Does Tax Policy Promote Economic Development? Evidence from Developing Countries with Varying Levels of Corruption

Chiranjibi Gautam and Hochul Shin

This study examines how tax structures influence economic development across different levels of control of corruption (COR), using a country panel dataset covering 52 developing countries from 1995 to 2024. The empirical analysis indicates that the direct relationship between the indirect-to-direct tax ratio and growth is relatively weak; however, this ratio becomes significant only when corruption is properly controlled. This pattern suggests that indirect taxes, which are generally considered less distortionary than direct taxes, can effectively support government revenue and foster economic growth only under high COR. An additional case study of Nepal aligns with the main panel results, confirming that the effect of tax composition on growth varies depending on the COR. Overall, the findings emphasize the importance of strengthening institutions and implementing context-specific, optimal, and balanced tax policies to promote sustainable economic growth in developing countries.

Keywords: tax composition, economic development, control of corruption, fiscal policy, developing countries

JEL Classification: O11, H21, O43

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I. Introduction

Whether and how fiscal policy affects economic development remains a central question in development economics. The relationship between fiscal policy and economic growth is strongly influenced by institutional quality and government efficiency. Developing countries differ considerably in their institutional and governance environments. Consequently, the same tax structure may generate very different growth outcomes across countries. Despite extensive research on taxation and growth, little attention has been paid to how tax composition interacts with institutional quality to shape economic growth.

This study extends the existing literature by examining how tax policy and institutional quality, proxied by control of corruption (COR), jointly influence economic growth. Specifically, it investigates whether the growth effects of tax composition depend on COR. In doing so, the study explains why similar fiscal policies may generate different outcomes across countries. The analysis provides new insights into the design of growth-enhancing and institution-sensitive tax systems. By emphasizing the interaction between tax composition and institutional quality, this study contributes to the growing body of literature highlighting the important role of institutions in long-run economic growth (Persson and Tabellini, 2021;Tabellini, 2008).

Researchers have long been interested in examining the relationship between tax policy and economic growth. For example, Gale and Samwick (2017) analyzed the effects of income tax changes on economic growth and theoretically argued that tax cuts can stimulate growth by increasing incentives to work, save, and invest. However, the effectiveness of such policies may vary considerably across countries depending on institutional and cultural factors, particularly government efficiency and the COR. These differences suggest that the growth effects of fiscal policy cannot be fully understood without considering the broader institutional environment.

The literature on corruption presents two contrasting perspectives regarding its effect on economic performance. The "sand-the-wheels" hypothesis argues that corruption hampers economic growth by increasing transaction costs, distorting incentives, and discouraging productive investment (Mauro, 2004). By contrast, the "grease-the-wheels" hypothesis suggests that, in highly bureaucratic and inefficient institutional environments, corruption may temporarily facilitate economic activity by helping firms bypass administrative obstacles (Dreher & Gassebner, 2013). These competing perspectives imply that institutional quality plays a decisive role in shaping how fiscal policy affects economic growth.

Governments primarily finance public expenditure through tax revenue. The level and structure of taxation can influence investment in physical and human capital, labor productivity, and long-run economic development (Shahmoradi et al., 2019). Some countries impose relatively high income taxes to increase government revenue from corporations, businesses, and individuals, whereas others reduce corporate taxes to encourage entrepreneurial activities and promote sustainable economic development. Although many studies have examined the relationship between taxation, public expenditure, and economic growth, exploring the role of tax composition is particularly important in developing countries with varying institutional quality.

In this study, tax composition is measured by the ratio of indirect taxes (IT) to direct taxes (DT) and its interaction with COR. IT mainly refer to taxes on goods and services as a proportion of total government revenue, whereas DT primarily include taxes on income, profits, and capital gains as a proportion of total government revenue. The key institutional variable used in this study is COR. In addition, our analysis also controls for major determinants of economic growth, including education (*EDUS*), investment (*GCF*), demographic structure (*POP*), and foreign direct investment (*FDI*).

Previous studies suggest that consumption-based taxes may be less distortionary to savings and investment than income or corporate taxes. Arnold et al. (2011) argued that consumption taxes are generally more growth-friendly because they discourage investment less than DT. This argument may be particularly relevant in developing countries, where economic activities are often more consumption-driven (Joshi & Ayee, 2009). Building on these insights, this study hypothesizes that the growth effects of tax composition depend critically on the COR.

A heavy reliance on DT in countries with weak institutional quality may lead to leakages, administrative inefficiencies, and limited growth benefits because of the higher risk of tax evasion and the greater administrative challenges associated with DT collection. By contrast, in such environments, greater reliance on IT may make revenue collection relatively easier because of the lower administrative burden and reduced opportunities for tax evasion. As a result, IT can serve as a more efficient tool for generating government revenue and supporting economic growth in countries with weak institutional capacity.

Good governance and low corruption can improve private savings, investment, and the efficiency of resource allocation, thereby promoting economic growth (Han et al., 2015). By contrast, high levels of corruption can weaken government efficiency, encourage rent-seeking and tax evasion, and undermine productive economic activities, ultimately reducing per capita GDP growth (Acemoglu et al., 2003). By interacting tax composition with COR, this study provides new evidence on how institutional quality moderates the relationship between tax composition and economic growth in developing countries.

The remainder of this paper is organized as follows: Section (II) reviews the related literature on tax policy, economic development, and corruption; Section (III) presents the data and research methodology; Section (IV) reports the empirical results and discussion; Section (V) provides an additional case study of Nepal; and Section (VI) presents the policy implications.

II. Review of Related Literature

The relationship between tax policy and economic growth has been extensively studied across various contexts, including developed, developing, and least developed economies, as well as high-, middle-, and low-income countries. Early research by Barro (1991) incorporated fiscal variables into growth regressions and found a significant negative correlation between government consumption expenditure and growth through distortionary taxation. He also argued that increased labor-leisure trade-offs arise through expected future increases in taxes to repay deficit financing (Barro, 1989). Likewise, Lucas Jr. (1988, 1990) demonstrated that fiscal policy directly influences long-run economic growth by promoting human capital accumulation and altering incentives that affect savings and investment decisions. Building on

the extended endogenous growth theory of Barro (1990), Easterly and Rebelo (1993) explored the relationship between taxes, government expenditure composition, and economic growth. They emphasized the positive driving effect of transportation and communication investment. Furthermore, they stated that international trade taxes in developing countries and income taxes in developed countries correlated significantly with economic growth. Widmalm (2001), focusing on 23 Organization for Economic Co-operation and Development (OECD) countries between 1965 and 1990, stated that the growth effect of personal income tax is negative and significant. Similarly, Lee and Gordon (2005) confirmed that statutory corporate tax rates had a negative and statistically significant effect on economic growth across 70 countries spanning 1970–1997.

Meanwhile, other studies have reported a positive effect of taxes on growth. For instance, Babatunde et al. (2017) explored the influence of tax revenue on economic growth using a panel of 16 African countries during the period 2004–2013 and observed a significant positive effect of tax revenue on growth. The authors explained that funds generated from tax revenue can enhance investment in human capital and public infrastructure, which can lead to higher economic growth. However, their analysis revealed a negative relationship between FDI and growth. Despite these positive findings in parts of the literature, several studies have continued to report adverse effects of certain taxes on economic growth. Binti Saidin et al. (2016), who examined 27 Asian countries between 2005 and 2015, found that personal income tax had a negative effect on growth. Moreover, the authors claimed that FDI links positively with personal income tax but correlates negatively with corporate tax and growth. Similarly, Gale and Potter (2002) examined the effect of the 2001 U.S. tax reform and concluded that it had little to no net consequences on GDP over the following decade. The authors suggested that the negative effect of high deficits and declining national savings can offset the positive effect of lower marginal tax rates.

The studies mentioned above have mainly discussed the role of tax levels in economic growth. However, increasing attention has been given to the adoption of an optimal tax structure to foster economic development in both developed and developing countries. Bahl and Bird (2008) emphasized that a well-designed tax portfolio is one of the best ways to ensure the desired economic progress in developing countries. Similarly, Gale and Samwick (2017) stated that an appropriate tax

structure and changes to the tax base are crucial for achieving economic development because different tax structures do not have the same effect on growth. In addition, selecting suitable tax reforms to minimize corruption and tax evasion is key to enhancing GDP per capita in developing countries (Gordon and Li, 2009). In this regard, considerable attention has been given to the role of IT in promoting economic growth.

The role of goods and services tax (IT) in economic growth has been widely investigated in developing and developed countries. Abd Hakim et al. (2016) examined the relationship between IT and economic growth using the Arellano–Bond dynamic panel generalized method of moments (GMM) estimation for 160 countries. The study found that IT correlates positively with economic growth in developed countries but associates negatively and significantly with growth in developing countries. Similarly, Joshi and Ayee (2009) argued that IT remain one of the most effective tools for revenue mobilization in developing economies, particularly where the informal sector accounts for a large share of economic activity. Venkadasalam (2014) also investigated the post-implementation effects of IT in Asian countries and reported mixed outcomes across nations. The study identified a negative relationship between IT and economic growth in the Philippines and Thailand, whereas a significant positive relationship was observed in Singapore. Likewise, Hakim et al. (2013) analyzed the influence of IT across different income groups and found a negative relationship in low-, lower-middle-, and middle-income countries but a positive relationship in high-income and OECD countries. These mixed findings suggest that the growth effects of IT differ depending on a country's economic structure and level of development.

The debate over whether IT are less harmful to growth than DT has therefore received considerable attention in the literature. Arnold et al. (2011) argued that IT are comparatively less harmful to economic growth than personal income tax and corporate income tax (i.e., DT). They suggested that consumption taxes, as a form of IT, do not discourage savings and investment and may therefore contribute positively to economic development. Similarly, Gupta (2014) emphasized that IT can create collective gains for industries, trade, agriculture, and government revenue generation. The study further noted that IT enhanced commercial activity in sectors of the Indian economy that had previously remained outside major tax reforms. Consequently, the

effectiveness of IT in promoting economic growth may largely depend on government efficiency and institutional quality, particularly the degree of COR.

Corruption has emerged as a critical factor influencing the effectiveness of tax systems and economic growth. Mauro (2004) found an inverse relationship between corruption and economic growth, supporting the idea that the distortion of incentives and misallocation of resources can decrease economic growth. Méon and Weill (2010) empirically examined the grease-the-wheels hypothesis through a cross-country panel analysis and observed that corruption can positively impact growth only in weak governance settings. Nevertheless, the authors obtained mixed results across other countries and economic contexts. Dreher and Gassebner (2013) tested the grease-the-wheels hypothesis using data from 43 developing countries between 2003 and 2005 and confirmed the greasing effect of corruption on the economy. The authors further explained that corruption can help accelerate the registration process for firm entry into the market in highly regulated countries. Meanwhile, Dollar and Kidder (2017) demonstrated that strong institutions, characterized by low corruption, can ensure the optimal utilization of available resources and foster a sound ecosystem that increases the inflow of capital and labor while improving productivity.

However, other studies have argued for the negative effect of corruption, commonly referred to as the sand-the-wheels hypothesis. Acemoglu et al. (2003) claimed that weak governments and institutions in highly corrupt countries can lead to negative externalities, such as rent-seeking activities, moral hazard, and poor management, which reduce investors' confidence and hinder economic development. Corruption can also destroy societal ethics, decrease tax revenue, and reduce economic growth by eroding public resources and diminishing taxpayers' morale. In highly corrupt nations, high tax rates can reduce revenues, pushing such economies into a poverty trap (Attila et al., 2008; Tanzi and Davoodi, 2000; Torgler, 2007).

In conclusion, the literature highlights the complex interplay between tax policy, corruption, and economic development. An effective tax structure can positively influence long-run economic performance; however, its success depends on context-specific factors such as good governance, government efficiency, and institutional quality, particularly COR. Developing countries face challenges in balancing

these dynamic forces to achieve sustainable economic development. Therefore, this study contributes to the literature by exploring how the growth effect of tax composition differs across varying COR levels in developing countries.

III. Data and Research Methodology

Within the neoclassical framework, Solow (1957) emphasized productivity growth (exogenous technological progress) as the fundamental driver of long-term economic growth. By contrast, endogenous growth models emphasize the role of fiscal policy, which is largely absent from the neoclassical framework, and highlight its importance for sustaining long-term growth. Lucas Jr. (1988, 1990) demonstrated that public policy can directly influence economic growth either through human capital accumulation or by altering investment decisions. In this study, the empirical specification draws on the framework developed by Lucas and the augmented Solow–Swan model, which is consistent with the empirical approach of Arnold (2008).

Output (*Y*) can be modeled as a function of inputs, including physical capital (*K*), human capital (*H*), and labor (*L*) at time (*t*) based on the Cobb–Douglas production function, as follows:

$$Y_{it} = [A_{it} K_{it}^{\beta_1} H_{it}^{\beta_2} \left(L_{it}\right)^{1-\beta_1-\beta_2}], \tag{I}$$

where β_1 and β_2 represent the partial elasticity of output with respect to physical capital K_{it} and human capital H_{it}, and A_{it} denotes total factor productivity (TFP). TFP is decomposed into two components, namely, economic efficiency I_{it}, which can be influenced by institutions and public policy, and the level of technological progress Ω_t. Thus, I_{it} can be written as a function of institutional quality (COR) and policy variables (taxation), whereas Ω_t is an exogenous time-varying component (technological trend).

Accordingly, the Cobb–Douglas production function in Equation (I) can be transformed into a simple empirical research model, as presented in Equation (II).

In this framework, GDP per capita is specified as a function of investment in physical capital (*GCF*), human capital (*EDUS*), and labor (*POP*), accompanied by the policy variables IT, DT, and COR to measure government and institutional efficiency. Such efficiency can reduce

the costs associated with production and attract private investment, which can exert significant positive or negative effects on GDP growth. To test the effect of technological diffusion from developed countries to developing countries on per capita GDP, this study incorporated FDI as a proxy variable. Policymakers suggested that developing middle-income countries engage in technological diffusion to escape the middle-income trap and promote economic development.

Based on the above theoretical framework, the following baseline regression model is specified:

$$\begin{aligned}\ln\left(PGDP\right)_{it} &= \beta_0 + \beta_1 \ln\left(PGDP\right)_{i,t-1} + \beta_2\left(IT\,/\,DT\right)_{it} + \beta_3\left(COR\right)_{it} \\ &+\beta_4\left(\frac{IT}{DT} * COR\right)_{it} + \beta_5\left(TAX\right)_{it} + \beta_6\left(EDUS\right)_{it} + \beta_7\left(GCF\right)_{it} \\ &+\beta_8\left(POP\right)_{it} + \beta_9\left(FDI\right)_{it} + e_{it}\end{aligned} \tag{II}$$

The empirical specification presented above (Equation II) is grounded in the existing literature on fiscal policy and economic growth. The key explanatory variable, tax composition (IT/DT), is motivated by prior studies emphasizing the role of the composition of taxation between DT and IT (i.e., tax structure), rather than the overall tax level, in influencing economic growth (Arnold et al., 2011; Bahl & Bird, 2008; Easterly & Rebelo, 1993; Gale & Samwick, 2017). Institutional quality, proxied by COR, is incorporated as a key determinant of economic efficiency, as widely recognized in the governance and growth literature (Attila, 2008; Mauro, 2004; Méon and Weill, 2010; Persson and Tabellini, 2021). To capture the conditional effectiveness of fiscal policy, this paper includes an interaction term IT/DT * COR. This approach allows to examine whether the growth effects of tax composition vary across different institutional environments (i.e., low- versus high-corruption settings), which directly aligns with the core objective of our study. Furthermore, this study incorporates standard control variables, including gross capital formation (*GCF*), human capital (*EDUS*), working-age population (*POP*), and foreign direct investment (*FDI*). These variables are widely used in growth models and are consistent with the existing growth literature.

Finally, to address potential endogeneity, reverse causality, and unobserved heterogeneity, this paper adopts the dynamic panel GMM method proposed by (Arellano and Bover 1995) and extended by

Table 1
Variable Definitions and Sources

Variable	Definition	Source
PGDP	GDP per capita, PPP (constant 2021 international $)	WDI
FDI	Foreign direct investment, net inflows (% of GDP)	WDI
GCF	Gross capital formation (% of GDP)	WDI
TAX	Tax revenue (% of GDP)	WDI
DT	Taxes on income, profits, and capital gains (% of total government revenue)	WDI
IT	Taxes on goods and services (% of total government revenue)	WDI
COR	Control of corruption estimate (from −2.5 [low] to 2.5 [high])	WDI
IT/DT	Ratio of IT to DT	WDI
(IT/DT) * COR	Interaction term of ratio of IT to DT and COR	WDI
POP	Population of individuals aged 15–64 years (% of total population)	WDI
EDUS	Gross secondary school enrollment rate (%)	WDI

Note: WDI refers to World Development Indicator, World Bank

Blundell and Bond (1998), which is commonly used in cross-country growth regressions. This approach uses internal instruments derived from lagged values of the variables to obtain consistent estimates in the presence of endogeneity. It is assumed that lagged values of the explanatory variables are correlated with the endogenous regressors but uncorrelated with the error term in the model. The validity of the instruments is further supported by standard diagnostic tests, including the Hansen test of over-identifying restrictions and the Arellano–Bond test for serial correlation. Both tests confirm the validity of the instruments used in the model; the results are presented in the empirical analysis section. This study applies 5-year averaged data from 52 developing countries spanning 1995 to 2024. Missing data were replaced with the corresponding 5-year period averages. Appendix 1 contains a list of the countries.

Table 2 presents the descriptive statistics of the variables used in the empirical analysis. Specifically, the mean of EDUS stands at 73.13% and demonstrates substantial variation across the countries (with a

TABLE 2
DESCRIPTIVE STATISTICS

Variable	Mean	Median	Maximum	Minimum	Std. Dev.	Observation
ln (PGDP)	3.96	4.00	4.52	3.18	0.31	255
TAX	15.18	14.68	36.01	6.73	4.87	255
IT	36.11	36.86	62.13	4.57	10.93	255
DT	23.86	22.95	51.92	2.58	10.88	255
COR	−0.47	−0.47	0.69	−1.45	0.42	255
EDUS	73.13	79.00	115.84	10.95	23.07	255
GCF	23.99	23.39	48.92	13.40	5.96	255
FDI	3.23	2.54	24.27	−2.76	3.01	255
POP	62.50	63.02	75.33	49.58	5.76	255

Note: IT and DT are measured as percentage of tax revenue; FDI and GCF are measured as percentage of GDP; PGDP is measured in constant 2021 international dollar

standard deviation of 23.07, ranging from 10.95 to 115.84). IT has a mean of 36.11, whereas GCF averages 23.99% of GDP, and both show moderate variation. The mean of log per capita GDP is 3.96, which ranges widely from 3.18 to 4.52, and FDI averages 3.23% of GDP but exhibits high variability, with negative values indicating that outflows exceed inflows. POP averages approximately 62.50%, which ranges from 49.58% to 75.33%, and COR has a mean of −0.47 and a standard deviation of 0.42, which indicates substantial variation in institutional quality across the sample. Because trade taxes, social contributions, grants, and other nontax revenues exist, the sum of IT and DT is not 100% but averages around 60%.

IV. Empirical Results and Discussion

The empirical analysis in this paper starts with fixed effects (FE) and random effects (RE) estimations. Then, conducted a Hausman test to compare the RE and FE models. The test statistics χ^2 (8) = 4.76 and p-value = 0.78 fail to reject the null hypothesis that the RE estimator is consistent. Therefore, the Generalized Least Squares (GLS) RE model over the FE model is adopted. However, GLS cannot adequately address potential endogeneity, thus this study employed the Generalized Method

Table 3
Regression Results

Variables	GLS (RE)	GMM
ln $(PGDP)_{i, t-1}$		0.401*
		(0.216)
TAX	−0.007**	−0.004
	(0.003)	(0.003)
IT/DT	−0.016	0.042
	(0.079)	(0.097)
(IT/DT) * COR	0.190**	0.248**
	(0.097)	(0.129)
COR	0.090***	−0.058
	(0.037)	(0.053)
GCF	0.003*	−0.006
	(0.002)	(0.004)
EDUS	0.005***	0.004**
	(0.001)	(0.002)
POP	0.018***	0.016***
	(0.004)	(0.005)
FDI	−0.003	0.011**
	(0.004)	(0.005)
C	2.509***	1.238**
	(0.197)	(0.526)
(AR2) p-value		0.51
Hansen test (J) p-value		0.11
R-squared	0.71	
Hausman test p-value	0.78	

Note: Regression coefficients are reported, with robust standard errors in parentheses. ***, **, and * denote the 1%, 5%, and 10% significance levels, respectively. The number of observations is 206 for RE and 204 for GMM.

of Moment (GMM), which is robust to potential endogeneity problems such as omitted variables and reverse causality. The Arellano–Bond test for AR (2) ($p = 0.51$) and the Hansen test of overidentifying restrictions ($p = 0.11$) yielded results above the conventional significance level, indicating the absence of second-order autocorrelation and confirming the validity of instruments in the GMM regression. This paper controlled for total tax revenue (% of GDP) to isolate the level effect of tax revenue

on growth and explicitly identify the effect of composition or tax structure on growth.

The estimation results in Table 3 demonstrate that the lagged value of log PGDP is significant and positively correlated with the current log PGDP in developing countries. COR appears to have an insignificant effect on economic growth in the GMM model, and IT/DT provides insignificant effects on growth. However, when interacting IT/DT with the COR variable, this interaction term becomes positive and statistically significant. This pattern implies that a higher reliance on IT relative to DT promotes economic growth in developing countries when governments adequately control corruption (improved institutional quality). However, in low corruption-control environments, the growth effect of IT/DT is not statistically significant. This finding indicates that better institutional quality enhances the effectiveness of this tax composition in promoting economic growth. It also improves tax collection efficiency and resource allocation. In other words, the results confirm that, to achieve long-run economic growth, fiscal policy should be context-specific (considering the COR level), and the tax mix (IT vs. DT) should be appropriately balanced.

Moreover, this paper found that human capital, proxied by education (*EDUS*), can significantly boost growth in developing countries. This result is consistent with Lucas (1988, 1990), who argued that human capital accumulation and technology can drive growth and generate increasing returns. Similarly, our results showed that POP can enhance growth in developing countries. FDI correlated positively and significantly with growth in the GMM model.

This study controlled for total tax as a percentage of GDP to isolate the level effect of total tax on growth and found that IT/DT was initially insignificant but became significant and positive once it was interacted with COR in the GLS and GMM estimations. The findings support the main hypothesis of this study: the growth effect of tax composition varies depending on institutional quality (COR).

V. Additional Case Study of Nepal

This research further performed a separate time series analysis as an additional case study[1] to investigate the relationship among economic

[1] This study presents the Nepal case study, which adopts the ARDL model

growth, proxied by per capita GDP; tax structure (DT and IT); and the moderating role of institutional quality, proxied by COR, in Nepal. An autoregressive distributed lag (ARDL) bounds-testing approach have been adopted and employed annual time series data from 1991 to 2022 to identify the long- and short-term effects. This study selected Nepal for the case study owing to its weak fiscal capacity, narrow tax base, and fragile governance structure. Moreover, Nepal is one of the countries included in the baseline panel data analysis. The Nepalese tax system is highly sensitive to corruption primarily because of discretionary tax enforcement and policy-level corruption, which can result in laws that favor specific business groups (Thapa, 2025). This institutional context makes Nepal an appropriate case for examining the nexus among taxation, corruption, and economic growth. Moreover, Nepal's ongoing institutional transition and persistent informality exhibit substantial time-series variation, allowing for meaningful robustness assessments of the panel-based results.

This research constructed a proxy for COR using annual reports from the Commission for the Investigation of Abuse of Authority (CIAA) of Nepal. Specifically, the number of cases registered by the CIAA has been considered as an indicator of COR. A high number of registered cases reflects active investigation and enforcement by the government to reduce corruption in public institutions. In this sense, a high number of corruption cases indicates strong detection mechanisms, an improved rule of law, and enhanced administrative capacity. This approach is conceptually consistent with the World Bank's COR indicator, which captures perceptions of corruption as well as broad governance dimensions, including the rule of law, government effectiveness, regulatory quality, political stability, and voice and accountability. The tax data have been obtained from the Nepal Rastra Bank (NRB), the country's national central bank. The NRB is considered a more reliable source than other available data providers, ensuring a high degree of data quality and accuracy. Because data on corruption were available only from 1991, the dataset covers the period 1991–2023

This study used the participation rate in the Secondary Education Examination (SEE), previously known as the School Leaving

explicitly, as an additional country-specific case study that complements the panel findings. This analysis aims to provide supportive evidence from a time series perspective.

TABLE 4
VARIABLE DESCRIPTIONS

Variable	Variable name and measure	Source
PGDP	GDP per capita, PPP (constant 2021 international $)	WDI
Tax	Total tax revenue (% of GDP)	NRB
IT	Taxes on goods and services (% of GDP)	NRB
DT	Taxes on income, profits, and capital gains (% of GDP)	NRB
COR	Log of number of corruption cases registered by CIAA-Nepal	CIAA
EDUS	SEE participation rate (% of 15–19 years age group)	NRB
GCF	Gross capital formation (% of GDP)	WDI
OPEN	Import + export (% of GDP)	WDI

Note: WDI refers to the World Development Indicators from the World Bank, NRB refers to the Nepal Rastra Bank, and CIAA refers to the Commission for the Investigation of Abuse of Authority of Nepal.

Certificate examination, or grade 10 examination, as a proxy for human capital.[2] The examination represents the minimum formal educational qualification required for entry into higher secondary education and the formal labor market in Nepal and serves as a widely recognized screening device for employers. The examination indicates the completion of compulsory secondary education (i.e., middle school graduation) and is a critical educational threshold in the Nepalese education system. Individuals who take the SEE are believed to have acquired basic knowledge, skills, and literacy, which can enhance productivity. Thus, the SEE participation rate can capture the proportion of the youth cohort that has reached a minimum human capital threshold relevant to economic activity. This research constructed the indicator as the number of students who participated in the SEE divided by the total population of individuals aged 15–19 years, multiplied by 100. The variable human capital is denoted by (EDUS). The data on male and female individuals aged 15–19 years were collected from the World Bank, while the data on the SEE participants

[2] Information can be found at https://thehimalayantimes.com/nepal/secondary-education-exams-begin-today and https://thehimalayantimes.com/kathmandu/bidya-devi-bhandari-certifies-education-act-eighth-amendment-bill

Table 5
Summary Statistics

Variables	Mean	Median	Maximum	Minimum	Std. Dev.	Observations
PGDP	3.45	3.43	3.68	3.27	0.13	32
TAX	12.02	5.84	38.91	1.43	11.64	32
IT/DT * COR	0.90	0.90	1.19	0.69	0.10	32
OPEN	47.47	46.09	64.04	36.30	6.39	32
EDUS	9.54	9.96	15.99	3.22	4.26	32
GCF	28.53	28.03	41.38	20.25	5.84	32
IT/DT	0.34	0.32	0.71	0.22	0.11	32
COR	3.70	3.63	4.49	2.93	0.55	32

Table 6
Dickey–Fuller Test for Unit Root

	Intercept		Trend		Results
Variable	Level	First difference	Level	First difference	
PGDP	0.97 (0.99)	−5.36*** (0.000)	−1.96 (0.62)	−5.48*** (0.00)	I (1)
TAX	−1.62 (0.64)	−4.65*** (0.001)	−1.961 (0.62)	−4.68*** (0.001)	I (1)
IT/DT	−6.82*** (0.00)		−5.53*** (0.00)		I (0)
COR	−0.44 (0.91)	−3.86*** (0.002)	−2.28 (0.44)	−3.78** (0.01)	I (1)
IT/DT * COR	−4.51*** (0.001)		−4.93*** (0.001)		I (0)
EDUS	−0.24 (0.932)	−3.46** (0.043)	−3.46** (0.043)	−6.53*** (0.00)	I (1)
OPEN	−2.15 (0.22)	−5.34*** (0.000)	−3.25* (0.07)	−5.28*** (0.001)	I (1)
GCF	−2.29 (0.17)	−7.01*** (0.000)	−3.71** (0.022)	−6.87*** (0.000)	I (1)

Note: ADF statistics are provided with the corresponding probability value in parentheses; ***, **, and * denote the 1%, 5%, and 10% significance levels, respectively.

were collected from NRB reports.

Table 5 presents the summary statistics, which reveal that Nepal has made substantial progress in trade openness, with values ranging from 36.30 to 64.04. The target variable, IT/DT, exhibits limited variation over the study period, as indicated by its small standard deviation of 0.11. By contrast, noticeable progress can be seen in COR and gross capital formation in Nepal. Before proceeding with the empirical analysis, this paper conducted stationarity checks and found that the variables were integrated in mixed orders: some were I (1), whereas others were I (0). Given our relatively small sample and the mixed integration order of the variables, the ARDL model provides clear advantages over standard VAR or VECM models. The ARDL model is considered superior because including the lags of the dependent and independent variables can help reduce potential endogeneity problems. The model is selected based on the AIC values, which are provided in Appendix 2.

A. ARDL Model

Cointegration analysis using the ARDL bounds-testing approach is introduced by Pesaran et al. (2001) to determine the short- and long-term relationships between growth and tax composition in Nepal, utilizing the error correction model (ECM). By referring to Pesaran et al. (2001), Narayan and Smyth (2004), and Duasa (2007), the following ARDL specification is constructed.

$$\begin{aligned}
\Delta PGDP_t = {} & \alpha_0 + \sum_{i=1}^{p} \mu_i \left(\Delta PGDP_{t-i}\right) + \sum_{i=0}^{p} \lambda_i \left(\Delta TAX_{t-i}\right) \\
& + \sum_{i=0}^{p} \delta_i \left(\Delta IT / DT_{t-i}\right) + \sum_{i=0}^{p} \theta_i \left(\Delta COR_{t-i}\right) + \sum_{i=0}^{p} \gamma_i \left(\Delta \frac{IT}{DT} * COR_{t-i}\right) \\
& + \sum_{i=0}^{p} \eta_i \left(\Delta OPEN_{t-i}\right) + \sum_{i=0}^{p} \tau_i \left(\Delta EDUS_{t-i}\right) + \sum_{i=0}^{p} \omega_i \left(\Delta GCF_{t-i}\right) \\
& + \beta_1 PGDP_{t-1} + \beta_2 TAX_{t-1} + \beta_3 IT/DT_{t-1} + \beta_4 COR_{t-1} \\
& + \beta_5 \frac{IT}{DT} * COR_{t-1} + \beta_6 OPEN_{t-1} + \beta_7 EDUS_{t-1} + \beta_8 GCF_{t-1} + \varepsilon_t,
\end{aligned} \tag{III}$$

where λ_0 is the intercept, Δ is the first-difference operator, and ε_t represents the error term. Based on the optimal lag structure presented in Appendix 1, a maximum lag length of one was selected.

The ARDL bounds-testing approach (long form and bounds test)

Table 7
ARDL Bounds Test

Test Statistic	Value	Significance	Lower Bound I (0)	Upper Bound I (1)
F statistic	9.402659	1%	2.73	3.9
		5%	2.17	3.21
		10%	1.92	2.89

was applied to identify whether a cointegrating relationship links the variables in Table 7. Because the F statistic (9.402) exceeds the lower bound I (0) and the upper bound (1), a valid long-run cointegrating relationship links the variables. Accordingly, the long- and short-term dynamics were estimated.

The short-term coefficients and error correction term (ECT) using the ECM was obtained, as follows:

$$\begin{aligned}\Delta PGDP_t &= \lambda_0 + \sum_{i=1}^{p}\lambda_{1i}\left(\Delta PGDP_{t-i}\right) + \sum_{i=0}^{p}\lambda_{2i}\left(TAX_{t-i}\right) \\ &+\sum_{i=0}^{p}\lambda_{3i}\left(\Delta IT\,/\,DT_{t-i}\right) + \sum_{i=0}^{p}\lambda_{4i}\left(\Delta COR_{t-i}\right) + \sum_{i=0}^{p}\lambda_{5i}\left(\Delta \frac{IT}{DT} * COR_{t-i}\right) \\ &+\sum_{i=0}^{p}\lambda_{6i}\left(\Delta OPEN_{t-i}\right) + \sum_{i=0}^{p}\lambda_{7i}\left(\Delta EDUS_{t-i}\right) + \sum_{i=0}^{p}\lambda_{8i}\left(\Delta GCF_{t-i}\right) \\ &+\lambda_9 ECT_{t-i} + \varepsilon_t\end{aligned} \tag{IV}$$

The speed-of-adjustment parameter is denoted by λ_9, which indicates how much of the long-term disequilibrium has been corrected in each period.

B. Long-term Results

The negative and statistically significant coefficient of ECT_{t-1} confirms a long-term relationship among the variables. The estimated coefficient of −1.42, significant at the 1% level, indicates a high speed of adjustment toward long-term equilibrium. Although the magnitude exceeds the conventional range, the result is plausible in the context of Nepal. Nepal's economy experienced several major shocks, including a decade-long civil conflict (1996–2006), the devastating earthquake of April 25, 2015, and the COVID-19 pandemic. These events caused substantial deviations from long-term output trends. In the aftermath

TABLE 8
ARDL LONG-TERM ESTIMATION

Variable	Coefficient	Std. Error	Prob.
TAX	0.005167***	0.000426	0
IT/DT	−0.20832***	0.058758	0.0121
EDUS	0.010006***	0.001665	0.001
GCF	−8.45E-05	0.001144	0.9435
OPEN	−0.00097*	0.000467	0.0829
(IT/DT) * COR	0.063365**	0.02	0.0194
COR	−0.087325*	0.042919	0.0881
C	3.625872	0.133145	0

Note: ***, **, and * denote the 1%, 5%, and 10% significance levels, respectively.

of such shocks, economic activity in Nepal tended to recover rapidly owing to policy-driven reconstruction efforts, sizable foreign aid inflows, and strong remittance receipts, which resulted in a faster-than-average adjustment back to long-term equilibrium, and strong remittance receipts, which resulted in a faster-than-average adjustment back to long-term equilibrium.

The long-term estimates reported in Table 8 indicate that the ratio of IT to DT has a negative and statistically significant effect on economic growth. However, when the tax structure variable is interacted with the COR indicator, the coefficient becomes positive and significant. This finding suggests that IT, relative to DT, can support economic growth in Nepal once corruption is effectively controlled and tax administration efficiency is improved. This finding is consistent with the developing country panel results presented in Table 3. Furthermore, human capital, proxied by the secondary education examination participation rate (*EDUS*), exerts a positive and significant effect on long-term economic growth in Nepal. The overall tax variable is also statistically significant in the long run.

C. Short-term Results

The short-run results from Table 9 indicate that the tax-to-GDP ratio has a negative and statistically significant effect on economic growth, which is consistent with theoretical expectations. An increase

Table 9
Error Correction Regression

Variable	Coefficient	Std. Error	Prob.
ECT_{t-1}	−1.41019***	0.365681	0.0084
D ($PGDP_{t-1}$)	0.21183	0.164731	0.2459
D (TAX)	0.001995	0.001032	0.1014
D (TAX_{t-1})	−0.00415**	0.001126	0.0103
D (IT/DT)	0.014892	0.066	0.829
D (IT/DT_{t-1})	0.162696	0.105324	0.1734
D (EDUS)	0.005764	0.003427	0.1436
D ($EDUS_{t-1}$)	−0.00529**	0.001727	0.0222
D (GCF)	3.32E-05	0.000585	0.9566
D (GCF_{t-1})	0.00134	0.00094	0.2037
D (OPEN)	−0.00035	0.000538	0.5371
D ($OPEN_{t-1}$)	0.000491	0.000621	0.4589
D (IT/DT * COR)	−0.00186	0.015903	0.9105
D (IT/DT * COR_{t-1})	−0.05314	0.03267	0.155
D (COR)	0.056925	0.041754	0.2217
D (COR_{t-1})	0.105738	0.070094	0.1822
C	5.113152	1.376554	0.0099

Note: ***, **, and * denote the 1%, 5%, and 10% significance levels, respectively.

in taxation may reduce the incentives to work, save, and invest, which can decrease short-term economic activities. Similarly, the education variable exhibits a negative short-term coefficient, which indicates that investments in human capital take time to translate into productivity gains and growth-enhancing outcomes. Despite the short-term adjustment costs, the overall tax variable is positive and significant in the long run, highlighting the relevance of fiscal policy dynamics in Nepal's growth process.

Table 10
Diagnostic Test

	F Statistic	P-value	Result
Heteroskedasticity test: Breusch–Pagan–Godfrey	0.55	0.85	No heteroskedasticity problem
Serial correlation LM test: Breusch–Godfrey	1.28	0.32	No serial correlation problem

Diagnostic test results presented in Table 10 indicate that the ARDL models lack serial correlation, because the p-values associated with the F statistic exceed the conventional significance level. In addition, the Breusch–Pagan–Godfrey test confirmed that the models are free from heteroscedasticity, because the p-values associated with the F statistic exceed the standard critical value. The CUSUM and CUSUM of squares tests of the fitted models are presented in Appendix 3, showing that the trend line lies within the critical bounds of a standard 5% level of significance, which confirms parameter stability. These diagnostic tests confirm the stability of the estimated coefficients of the ARDL models.

VI. Discussion and Policy Implications

Tax policy changes can influence the economy in multiple ways. Tax increases can reduce people's disposable income, which can lead to reduced consumption and investment and cause economic downturns. Conversely, tax cuts can stimulate growth by encouraging individuals to work, save, and invest their additional income from lower tax burdens. However, excessive tax cuts may result in budget deficits.

Reducing government spending, borrowing from international organizations, and utilizing national savings are the primary ways through which governments address budget deficits. However, each of these approaches entails considerable drawbacks. A reduction in government spending can decrease aggregate demand, increase unemployment, and slow economic growth. Financing deficits through national savings can raise interest rates, thereby increasing borrowing costs for the private sector and discouraging investment. Likewise, borrowing from international organizations can increase national debt and create a future burden, because the government must allocate resources to repay both interest and the principal. Moreover, external borrowing may expose the economy to exchange rate risks.

From this discussion, the adverse effects of deficit financing on economic growth are evident. Although this paper emphasize the drawbacks of deficit financing associated with tax cuts, policymakers should also acknowledge its advantages—particularly when governments use deficit financing as an instrument for productive investment. Therefore, authorities should design tax structures with differentiated tax bases for different components in a way that does not directly hinder the daily activities of citizens but still generates sufficient revenue to sustain government operations. Moreover, policymakers should be cautious in selecting appropriate tax strategies based on government efficiency and the prevailing COR level (institutional quality).

It is recommended that adjusting the composition of tax types rather than changing overall taxes is a more policy relevant strategy. For example, reducing DT can increase the disposable income of laborers, investors, and the general public, which can increase the demand for goods and thus stimulate investment. Additionally, this particular tax reform can attract foreign investors. Moreover, it is suggested that compensating for the reduction of DT with IT, because IT is less visible to taxpayers. However, policymakers must exercise caution when implementing the tax base for IT. For example, imposing high tax rates on luxury goods and services, alcohol, tobacco, and other activities that can harm the environment would be desirable. However, authorities should not raise taxes on basic consumption goods excessively, thereby maintaining smooth consumption and achieving the desired tax revenue level. This recommendation is consistent with the findings of Mirrlees (2011) and Tanzi and Zee (2000).

In high-corruption environments, tax officials and taxpayers may benefit from tax evasion; thus, an initial tax cut may have little impact on household spending or overall demand. However, over time, tax reductions can help curb corruption, as individuals become less inclined to make bribery payments and more willing to comply with government tax policies when they perceive such policies to be favorable to producers, investors, and consumers (Schneider & Enste, 2000). Thus, the government should exercise caution when formulating policies related to tax changes and tax structures. Additionally, policymakers should adopt distinct strategies for each type of tax structure. This analysis revealed a significant positive effect of IT relative to DT on economic growth in the presence of strong COR.

The relationship between tax policy changes and economic growth involves many issues that remain for future research. This study examined IT and DT. Future studies should incorporate other tax structures to provide more detailed policy implications and enable governments to develop tailored tax policies for each tax category, such as corporate taxes, international trade taxes, import duties, and export duties, to promote economic growth.

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Appendices

Appendix 1
Selected Developing Countries

Selected Developing Countries		
Albania	Ghana	Namibia
Angola	Guatemala	Nepal
Argentina	Honduras	Nicaragua
Armenia	India	North Macedonia
Azerbaijan	Jamaica	Papua New Guinea
Bangladesh	Jordan	Paraguay
Belarus	Kazakhstan	Peru
Belize	Lesotho	Philippines
Burkina Faso	Madagascar	South Africa
Cameroon	Malaysia	Sri Lanka
China	Maldives	Thailand
Colombia	Mali	Togo
Cote d'Ivoire	Mauritius	Tunisia
Dominican Republic	Mexico	Turkiye
Egypt, Arab Rep.	Moldova	Ukraine
El Salvador	Mongolia	West Bank and Gaza
Eswatini	Morocco	
Fiji	Myanmar	

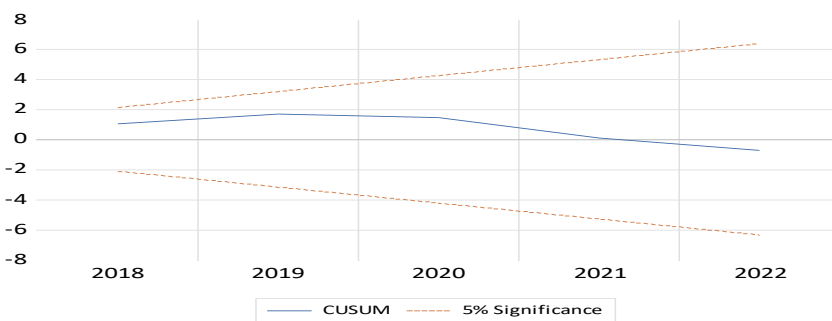
Appendix 2

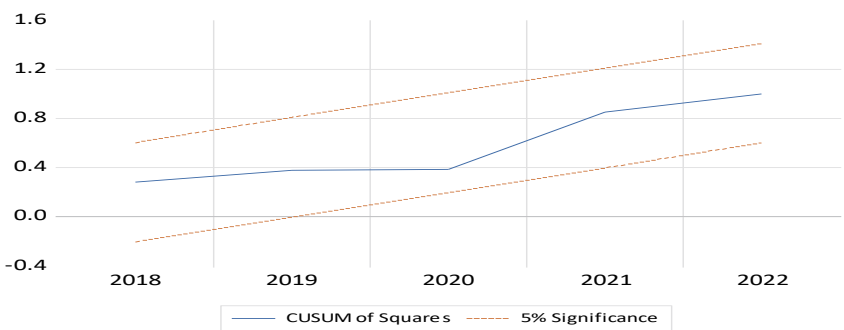
Model Selection Criteria

Model	LogL	AIC*	BIC	HQ	Adj. R-sq	Specification
60	112.48889	−6.547671	−6.038836	−6.381803	0.995917	ARDL (1, 1, 0, 0, 0, 1, 0, 0)
59	113.11309	−6.523425	−5.968333	−6.342479	0.995872	ARDL (1, 1, 0, 0, 0, 1, 0, 1)
58	112.94405	−6.512519	−5.957428	−6.331573	0.995827	ARDL (1, 1, 0, 0, 0, 1, 1, 0)
124	110.86638	−6.507508	−6.044932	−6.35672	0.995683	ARDL (1, 0, 0, 0, 0, 1, 0, 0)
1	113.61823	−6.29795	−5.557828	−6.056689	0.994939	ARDL (1, 1, 1, 1, 1, 1, 1, 1)

Appendix 3

CUSUM and CUSUM of Squares Tests





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