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Effect of Tax Revenue on Gross Domestic Product of Nepal

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Abstract

The study investigated the effect of different types of tax revenue and other macroeconomic variables, such as inflation and government expenditure, on Nepal's GDP per capita (economic growth) from 1995/96 to 2022/23. It incorporated GDP as the dependent variable, where overall tax revenue, customs duty, excise duty, income tax, VAT, inflation, and government expenditure served as independent variables. The stationarity of the data was tested using the ADF test. Likewise, the ADRL bound test was used to determine the long-run and short-run relationships between the variables. The analysis revealed that customs duty, income tax, and VAT had a negatively significant impact, while overall tax revenue had a positively significant impact on Nepal's GDP per capita.

***Keywords**:* tax revenue, GDP per capita, income tax, custom duty, VAT, government expenditure, inflation, ARDL model, fiscal policy

Introduction

Taxes are an important instrument for financing public expenditures and fostering economic growth (Nepaune, 2015; Ojha & Shakya, 2024). However, this relationship is widely debated among scholars. For example, Ghimire (2019) and Kharel (2021) revealed a significant positive influence of tax and total revenue on GDP, though they still fall short of funding government expenditure. On the contrary, Macek (2015) found a negative relation between corporate taxes, personal income taxes, security contributions, and economic growth. In addition, Vasishtha (2023) discovered that direct taxes showcased a negative effect on GDP, while indirect taxes seemed to boost the GDP.

Apart from that, Keynesian macroeconomic theory highlights the contribution of taxes for balancing wealth, maintaining stability, increasing demand, and supporting economic growth. Likewise, in times of high demand-side growth, the government raises taxes to curb inflation and cool the economy (See Jahan, Mahmud & Papageorgiou, 2014; Sangkuhl, 2015). However, if the fiscal multiplier is greater than one, a one-dollar tax cut or increase in government spending would result in a more than one-dollar rise in GDP (Jahan, Mahmud & Papageorgiou, 2014). Meanwhile, Ilzetzki,

Mendoza, and Végh (2013) highlighted that during an economic crisis, the value of the multiplier appears to be uncertain. Moreover, the Laffer Curve suggests that higher taxes on consumption can lower the relative cost of leisure, decrease consumption and the labor supply, and ultimately reduce tax revenue (Bosi & Desmarchelier, 2017).

Nepal, being a least developed country (LDC), 92% of government revenue is derived from taxes. (Ministry of Finance, 2023), with most of the revenue coming from indirect tax, i.e., around 70% (Ojha & Shakya, 2024). In addition, a plethora of researchers have examined the effect of tax revenue on GDP (Dahal, 2020; Ghimire, 2019; Kharel, 2021; Maharjan, 2018). However, these studies examine taxes in general, excluding the individual contribution to GDP.

Likewise, the existing studies have also focused on economic variables like government spending, gross fixed capital formation, inflation, and current account balance. (Shafiq *et al.*, 2022), where the contributions of direct and indirect taxes on overall economic growth are still scant in the Nepalese context. Therefore, this study explores the impact of different types of direct and indirect taxes that likely impact GDP per capita using a longitudinal design, considering government expenditure and inflation. This study on the "Effect of Tax Revenue on Gross Domestic Product" provides valuable insights for researchers, policymakers, and the general public regarding the effect of different types of taxes and macroeconomic variables on overall economic performance (GDP per capita).

The major research questions for the study are:

1. To what extent do the different types of taxes, i.e., direct and indirect taxes, affect the GDP per capita in the nepalese economy?
2. What is the linkage between inflation and government expenditure with GDP per capita?

Literature Review and Hypothesis Development

Taxation is an instrument imposed by the government to generate public funds. It is a mandatory financial charge or payment levied on an individual, group of individuals, or business organization's income, profit, or wealth by the tax authorities (Dahal, 2020). Taxes are divided into two types. They are direct taxes and indirect taxes. Direct taxes are paid by the individual or the organization directly to the entity that imposed the payment. Examples: Income tax, Corporate tax, Interest tax, Property tax, and Capital gain tax. On the other hand, Indirect taxes are levied on an individual or

organization but are passed to the consumer who ultimately makes the payment. Examples: VAT, Sales tax, Excise, customs, and Service tax (Khanal, 2018).

The primary purpose of taxes is to finance government spending and economic growth. (Dahal, 2020). Economic Growth is a steady process of increasing the economy's productive capacity over time to raise levels of national output and income. GDP per capita can be used as a measure of a country's economic output and national income at a specific point in time. It is the total market value of all finished goods and services produced in a country during a given period, divided by the total population, usually a year (Smith & Todaro, 2012).

During the third century BCE, Kautilya Chanakya wrote the ancient Indian political book "Arthashastra," which covered various economic theories in his work, including mixed economies, taxes, and economic growth (Sarkar, 2000). Chanakya quotes, "A King must collect tax like a honeybee, enough to sustain but not too much to destroy." He believed that maintaining society's economic stability depends heavily on the tax system. His tax system was built on simplicity, standardization, and certainty of time, rate, and form of payment (Panday, 2018). Chanakya's meticulous approach to revenue collection highlights a visionary model of governance in which state resources are systematically collected and invested to protect the country, improve social welfare, and foster projects like roads, buildings, and social and educational institutions, resulting in economic development (Shukla, 2021).

Likewise, Adam Smith's theory of the invisible hand states that the nature of the free market is self-regulatory, and people follow their interests while unintentionally promoting the welfare of society. Smith supported little government intervention since too much interference can affect the market's inherent efficiency (Denis, 2005). Furthermore, the benefit received theory suggests that the state and taxpayers have an exchange relationship. When the state offers its citizens specific products and services, the residents should pay for these goods and services in proportion to the benefits received (Bhartia, 2009). Moreover, Keynesian Economic Theory by John Maynard Keynes (1936) emphasized government intervention through fiscal policy, where taxation and government expenditures influence aggregate demand in the economy. According to this theory, the government should lower taxes and raise expenditures during the recession to encourage investment and consumption. On the other hand, the government should implement a contractionary fiscal policy by reducing aggregate demand through higher taxes and lower government spending during times of high inflation and an overheated economy (Sangkuhl, 2015). Milton Friedman was one of the

most influential economists since John Maynard Keynes. However, he had a different view from Keynes. He advocated for free market capitalism. He argued that ownership means of production should be in the hands of individuals or corporations rather than in the hands of the government, as it encourages efficiency and growth. Private owners should have decision-making authority without government interference by means like income redistribution (Pryor, 2010).

Nepal's economic structure shifts as the non-agricultural sectors ' contribution to GDP rises while the agriculture sector declines. Likewise, the manufacturing sector's contribution to GDP has stayed low, reflecting a lack of job opportunities and a smaller tax base (Ministry of Finance, 2023). However, the service sector's GDP contribution has been rising, which may help expand the tax base (Nepal Rastra Bank, 2024). The GDP growth rate was 9% in 2017 and dropped to negative 2.4% in 2020. It gradually began to recover, reaching 5.6% in 2022, eventually dropping to 2% in 2023 (The World Bank, 2024).

In Nepal, revenue is generated from tax and non-tax revenue. Taxes are the primary source, accounting for more than 90%, while non-tax revenue contributes less than 10% of the government revenue. For the past 20 years, total tax revenue has been in increasing order (Ministry of Finance, 2023). Nepal's tax-to-GDP ratio stands as the highest among the SAARC countries (The World Bank, 2024). The scope of taxation is expanding as the overall total number of registrations of individual and business taxpayers increased by 134% from mid-July 2019 to mid-March 2023, i.e., from 2464440 to 5769180 (Ministry of Finance, 2023). The Income Tax Act of 2002 provision allows the imposition of tax (Inland Revenue Department, 2002). Under Nepal's MOF, the IRD collects income taxes, VAT, and excise duty, whereas the Customs Department collects customs duty (Inland Revenue Department, 2016).

A crucial fiscal policy for the nation and its economy is taxation (Anabtawi & Iriqat, 2016). Yet, there exists debate regarding whether a higher tax ratio leads to higher GDP growth. McNabb (2018) claimed that higher taxes can either provide the government with funds to invest in sustainable areas such as education, infrastructure, research, and development, which help enhance the country's economic productivity, or higher taxes distort incentives, discouraging individuals from supplying more labor and firms from increasing production.

In developing countries like Tanzania, Nepal, and Nigeria, domestic taxes positively impact GDP. For example, in the studies of Babatunde and Ibukun (2016);

Ghimire (2019); Maganya (2020); Maharjan (2018) and Kharel (2021), they found that there is a strong positive relationship between tax revenue and GDP, indicating an increase in tax revenue increases GDP. In a similar vein, Adhikari (2024), also found a positive relationship between income tax and GDP, highlighting an effective fiscal policy intervention in Nepal. Further, in various Indian states, commodity and service taxes hinder growth, whereas property taxes enhance it, suggesting a shift from commodity and service taxes to property taxes (Gaur & Neog, 2020).

Apart from that, in developed countries like the EU, Patonov and Stoilova (2013) discovered a strong and clear positive impact of direct taxes on economic growth, and Spulbar *et al.* (2021) revealed that the increased level of taxation influences GDP. In addition, Crăciun *et al.* (2023) found that corporate taxes and indirect taxes, including VAT, stimulate growth while individual or household and other taxes negatively impact the EU. However, Macek (2015) found a negative relation between corporate taxes, personal income taxes, security contributions, and economic growth in some OECD countries. In addition, Nguyen, Onnis and Rossi (2021) found that reducing individual and corporate taxes boosts the UK's GDP (i.e., a 1% tax cut results in a 0.78% rise in GDP).

Enejoh and Tsauni (2017) stated inflation as a sign of economic growth, but too much growth could lead to hyperinflation, resulting in a negative impact. In contrast, zero inflation indicates a stagnating economy. An ideal situation is one where the inflation rate is mild enough to support economic stability. Davcev, Hourvouliades, and Komic (2018) found a significant negative relationship between inflation and GDP, with a rise in annual inflation by 10%, causing a decrease of 0.2 to 0.3 % in the real GDP. In contrast, in the context of four South Asian countries, a positive relationship exists between inflation and GDP in the long run (Jayathileke & Rathnayake, 2013). According to Azam and Khan (2022), an inflation threshold should not exceed 12.3% and 5.4% for developing and developed countries to avoid the negative impact of inflation while sustaining economic growth. The inflation rate should be set at a tolerable rate to prevent adverse effects on the economy (Adaramola & Dada, 2020), where Ahmad (2022) determined that a moderate level of inflation is good for the economy, whereas a high level causes severe effects.

Government expenditure is a double-edged sword. It can significantly boost overall economic output. Meanwhile, it can also have adverse effects by discouraging private investment and slowing down the economy if the fund comes at the cost of higher taxes or heavy borrowing (Alsadiq & Alshahrani, 2014). A study analyzed 182

countries, revealing that government spending and economic growth cause each other. However, in low-income countries, weak institutions and high corruption hinder government spending in promoting economic growth (Lin, Tang & Wu, 2010). Loto (2011) revealed that spending on health, communication, national security, health, and transportation is positively correlated with economic growth, but spending on education and agriculture is negatively correlated. However, Tang (2009) demonstrated that government spending on defense and education is co-integrated with GDP while showing no co-integrating relation to health. The study of SAARC countries (Pakistan, India, Bangladesh, and Bhutan) suggested that there exists a unidirectional causality between GDP and government expenditure, with either GDP causing government expenditure or vice versa (Rahman *et al.*, 2023).Eight EU countries had significant relationships between government spending and the economy, four of which had a positive correlation, and the other four had a negative correlation. However, the remaining countries in the study had an insignificant relationship between government expenditure and economic growth (Dudzevičiūtė, Liučvaitienė & Šimelytė, 2018).

The hypothesis to be tested in the study is as follows:

H1: There is a statistically significant effect of Tax Revenue on GDP per capita

H2: There is a statistically significant effect of Custom Duty on GDP per capita

H3: There is a statistically significant effect of Excise Duty on GDP per capita

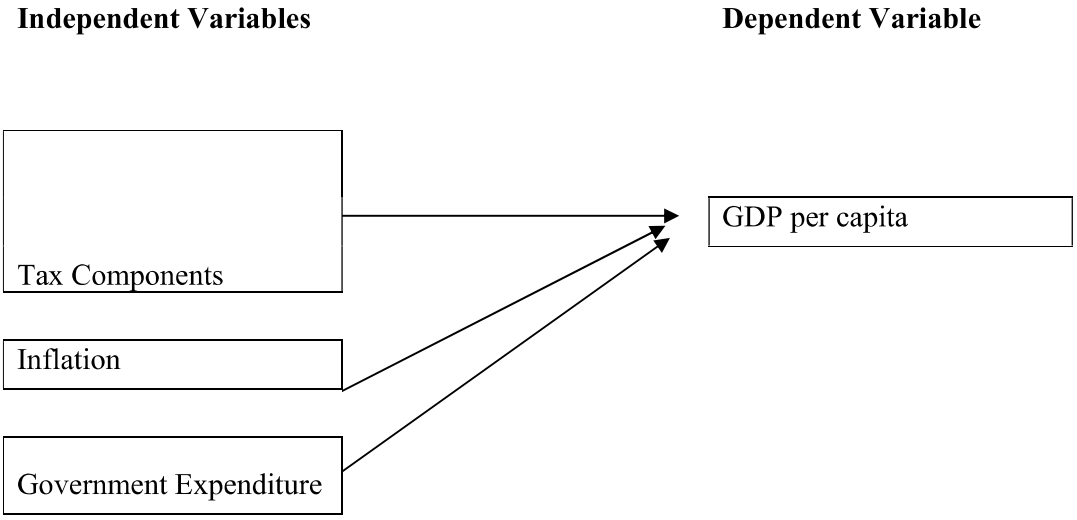
H4: There is a statistically significant effect of Income Tax on GDP per capita

H5: There is a statistically significant effect of VAT on GDP per capita

H6: There is a statistically significant effect of Inflation on GDP per capita

H7: There is a statistically significant effect of Government Expenditure on GDP per capita

Conceptual Framework of the Study



Methodology

This study analyzed the effect of direct and indirect taxes on GDP while also considering government expenditure and inflation. Such types of studies were mostly explored by using a quantitative research design (See Gaur & Neog, 2020; Kharel, 2021; Maganya, 2020; Shafiq *et al.*, 2022; Spulbar *et al.,* 2021). Therefore, based on the deductive approach under quantitative research design, the research tools are employed. The study was based on the observation of tax revenue, non-tax revenue, various direct and indirect tax revenues, government expenditure, inflation, and GDP across different periods. Therefore, the population of the study encompasses all periodic observations of these variables. The sample data were collected by defining the criteria of each variable using a purposive sampling technique. Under this technique, the period from 1995/96 to 2021/22 was considered. The research relied on secondary longitudinal data (See Adhikari, 2024; Dahal, 2020; Ghimire, 2019; Kharel, 2021; Mandal, 2022).

The Nepalese economy from 1995/96 to 2021/22, with yearly data, was considered as the sample size. Altogether, 27 yearly observations were used as a sample size for this study. The sample size was selected with consideration of existing literature on similar topics (Enejoh &Tsauni, 2017 ; Neog & Gaur, 2020; Shafiq et al., 2022;Vasishtha, 2023).

Archival research was considered as a data collection method. The MOF-dataportal, the World Bank, and Nepal Rastra Bank were used as the data collection sources. The data were safely kept in the spreadsheet.

Table 1

Sources of Secondary Data

Symbol	Variable Definition	Data source
Y	GDP Per capita ($) constant 2015	World Bank
X1	Tax revenue in NPR	Ministry of Finance, Data Portal
X2	Custom Duty in NPR	Ministry of Finance, Data Portal
X3	Excise Duty in NPR	Ministry of Finance, Data Portal
X4	Income Tax in NPR	Ministry of Finance, Data Portal
X5	VAT in NPR	Ministry of Finance, Data Portal
X6	Inflation % (CPI)	Nepal Rastra Bank
X7	Government Expenditure in NPR	Ministry of Finance, Data Portal

Various tools, such as the Pearson correlation and the ADRL bound test, were used by researchers in longitudinal economic data analysis (See Dudzevičiūtė, Liučvaitienė & Šimelytė, 2018; Ojha & Shakya, 2024; Shafiq *et al.*,2022; Vasishtha, 2023). For instance, (Aliyu and Mustapha, 2020; Mandal, 2022; Shafiq *et al.*, 2022) applied the ADRL bound test to examine the long-run and short-run relationship between tax revenue and GDP. Likewise, (Ojha and Shakya, 2024; Vasishtha, 2023) used correlation to explore the relation and effect of tax revenue on GDP. Therefore, these tools were employed by this study for quantitative data analysis. Stata and Excel were used as data analysis software.

In econometric form,

$$\begin{aligned}\Delta GDPt = \alpha 0 + \sum\beta_1\Delta TR_{t-1} + \sum\beta_2\Delta CD_{t-1} + \sum\beta_3\Delta ED_{t-1} + \sum\beta_4\Delta IT_{t-1} + \sum\beta_5\Delta VAT_{t-1} \\ + \sum\beta_6\Delta CPI_{t-1} + \sum\beta_7\Delta GE_{t-1} + \sum\delta_1 TR_{t-1} + \sum\delta_2 CD_{t-1} + \sum\delta_3 ED_{t-1} + \sum\delta_4 IT_{t-1} \\ + \sum\delta_5 VAT_{t-1} + \sum\delta_6 CPI_{t-1} + \sum\delta_7 GE_{t-1} + \sum\Omega_1 GDP_{t-1} + \mu t\end{aligned}$$

The econometric model examines the relationship between GDP per capita (ΔGDPt) and other fiscal variables such as tax revenue (TR) and specific components of tax revenue, including customs duty (CD), excise duty (ED), income tax (IT), Value-Added Tax (VAT), Consumer Price Index (CPI), and government expenditure (GE) in both the long and short run.

The short-term effects of changes (Δ) in their respective variables are shown by coefficients β1, β2, β3, β4, β5, β6, and β7, and long-term effects of the lagged levels of these variables on GDP per capita are shown by coefficients δ1, δ2, δ3, δ4, and δ5. The

rate at which the economy recovers from a shock is indicated by the coefficient Ω_1, which is linked to lagged GDP (GDPt-1); a negative value indicates a gradual adjustment. The error term μ_t represents the unexplained variation in GDP per capita.

Furthermore, the data sources and gathered information were cross-verified for accuracy and consistency between the MOF-economic survey, MOF-database, the World Bank, and Nepal Rastra Bank.

Result and Discussion

Descriptive statistics is used to determine a clear picture of the data.

Table 2

Result of Descriptive statistics

Statistics	GDP Per Capita	Tax Reveneue (NPR)	Custom Duty (NPR)	Excise Duty (NPR)	Income Tax (NPR)	VAT (NPR)	Inflation% (CPI)	Government Expenditure (NPR)
Mean	701.691	25793.005	5726.033	3936.720	6706.802	8286.143	7.012	39738.137
Standard Error	36.725	5484.392	1196.663	893.610	1529.410	1753.894	0.471	8014.589
Median	635.000	8515.550	2106.240	1118.960	1622.330	2981.570	7.658	16134.990
Mode	-	-	-	-	-	-	-	-
Standard Deviation	204.475	30535.803	6662.736	4975.411	8515.393	9765.268	2.621	44623.341
Sample Variance	41810.176	93243527 3.316	44392041 .697	24754716 .910	72511920 .185	95360449 .651	6.872	199124255 4.000
Range	641.738	97250.170	23783.610	16532.490	25896.060	31027.140	10.196	139043.200
Minimum	441.482	1166.250	394.500	145.280	112.480	400.770	2.435	3089.800
Maximum	1083.220	98416.420	24178.110	16677.770	26008.540	31427.910	12.631	142133.000

Source: Author's calculation

The study reveals that GDP per capita increased significantly, rising from a low of $441.482 to a high of $1,083.220, suggesting a gradual economic improvement. The government's ability to generate tax revenue has increased over time, growing from NPR 1,166.250 (in ten million) to NPR 98,416.420 (in ten million), with a mean of NPR 25,793.005 (in ten million). Furthermore, among specific tax components, customs duty, excise duty, income tax, and VAT averaged at NPR 5,726.033, NPR 3,936.720, NPR 6,706.802, and NPR 8,286.143 (all in ten million), respectively. Based on standard deviations, these variables indicated substantial variation. Likewise, the CPI (inflation) ranged from 2.435% to 12.631%, with a mean of 7.012%, a measure of price stability that could influence the consumers' purchasing power. Finally, government spending had an average of NPR 3,9738.137 (in ten million), with a range of NPR 3089.800 (in

ten million) to NPR 14,213.300 (in ten million). The table indicates that the average government expenditure exceeds tax revenue by approximately 54%, although the gap could be financed by non-tax revenues as well.

As the data contains variables with large differences in scale, the data is transformed using logarithms to standardize the scale (Aliyu & Mustapha, 2020; Nepal Rastra Bank, 2020).

Table 3

Result of Correlation Analysis

Correlation among Tax components, Government Expenditure, CPI and GDP Per Capita

	GDP Per Capita	Tax Revenue	Custom Duty	Excise Duty	Income Tax	VAT	CPI	Government Expenditure
GDP Per Capita	1.000							
Tax Revenue	0.994	1.000						
Custom Duty	0.992	0.996	1.000					
Excise Duty	0.990	0.998	0.991	1.000				
Income Tax	0.994	0.998	0.994	0.994	1.000			
VAT	0.993	0.999	0.993	0.998	0.995	1.000		
CPI	0.070	0.029	0.025	0.033	0.018	0.041	1.000	
Government Expenditure	0.995	0.998	0.995	0.996	0.996	0.998	0.036	1.000

Source: Author's calculation

The correlation table shows the degree of linear relationship between GDP Per Capita and several independent variables. The observation shows that GDP Per Capita has a strong positive relationship with the overall Tax Revenue (0.994), as well as with its segregated components: Customs Duty (0.992), Excise Duty (0.990), Income Tax (0.994), VAT (0.993), and also with Government Expenditure (0.995). However, it reveals a weak positive relationship with CPI (0.070).

Table 4

Unit Root Test

Variables	**Symbol**	**Stationary Level**

GDP Per capita ($)	Y	I (0)
Tax revenue (NPR)	X1	I (0)
Custom Duty (NPR)	X2	I (0)
Excise Duty (NPR)	X3	I (0)
Income Tax (NPR)	X4	I (0)
VAT (NPR)	X5	I (0)
Inflation % (CPI)	X6	I (1)
Government Expenditure (NPR)	X7	I (0)

Source: Author's calculation

Augmented Dickey-Fuller (ADF) was used in the stationary test to determine whether the data had a unit root (Cheung and Lai, 1995). The results show that all the variables were stationary at a level, whereas CPI was stationary at the first difference.

Table 5

Result of Shapiro-Wilk Test for Normality

Variable	Obs	W	V	Z	Prob>z
residuals	27	0.951	1.433	0.739	0.230

Source: Author's calculation

Firstly, the Shapiro-Wilk W test is applied. The test generates a W statistic which ranges from 0 to 1, with values near to 1 signifying that the data closely follows a normal distribution. On the other hand, values closer to 0 indicate a major deviation from normality (Shapiro and Wilk, 1965).

The table shows, the W statistic is 0.951, which is relatively close to 1. This indicates that the data has a good fit to a normal distribution.

Table 6

Result of JB residuals

Jarque-Bera normality	1.31
Chi (2)	0.520

Source: Author's calculation

Similarly, the Jarque-Bera test was conducted to assess the normality of the residuals. The chi-square (P-value) is used to determine whether to reject the null hypothesis of normality. The test yields a JB statistic of 1.31 with an associated P-value

of 0.520. Since the p-value exceeds the 0.05 significance level, the null hypothesis cannot be rejected, indicating that the residuals are approximately normally distributed (Brys, Hubert and Struyf, 2004).

Table 7

Result of Skewness/Kurtosis tests

Obs	Pr(Skewness)	Pr(Kurtosis)	adj chi2 (2)	Prob>chi2
27	0.193	0.732	1.98	0.372

Source: Author's calculation

The Skewness/Kurtosis test was further performed. The data appears to be normally distributed since all the p-values are greater than the 5% significance level (Yap and Sim, 2011). The result provided skewness (0.193) and kurtosis (0.732), which are both greater than the 5% significance level. Additionally, the joint test p-value (0.372) further confirms normality when both skewness and kurtosis are considered.

In this study, autocorrelation was examined using the Durbin-Watson test. The test produced a Durbin-Watson statistic of 2.71, close to the ideal value of 2, indicating no evidence of autocorrelation (Nerlove and Wallis, 1966).

Table 8

Result of White's test for Heteroscedasticity

chi2 (24)	25.00		
Prob>chi	0.4058		
Source	chi2	df	p
Heteroskedasticity	25.000	24.000	0.406
Skewness	19.650	19.000	0.416
Kurtosis	0.290	1.000	0.587
Total	44.950	44.000	0.432

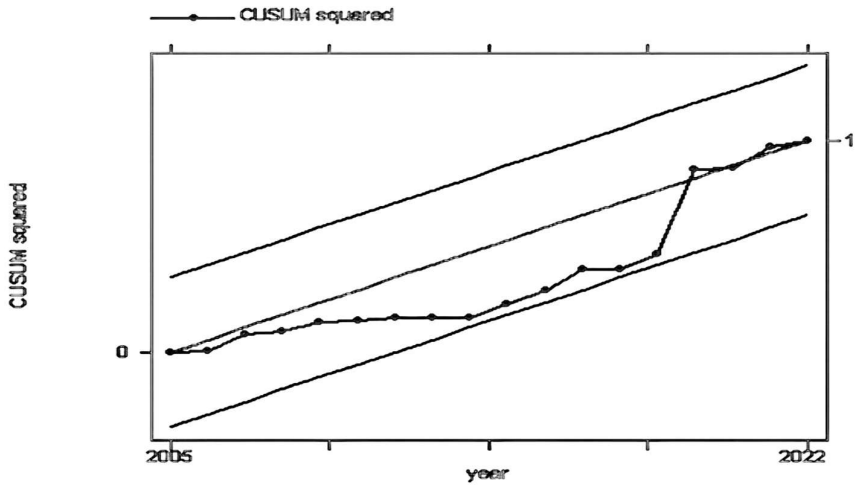
Source: Author's calculation

The heteroscedasticity test is employed to determine whether the variance of the regression errors depends on the values of the independent variables (heteroscedasticity problem). Since the p-value of 0.406 from White's test for heteroscedasticity is higher than 0.05, the null hypothesis cannot be rejected (Klein *et al.*, 2015). This indicates that

there is no heteroscedasticity in the data and the variance of the residuals is constant. Also, there is no problem with skewness and kurtosis.

Figure 1

Result of Stability test using CUSUM SQ



The CUSUM SQ has been employed to analyze the stability of long-term parameters. At the 5% level, the null hypothesis cannot be rejected if the test plot falls inside critical bounds (Shafiq *et al.*, 2022). The CUSUM SQ line falls under the 5% significance level. Hence, the model is fit for the study.

Based on all the tests performed, the ARDL model has been found as the ideal model for estimating the variables' short- and long-term effects.

Engle and Granger (1987) introduced the concept of cointegration, including estimating techniques and tests to confirm the presence of long-term relationships. To investigate this, the ARDL bound test has been applied. F-test and T-test have been used to determine whether the long-term cointegration between the variables is significant (Nepal Rastra Bank, 2020).

Table 9

Result of Bound Test from ARDL

F-Statistics	3.074	
Significance	I (0)	I (1)
Bound	Bound	Bound
10 percent	2.030	3.130
5 percent	2.320	3.500
1 percent	2.960	4.260
T-Statistics	-4.348	
Significance	I (0)	I (1)
Bound	Bound	Bound
10 percent	-2.570	-4.230
5 percent	-2.860	-4.570
1 percent	-3.430	-5.190

Source: Author's calculation

The F-statistic value is (3.074), which falls between I_0 and I_1 critical values. This indicates that the result is inconclusive and cannot alone confirm the long-run relationship. Likewise, the T-statistic is (-4.348), which also falls between I_0 and I_1 critical values. Thereby, also providing an inconclusive conclusion.

The error correction model has been used to analyze the long-term and short-term relationships between the dependent variable and the independent variables (Jaishi, 2024).

Table 10

Result of Long Run Estimate

R-Squared	0.9475			
Adjusted R-Squared	0.7481			
Root MSE	0.0122			
Variable	Coefficient	Std. Err.	t-stat	Prob
Tax revenue (NPR)	0.3332544	0.1801652	1.85	0.124
Custom Duty (NPR)	0.0981773	0.0589962	1.66	0.157
Excise Duty (NPR)	-0.2045575	0.0894342	-2.29	0.071
Income Tax (NPR)	-0.1475393**	0.0537402	-2.75	0.041
VAT (NPR)	0.0863859	0.0646597	1.34	0.239
Inflation % (CPI)	-0.0069657	0.0203633	-0.34	0.746
Government Expenditure (NPR)	0.1094419	0.0512646	2.13	0.086
Constant	4.659996	1.239343	3.76	0.013

Source: Author's calculation

In the long run, the above table illustrates that a 1% increase in Income Tax leads to a 0.15% decrease in GDP Per Capita. This effect is statistically significant at the 5% level (p = 0.041). However, for Tax Revenue (p = 0.124), Custom Duty (p = 0.157), Excise Duty (p = 0.071), VAT (p = 0.239), CPI (p = 0.746), and Government Expenditure (p = 0.086) are all insignificant at the 5% level. Among these variables, Tax Revenue, Custom Duty, VAT, and Government Expenditure show a positive relationship with GDP per capita, while CPI and excise duty show a negative relationship but are statistically insignificant at the 5% level.

With an R-squared value of 0.9475 and an adjusted R-squared value of 0.7481, the model appears to have a solid overall fit and captures a significant portion of the variation in GDP per capita.

Table 11

Result of Short Run Estimate

Variable	Coefficient	Std. Err.	t-stat	Prob
Tax revenue (NPR)	0.6299401**	0.2316204	2.72	0.042
Custom Duty (NPR)	-0.2903103**	0.0772733	-3.76	0.013

Excise Duty (NPR)	0.0355976	0.0734194	0.48	0.648
VAT (NPR)	-0.4430216**	0.1399626	-3.17	0.025
Inflation % (CPI)	0.0003152	0.0205378	0.02	0.988
Government Expenditure (NPR)	-0.1357344	0.0748784	-1.81	0.130
CointEq (-1)	-1.341462	0.3085144	-4.35	0.007

Source: Author's calculation

In the short run, Tax Revenue has a positive and statistically significant effect on GDP Per Capita at a 5% significance level (p = 0.042), suggesting that a 1% increase in Tax Revenue leads to a 0.63% increase in GDP Per Capita. In contrast, Custom Duty and VAT show a negative yet statistically significant effect at the 5% level with p values of 0.013 and 0.025, respectively. This implies that a 1% increase in Custom Duty, reduces GDP Per Capita by 0.29%. Furthermore, a 1% increase in VAT is associated with a 0.44% decrease in GDP Per Capita. With P-values of 0.648 and 0.988, Excise Duty and Inflation have a positive but insignificant effect on GDP, while government expenditure shows a negative but statistically insignificant relationship (p = 0.130).

The study provided mixed results regarding the effect of overall tax revenue, types of tax revenue, and other macroeconomic variables on GDP per capita during the long and short run. Aligning with the findings of Crăciun *et al.* (2023); Macek (2015) Sang *et al.* (2024); our study found a negative long-term relationship between income tax and GDP per capita. This suggests that higher income taxes may deter people from investing or launching businesses, ultimately limiting job availability, innovation, and economic growth (Sang *et al.*,2024). Similarly, Balasoiu, Chifu, and Oancea, (2023) reported that in EU countries, a 1% decrease in tax results in a 2.5% increase in GDP. The notion is further supported by findings of Maganya (2020) as well, in developing countries, a 1% increase in tax decreases GDP by 5875 times. In contrast, Pamba (2022) in South Africa; Odum, Odum and Egbunike (2018) in Nigeria indicated to have a positive effect of income tax on economic growth in the long run. Meanwhile, Neog and Gaur (2020) found no significant effect of income tax on growth.

The study confirmed a positive short-run relationship between tax revenue and GDP Per Capita, highlighting that an effective fiscal policy intervention can foster economic growth (Adhikari, 2024). This result is also supported by the prior research findings, such as (Babatunde & Ibukun, 2016; Kessy & Sukartini, 2023; Maganya, 2020; Maharjan, 2018; Mandal, 2022; Odum, Odum, and Egbunike, 2018;

Ghimire,2019). In contrast, Çollaku, Balaj and Hajdini (2023) found a negligible relationship between them in the short run. Shafiq *et al.* (2022) revealed a negative relationship between the variables in Pakistan. Moreover, the study discovered an inverse short-run relationship between Custom duty and GDP per capita as tariffs increase the cost of imported goods, reducing trade, leading to inflation and ultimately causing economic distortions (Kreuter & Riccaboni, 2023).

Similar results were discovered by prior researchers (Kreuter & Riccoboni, 2023; Thapa, 2023). However, Pamba, (2022) found a positive yet insignificant relationship between them. Furthermore, Owino (2019) in Kenya; (Anokwuru and Chidinma, 2023) in Nigeria found that customs duties help in economic growth. In the short run, VAT had an inverse relationship with GDP Per Capita, complementing the claim made by Abd Hakim et al., (2022); Otekunrin *et al.*, (2023). This indicates a negative impact on aggregate consumption and diminishing effect on disposable income, showcasing a negative influence on GDP (Chiricu, 2019). However, other studies have also found opposite conclusions as well (Crăciun et al., 2023; Vasishtha, 2023).

In the case of Excise Duty, an insignificant negative long-run and positive short-run relationship with GDP was found, similar to the findings of Touray & Jahateh, (2024). In contrast, Adejare, (2021) reported a significant short-run negative and long-run positive relationship. The study found an insignificant negative long-run and positive short-run relationship between inflation and GDP per capita. Similarly, Nazir *et al.* (2017); Paudel and Khanal, (2024); Ramzan, (2021) discovered insignificant results. However, Adaramola and Dada (2020); Davcev, Hourvouliades, and Komic (2018); Shafiq *et al.* (2022) found a significant negative relationship, while Jayathileke & Rathnayake (2013) discovered that a positive long-run relationship exists between them. Lastly, an insignificant positive long-run and negative short-run relationship was discovered between GE and GDP. Prior research on EU countries reported mixed results, where four exhibited significant positive or negative relationships, while the rest showed an insignificant relationship (Dudzevičiūtė, Liučvaitienė & Šimelytė, 2018). Furthermore, Kunwar (2019) found a significant positive relationship, while Abu-Bader & Abu-Qarn (2003) reported a negative one.

Conclusion and Implications

Ultimately, the study examined the effect of tax revenue and other macroeconomic variables on Nepal's gross domestic product. A yearly time series of

data was incorporated in the study from the period 1995/6 to 2022/23. The data were drawn from the MOF-data portal, the World Bank, and NRB. The ARDL test was applied for long-run and short-run relationships. According to the study, in the long run, only income tax has a statistically significant impact, however, the impact is negative. This suggests that income tax discourages individuals from supplying more labor and firms from increasing production, potentially lowering economic growth.

Apart from that, during the short run, overall tax revenue tends to boost the economy with positive GDP growth rate, implying that fiscal revenue inflows can spur economic activity in the near term. However, the short-run impact of VAT and customs duties were negative suggesting the VAT and customs duties decrease the demand for consumption and trade, resulting the negative impact on GDP. Futher while comparing both the long run and short run, the same level of influence were not observed for excise duty, inflation, and government expenditure on GDP per capita.

The government should prioritize macro variables such as overall tax revenue, income tax, VAT, and customs duty, which have a significant impact on GDP per capita. By focusing on these variables, effective fiscal and monetary policies should be implemented that would complement each variable and help sustain the economy. Likewise, policymakers could also focus on reviewing and lowering individual and corporate tax rates and structures, given the negative long-run association of income taxes with economic growth. Even though, in the long run, the study showcased a negative, insignificant association between Inflation and GDP per capita, NRB should enforce policies that manage the money supply to maintain a moderate inflation rate. The findings revealed that the government is spending more than it generates from tax revenue, indicating the possibility of a deficit. Although the government revenue is not included in the study, almost 90% of the GR is generated from taxes, suggesting that deficit spending should be carefully evaluated before performing fiscal activities.

Since this study considers a limited time frame from 1995/1996 to 2022/23, future studies could incorporate data after 2022/23 and examine the relationship of the same dependent and independent variables. Future studies could examine sub-components of tax revenue in detail. For example, separate individual and corporate tax, or study sectoral business effects (service, agriculture, manufacturing) on GDP. As Nepal is an open economy, future research could incorporate variables like remittance, foreign investment, and exchange rates in the model and examine their influence on GDP. Effective tax collection is essential. So, future work could incorporate indices of

governance and administrative quality and measure how improvements in digital filing, taxpayer education, or anti-corruption efforts affect the tax-GDP ratio.

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