 5% 10%	-4.05 -3.11 -2.72	0.007	Stationary at second difference
MFR	-4.44	1% 5% 10%	-4.04 -3.12 -2.69	0.005	Stationary at second difference
PIE	-3.32	1% 5% 10%	-4.29 -3.25 -2.76	0.031	Non-stationary

Table 4 illustrates the stationary and non-stationary characteristics of the dependent (TR) and independent variables. It is observed that PIE (t value = -3.32 > critical value at 1% level; p = 0.031), FDI (t value = -3.95 > critical value at 1% level; p = 0.031), and INF (t value = -3.21 > critical values at all the significant levels; p = 0.031) are non-stationary, whereas TR (t value = -4.79 < critical values at all the significant levels; p = 0.042), GDP (t value = -4.11 < critical values at all the significant levels; p = 0.041), Trade (t value = -5.04 < critical values at all the significant levels; p = 0.001), INFMOR (t value = -4.54 < critical values at all the significant levels; p = 0.002), FD (t value = -6.76 < critical values at all the significant levels; p = 0.001), FG (t value = -8.57 < critical values at all the significant levels; p = 0.000), AGR (t value = -5.72 < critical values at all the significant levels; p = 0.007), MFR (t value = -4.44 < critical values at all the significant levels; p = 0.005) are stationary. Since PIE, FDI, and INF experienced the nature of non-stationary, they were removed from the study.

4.2 Johansen's Cointegration Test

Since the unit root test cannot avoid spurious regression, it is essential to conduct a cointegration test (Elliott, 1998). Johansen's cointegration test is mainly based on trace statistics and max-Eigen statistics. If the value of trace and max-Eigen statistics surpasses the critical value along with a statistically significant p-value, then cointegration or long-run association ship occurs, whereas if the value of trace and max-Eigen statistics is inferior to the critical value along with a statistically insignificant p-value, then non-cointegration exists between dependent and independent variables (Johansen, 1988)**.** Using Johansen's cointegration test, we showed the long-run association of each independent variable separately with the dependent one for performing the most authentic and accurate result. The results of trace and max-Eigen statistics of **Model 1** are obtained in **Table 5.**

Table 5: Trace and Max-Eigen Statistics of Model 1

Variables	Eigenvalue	Trace Statistic	Critical value	Prob.	Remark
TR and GDP	0.648	19.99	15.49	0.009	Cointegration
TR and Trade	0.901	27.73	15.49	0.005	Cointegration
TR and INFMOR	0.481	10.03	15.49	0.278	Non-cointegration
TR and LEP	0.281	4.97	15.49	0.812	Non-cointegration
TR and FD	0.881	25.35	15.49	0.002	Cointegration
TR and FG	0.991	54.85	15.49	0.000	Cointegration
TR and AGR	0.879	23.99	15.49	0.002	Cointegration
TR and MFR	0.999	77.41	15.49	0.000	Cointegration
Variables	Eigenvalue	Max-Eigen statistic	Critical value	Prob.	Remark
TR and GDP	0.648	15.67	14.26	0.029	Cointegration
TR and Trade	0.901	26.12	14.26	0.004	Cointegration
TR and INFMOR	0.481	9.88	14.26	0.219	Non-cointegration
TR and LEP	0.281	4.95	14.26	0.741	Non-cointegration
TR and FD	0.881	23.36	14.26	0.004	Cointegration
TR and FG	0.991	51.14	14.26	0.000	Cointegration
TR and AGR	0.879	23.26	14.26	0.001	Cointegration
TR and MFR	0.999	77.4	14.26	0.000	Cointegration

Table 5 depicts the cointegration between TR (Tax Revenue) and all the explanatory variables individually. According to trace statistics, INFMOR (trace value = 10.03 < critical value; p = 0.278) and LEP (trace value = 4.97 < critical value; p = 0.812) show no cointegration with TR, whereas GDP (trace value = 19.99 >

critical value; p = 0.009), Trade (trace value = 27.73 > critical value; p = 0.005), FD (trace value = 25.35 > critical value; p = 0.002), FG (trace value = 54.85 > critical value; p = 0.000), AGR (trace value = 23.99 > critical value; p = 0.002) and MFR (trace value = 77.41 > critical value; p = 0.000) hold a cointegration with TR.

About the results of max-eigen statistics, INFMOR (max-eigen value = 9.88 < critical value; p = 0.219) and LEP (max-eigen value = 4.95 < critical value; p = 0.741) establish a sign of non-cointegration. In contrast, GDP (max-eigen value = 15.67 > critical value; p = 0.029), Trade (max-eigen value = 26.12 > critical value; p =0.004), FD (max-eigen value = 23.36 > critical value; p = 0.004), FG (max-eigen value = 51.14 > critical value; p = 0.000), AGR (max-eigen value = 23.26 > critical value; p = 0.001), and MFR (max-eigen value = 77.4 > critical value; p = 0.000) achieve an association with TR.

Overall, based on both trace and max-eigen statistics, INFMOR and LEP were removed from the study for avoiding spurious regression results while GDP, Trade, FD, FG, AGR, and MFR were left for the next analysis.

Table 6 Multicollinearity

Variables	Coefficient Variance	VIF
C	125.58	NA
AGR	1479.15	45.11
Trade	14.672	3.701
FG	0.169	24.785
FD	0.005	23.984
MFR	18.142	6.982
GDP	10.51	4.788

Table 6 depicts the value of the variance inflation factor of all the variables except GDP, MFR, and Trade is too high, meaning that they have severe multicollinearity.

For reducing multicollinearity problems in the regression analysis of **Model 1**, we removed AGR, FG, and FD from the study. As a result, three variables (GDP, Trade, and MFR) were found to be statistically accurate for the dependent one (TR).

4.3 Regression Analysis of Model 1

Regression analysis, where TR is the response variable and GDP, trade, and MFR are explanatory variables, was proved to be fit and rigorous. The value of R-squared and Adjusted R-squared was 0.993 and 0.992 respectively. The p-value of the F-statistic was 0.000 < 0.05 along with less standard error. In addition, data were found to be homoskedasticity because the probability of Chi-Square in the line of observed R-squared following the type of Breusch-Pagan- Godfrey was 0.39, which is larger than 0.05. Moreover, there was no sign of serial correlation, as the probability of Chi-Square in the line of observed R-squared for the Breusch-Godfrey Serial Correlation LM Test was 0.36, which is also much higher than 0.05. Finally, there was no multicollinearity among explanatory variables. In **Table 7**, the multicollinearity issue is again checked and in **Table 8**, the coefficient results of **Model 1** are represented elaborately.

Table 7: Coefficient Results of Model 1

Variables	Coefficient (β)	Std. Error	t-Statistic	Prob.
C	-9.152867	1.563863	-5.85273	0.0000
GDP	0.084719	0.002266	37.39303	0.0000
Trade	20.81119	3.304337	6.298145	0.0000
MFR	0.067129	0.000126	43.48632	0.0004

***Dependent Variable: TR ***Method: Least Squares**

Table 7 elucidates coefficient results, where GDP, Trade, and MFR are independent variables and TR is the dependent variable. P values of GDP, trade, and MFR are statistically significant, indicating that TR is significantly affected by them. Therefore, GDP ($\beta = 0.084$; $t = 37.39$; $p < 0.05$), Trade ($\beta = 20.81$; $t = 6.29$; $p < 0.05$), and MFR ($\beta = 0.067$; $t = 43.48$; $p < 0.05$) significantly influence TR. The value of intercept (C) is -9.152, indicating that TR is -9.152 when GDP, Trade, and MFR are zero, but whether the value of intercept is positive or negative is not a matter because intercept has no ideal and intuitive explanation in econometrics (Ramsay, 1977). In addition, this model captured less standard error, ranging from 0.0001 to 3.304.

Regression analysis proved that in Bangladesh, Tax Revenue (TR) has a positive and significant relation with GDP, Trade, and MFR.

5. Discussion of Findings

The study indicated GDP, Trade, and MFR as significant and positive determinants of TR, since the P values of GDP, Trade, and MFR were statistically significant ($P<0.05$). Though AGR, FD, and FG had a significant association with TR, they were removed for addressing multicollinearity problems in regression analysis. The variables, which were removed from the study for robust statistical analysis, may have indirect or insignificant effects on TR.

Based on the prevalent results, the study attained sufficient evidence to ensure GDP, Trade, and MFR as significant and positive predictors of TR. Almost similar results were investigated in a study, where Trade and MFR showed a positive and significant relation with tax revenue (Minh Ha et al., 2022). Ayenew, 2016 highlighted a positive and significant correlation between tax revenue and manufacturing. Andrejovská & Puliková, 2018 focused on the economic determinants of tax revenue in twenty-eight European countries and identified that gross domestic product has the highest impact on tax revenue. Raihan & Anjum, 2020 explored fiscal policy in the context of Bangladesh and found that there is a long-run causality between GDP and tax revenue. Ángeles Castro & Ramírez Camarillo, 2014 investigated the determinants of tax revenue in thirty-four countries and finalized the results that gross domestic product and manufacturing sectors have a positive and significant impact on tax revenue. However, the findings of the study contradicted the results of Gurdal et al., 2021, which asserted that gross domestic product has no relation to tax revenue.

6. Limitations and Further Scope for Research

The study experienced some limitations. Firstly, it focused only on Bangladesh. Therefore, it is suggested for further research is to explore the determinants of tax revenue in other countries. Furthermore, due to a lack of data and information, the study couldn't represent some factors that may have indirect or slight effects on tax revenue. So, it is recommended for the next research to detect those factors and evaluate their effects on tax revenue. Moreover, the study lacks other important and secret strategies to promote tax-

revenue collection, thus recommending further research to examine those strategies and highlight the current condition of the domestic as well as the global economy.

7. Research Implications and Conclusion

The study contributed to the significant theoretical and practical implications for the government bodies and policymakers to improve tax-revenue collection.

Theoretically, the study witnessed gross domestic product, trade, and manufacturing as positive determinants of tax revenue. First of all, normative theory or public expenditure theory (Samuelson, 1958) emphasizes the tax collection process based on public expenditure, which is likely to be fulfilled by earning income from trade, manufacturing, and other available means. Another one is the ability-to-pay theory (Kimmel, 1961), which insists on domestic income for public tax revenue collection. This theory elucidates that government tax revenue collection and domestic income are positively intertwined. That means it is possible to increase public revenue by taxing domestic income. Integrating public expenditure and ability-to-pay theories, we intend to extend theoretical contributions to improve tax-revenue collection. Therefore, in line with theoretical implications, policymakers, and government bodies may focus on gross domestic product, trade, and manufacturing to foster tax-revenue collection.

From a practical outlook, in Bangladesh, in the fiscal year 2024-25, tax revenue collection witnessed a deficit. The government bodies still face difficulty in achieving their desired tax-revenue collection with the current economic plight. In the study, gross domestic product, trade, and manufacturing were positive tax-revenue determinants. Following the results of the study, government bodies, policymakers, and concerned authorities may pay concentration on gross domestic product, manufacturing, and trade to increase government tax revenue. Hence, to deal with the tax revenue deficit, the government should insist on income tax accounting for GDP, custom tax accounting for trade, and promote the contribution and share of manufacturing to GDP. Confirming transparency in the taxation process and focusing on other factors for availing of a larger amount of public tax revenue is also important.

Conflict of Interest

Undoubtedly, there is no conflict of interest.

References

Adefolake, A. O., & Omodero, C. O. (2022). Tax revenue and economic growth in Nigeria. *Cogent Business & Management*, *9*(1), 2115282.

Alexi, A., Lazebnik, T., & Shami, L. (2023). Microfounded tax revenue forecast model with heterogeneous population and genetic algorithm approach. *Computational Economics*, 1-30.

Ali, S., Ali, S., Jiang, J., Hedvicakova, M., & Murtaza, G. (2022). Does board diversity reduce the probability of financial distress? Evidence from Chinese firms. *Frontiers in Psychology*, *13*, 976345.

Ali, S., Jiang, J., Hassan, S. T., & Shah, A. A. (2022). Revolution of nuclear energy efficiency, economic complexity, air transportation and industrial improvement on environmental footprint cost: a novel dynamic simulation approach. Nuclear Engineering and Technology, 54(10), 3682-3694.

Ali, S., Jiang, J., Rehman, R. U., & Khan, M. K. (2023). Tournament incentives and environmental performance: The role of green innovation. *Environmental Science and Pollution Research*, *30*(7), 17670-17680.

Apeti, A. E., & Edoh, E. D. (2023). Tax revenue and mobile money in developing countries. *Journal of Development Economics*, *161*, 103014.

Arvin, M. B., Pradhan, R. P., & Nair, M. S. (2021). Are there links between institutional quality, government expenditure, tax revenue, and economic growth? Evidence from low-income and lower-middle-income countries. Economic analysis and policy, 70, 468-489.

Ayenew, W. (2016). Determinants of tax revenue in Ethiopia (Johansen co-integration approach). International Journal of Business, Economics, and Management, 3(6), 69-84.

Ball, C., & Creedy, J. (2014). Population aging and the growth of income and consumption tax revenue. New Zealand Economic Papers, 48(2), 169-182.

Baunsgaard, T., & Keen, M. (2010). Tax revenue and (or?) trade liberalization. *Journal of Public Economics*, *94*(9-10), 563-577.

Benigno, G., & Benigno, P. (2003). Price stability in open economies. The Review of Economic Studies, 70(4), 743-764.

Brendler, P. (2023). Rising earnings inequality and optimal income tax and social security policies. *Journal of Monetary Economics*, *134*, 35-52.

Cagé, J., & Gadenne, L. (2018). Tax revenues and the fiscal cost of trade liberalization, 1792–2006. Explorations in Economic History, 70, 1-24.

Camara, A. (2022). The Effect of Foreign Direct Investment on Tax Revenue. Comparative Economic Studies, 1-23.

Carone, G., Nicodème, G., & Schmidt, J. H. (2007). Tax Revenue in the European Union: Recent Trends and Challenges Ahead. European Economy Economics Paper, (280).

Castro, G. Á., & Camarillo, D. B. R. (2014). Determinants of tax revenue in OECD countries over the period 2001–2011. Contaduría y administración, 59(3), 35-59.

Chettri, K. K., Bhattarai, J. K., & Gautam, R. (2023). Determinants of Tax Revenue in South Asian Countries. *Global Business Review*, 09721509231177784.

Clist, P., & Morrissey, O. (2011). Aid and tax revenue: signs of a positive effect since the 1980s. Journal of international development, 23(2), 165-180.

Crivelli, E. (2016). Trade liberalization and tax revenue in transition: an empirical analysis of the replacement strategy. *Eurasian Economic Review*, *6*, 1-25.

Debnath, B., Siraj, M. T., Rashid, K. H. O., Bari, A. M., Karmaker, C. L., & Al Aziz, R. (2023). Analyzing the critical success factors to implement green supply chain management in the apparel manufacturing industry: Implications for sustainable development goals in the emerging economies. *Sustainable Manufacturing and Service Economics*, *2*, 100013.

Diaz-Sanchez, J. L., Tagem, A. M., & Mota, J. (2022). Tax revenue effort and aid in fragile states: The case of Comoros. South African Journal of Economics.

Fajrina, A. S. I., & Setiawan, B. (2023). The Effects of Digitalization and GDP Per-Capita Growth on Tax Revenue in ASEAN Countries. *Optimum: Jurnal Ekonomi dan Pembangunan*, *13*(1), 14-24.

Fullerton, D. (1982). On the possibility of an inverse relationship between tax rates and government revenues. Journal of Public Economics, 19(1), 3-22.

Gamponia, V., & Mendelsohn, R. (1985). The taxation of exhaustible resources. *The Quarterly Journal of Economics*, *100*(1), 165-181.

Gemmell, N. (1988). Tax systems, tax revenue, and growth in LDCs: A review of empirical evidence. Intereconomics, 23(2), 84-90.

Gnangnon, S. K. (2021). Tax reform and public debt instability in developing countries: The trade openness and public revenue instability channels. Economic Analysis and Policy, 69, 54-67.

Gordon, R. H. (1985). Taxation of corporate capital income: tax revenues versus tax distortions. The Quarterly Journal of Economics, 100(1), 1-27.

Gupta, A. S. (2007). Determinants of tax revenue efforts in developing countries. Working paper. No. 7-184. International Monetary Fund.

Hall, S., Illian, J., Makuta, I., McNabb, K., Murray, S., O'Hare, B. A., ... & Bar-Zeev, N. (2021). Government Revenue and Child and Maternal Mortality. Open Economies Review, 32(1), 213-229.

Hamdan, A., Sarea, A., Khamis, R., & Anasweh, M. (2020). A causality analysis of the link between higher education and economic development: empirical evidence. Heliyon, 6(6), e04046.

Hines Jr, J. R. (2000). What is benefit taxation? Journal of Public Economics, 75(3), 483-492.

Hone, T., Szklo, A. S., Filippidis, F. T., Laverty, A. A., Sattamini, I., Been, J. V., ... & Millett, C. (2020). Smoke-free legislation and neonatal and infant mortality in Brazil: longitudinal quasi-experimental study. *Tobacco Control*, *29*(3), 312-319.

Hong, Q., & Smart, M. (2010). In praise of tax havens: International tax planning and foreign direct investment. European economic review, 54(1), 82-95.

Ho, T. T., Tran, X. H., & Nguyen, Q. K. (2023). Tax revenue-economic growth relationship and the role of trade openness in developing countries. Cogent Business & Management, 10(2), 2213959.

Hu, Y., & Yao, J. (2022). Illuminating economic growth. *Journal of Econometrics*, *228*(2), 359-378.

Idris, M., & Ahmad, T. S. T. (2017). Tax Revenue and Macroeconomic Growth in Nigeria: A Contextual Analysis. Asian Journal of Economics, Business, and Accounting, 3(223), 1-12.

James, H. L. (2020). CEO age and tax planning. *Review of Financial Economics*, *38*(2), 275-299.

Jardet, C., & Meunier, B. (2022). Nowcasting world GDP growth with high-frequency data. *Journal of Forecasting*, *41*(6), 1181-1200.

Jemiluyi, O. O., & Jeke, L. (2023). Foreign direct investment and tax revenue mobilization in South Africa: an ARDL bound testing approach. *Development Studies Research*, *10*(1), 2197156.

Jin, J., Liao, R. C., & Loureiro, G. (2021). The diverse effects of currency crises on multinational and local firms: The use of foreign currency debt. Journal of Multinational Financial Management, 62, 100706.

Junior, J. A., Lee, L. K., Fleegler, E. W., Monuteaux, M. C., Niescierenko, M. L., & Stewart, A. M. (2023). Association of State-Level Tax Policy and Infant Mortality in the United States, 1996-2019. *JAMA Network Open*, *6*(4), e239646-e239646.

Kalamov, Z. Y., & Zimmermann, K. J. (2023). GDP-linked bonds and economic growth. *Journal of International Money and Finance*, *137*, 102918.

Kebede, S., Zerihun, G., Berhanu, K., & Abebe, T. (2023). The role of foreign public debt on foreign exchange reserve in SSA countries: Does governance really matters?. *Cogent Economics & Finance*, *11*(2), 2223810.

Kendrick, M. S. (1939). The ability-to-pay theory of taxation. The American Economic Review, 92-101.

Kimmel, L. H. (1961). The Ability to Pay. Challeng*e*, *10*(2), 45-46.

Kim, D. H., & Lin, S. C. (2023). Income inequality, inflation and financial development. *Journal of Empirical Finance*, *72*, 468-487.

Kim-Duc, N., & Nam, P. K. (2023). Inflation-related tax distortions in business valuation models: A clarification. *The North American Journal of Economics and Finance*, *66*, 101907.

Kotsogiannis, C. (2010). Federal tax competition and the efficiency consequences for local taxation of revenue equalization. International Tax and Public Finance, 17(1), 1-14.

Larsen, L. B., & Oats, L. (2019). Taxing large businesses: cooperative compliance in action. Intereconomics, 54(3), 165-170.

Lee, A., & Paine, J. (2023). The Great Revenue Divergence. *International Organization*, *77*(2), 363-404.

Long, J. E., & Scott, F. A. (1982). The income tax and nonwage compensation. The Review of Economics and Statistics, 211-219.

Lucotte, Y. (2012). Adoption of inflation targeting and tax revenue performance in emerging market economies: An empirical investigation. Economic Systems, 36(4), 609-628.

Madsen, J. B., Minniti, A., & Venturini, F. (2023). The long-run investment effect of taxation in OECD countries. *Economica*, *90*(358), 584-611.

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.

Maheshwari, T., & Mani, M. (2023). Impact of goods and services tax on various sectors of Indian economy: a systematic literature review. *International Journal*, *17*(4), 539-555.

Martínez, Y. U., Arzoz, P. P., & Arregui, I. Z. (2022). Tax collection efficiency in OECD countries improves via decentralization, simplification, digitalization, and education. Journal of Policy Modeling.

Moeis, A. I. A., Djalal Nachrowi, N., Ananta, A., & Adrison, V. (2022). A trade-off between old-age financial adequacy and state budget sustainability: Searching a government optimum solution to the pension system in Indonesia. Cogent Economics & Finance, 10(1), 2079176.

Morrissey, O., Von Haldenwang, C., Von Schiller, A., Ivanyna, M., & Bordon, I. (2016). Tax revenue performance and vulnerability in developing countries. The Journal of Development Studies, 52(12), 1689-1703.

Ofoegbu, G. N., Akwu, D. O., & Oliver, O. (2016). Empirical analysis of the effect of tax revenue on the economic development of Nigeria. International Journal of Asian Social Science, *6*(10), 604-613.

Palokangas, T. (1987). Optimal taxation and employment policy with a centralized wage setting. Oxford Economic Papers, 39(4), 799-812

Pascal, E., & Wijaya, S. (2023). Searching For Tax Revenue Determinants in N-11: The Moderating Role of Regulatory Quality. *Ilomata International Journal of Tax and Accounting*, *4*(3), 628-645.

Rahman, M. M. (2023). Impact of taxes on the 2030 agenda for sustainable development: Evidence from organization for economic co-operation and development (OECD) countries. *Regional Sustainability*, *4*(3), 235-248.

Savoia, A., Sen, K., & Tagem, A. M. (2023). Constraints on the executive and tax revenues in the long run. *Journal of Institutional Economics*, *19*(3), 314-331.

Rayman, R. A. (2013). Pay As You Spend: The Social Justification. In Toxic Economic Theory, Fraudulent Accounting Standards, and the Bankruptcy of Economic Policy (pp. 172-180). Palgrave Macmillan, London.

Roeleveld, J. J. (2012). An argument for either excluding death as a capital gains tax event or abolishing estate duty. South African Journal of Accounting Research, 26(1), 143-164.

Samuelson, Paul A. "Aspects of public expenditure theories." The review of Economics and Statistics (1958): 332-338.

Saptono, P. B., & Mahmud, G. (2021). Macroeconomic Determinants of Tax Revenue and Tax Effort in Southeast Asian Countries. JDE (Journal of Developing Economies), 6(2), 253-275.

Shafiq, M. N., Hua, L., Bhatti, M. A., & Gillani, S. (2021). Impact of Taxation on Foreign Direct Investment: Empirical Evidence from Pakistan. Pakistan Journal of Humanities and Social Sciences, 9(1), 10-18.

Sharabidze, N. (2023). The Impact of Tax Revenues on Economic Growth: Empirical Evidence from Georgia. *Viešoji politika ir administravimas*, *22*(2), 230-237.

Spulbar, C., Ehsanifar, M., Birau, R., Babaie, A., & Doagă, D. I. (2021). Advanced empirical research based on structural equation modeling (SEM) regarding the impact of tax revenue on GDP dynamics at the EU-28 level. Scientific Annals of Economics and Business, 68(3), 285-307.

Stotsky, M. J. G., & WoldeMariam, M. A. (1997). Tax effort in sub-Saharan Africa. International Monetary Fund.

Süssmuth, B., & Wieschemeyer, M. (2022). Taxation and the distributional impact of inflation: The US post-war experience. Economic Modelling, 111, 105813.

Svejnar, J. (2002). Transition economies: Performance and challenges. Journal of Economic Perspectives, 16(1), 3-28.

Tanko, U. M. (2023). Financial attributes and corporate tax planning of listed manufacturing firms in Nigeria : moderating role of real earnings management. *Journal of Financial Reporting and Accounting*.

Tanzi, V. (1978). Inflation, real tax revenue, and the case for inflationary finance: theory with an application to Argentina. Staff papers, 25(3), 417-451.

Terefe, K. D., & Teera, J. (2018). Determinants of tax revenue in East African countries: An application of multivariate panel data cointegration analysis. Journal of Economics and International Finance, 10(11), 134-155.

Thornton, J. (2014). Does foreign aid reduce tax revenue? Further evidence. Applied Economics, 46(4), 359-373.

Tresch, R. W. (2022). Public finance: A normative theory. Academic Press.

Waterman, A. M. (2002). Economics as theology: Adam Smith's wealth of nations. Southern Economic Journal, 68(4), 907-921.

Wen, J., Farooq, U., Tabash, M. I., El Refae, G. A., & Subhani, B. H. (2023). Governance and tax revenue: does foreign aid matter?. *International Review of Administrative Sciences*, *89*(1), 273-291.

Yamazaki, A. (2022). Environmental taxes and productivity: lessons from Canadian manufacturing. Journal of Public Economics, 205, 104560. 901

Zagler, M. (2023). Foreign direct investment, legal uncertainty and corporate income taxation. *International Economics*, *173*, 19-28.

Zhang, F., Wu, G., Zhu, L., & Zhang, W. (2023). The impact of fiscal squeeze on corporate tax avoidance behaviors: Evidence from the agricultural tax reform. *Economic Analysis and Policy*, *79*, 890-.

Zotikov, N., Savderova, A., & Lyubovtseva, E. (2020, November). Improving taxation of agricultural production as a factor of successful development of the agricultural sector in Russia. In *IOP Conference Series: Earth and Environmental Science* (Vol. 604, No. 1, p. 012018). IOP Publishing.