



Examining the Influence of Direct and Indirect Taxation on Economic Growth: A Case Study of Pakistan

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ABSTRACT

Taxation and expenditure administration represents a significant concern for governments at all levels. Taxation plays a crucial role in the funding and formulation of economic policies. This study undertakes a comparative analysis of Pakistan's direct and indirect taxation systems, their impact on economic progress, and their relationship with inflation. The available data indicate that the impact of indirect taxes on economic growth is more significant compared to that of direct taxes. More precisely, a rise of one percent in indirect taxation results in a corresponding increase of 0.49% in GDP, while direct taxation leads to a GDP increase of 0.22%. Indirect taxes have a greater impact on inflation compared to direct taxes. It is recommended to consider long-term planning, expanding the tax base, reducing tax evasion, and enhancing the efficiency of the tax mix strategy. Indirect taxation has the potential to mitigate wealth inequality and foster economic growth. Tax and monetary policy have the potential to reduce inflation levels.

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1. Introduction

Government revenue is important and recognized globally. Governments globally invest in public development in social security, defense, law enforcement, and utilities like water, gas, electricity, transportation infrastructure, and nuclear power. Thus, public finance manages government revenue and expenditures. Federal, provincial, regional, and local financial systems contain tax and non-tax revenue streams. Taxes are the main source of government money, which is used to create economic policies and improve the state. Establishing and implementing a tax structure and technique is crucial to global competitiveness. Economists and scholars, including Thomas, view taxes as mandatory financial payments to the government rather than remunerations for specified services. Taxes are mandatory financial contributions made by residents of a jurisdiction to the ruling authority to fund the state's welfare and economic endeavors.

All nations get their money from taxes on individuals, corporations, and investors. In their research, Aamir et al. (2011) discusses the Four R's: Revenue, Redistribution, Reprising, and Representation. Redistribution involves transferring money from wealthy to poor people,

while revenue is how the government gets money. Reprising involves hazardous object costs, whereas Representation involves government transparency. Progressive, regressive, and proportional taxes create income and consumption inequities. Two types of taxes exist: direct and indirect. Direct taxes affect the taxpayer, while indirect taxes affect others. Sales tax, VAT, excise and customs charges, and tariffs are indirect taxes, according to (Bofah, 2003). However, direct taxes include income, wealth, and property taxes.

Taxation aims to maximise income and minimise distortions. Governments raise revenue through direct and indirect taxation despite political resistance. Taxes greatly affect growth. Public income collection and economic growth depend on them. National economic competitiveness depends on tax policies. Taxation and economic growth were explored by (Mashkoo, Yahya, & Ali, 2010). Company priorities include revenue maximisation. Companies can optimise by reducing expenses or increasing output. The company maximises output-cost differential in both cases. Company productivity is affected by government regulations, especially taxes. Thus, policies impact business decisions. Per Hussain (2005), indirect taxes like excise duty and sales tax affect producer production and resource allocation. A gap exists between needed and supplied goods and services. Taxes impact manufacturing and distribution. Consumers benefit and suffer from direct and indirect taxation (Esmaeel, 2013). Labor-capital income distribution influences productivity. Growing production and worldwide trade have shown how endogenous forces drive output growth (Pereira, Temouri, Jones, & Malik, 2019).

A nation's tax system should reflect its economy, tax capacity, and public service demand. A country's tax system is influenced by its neighbours' economies, histories, and taxes. Some nations have considerably boosted their tax rates, while others have kept them. France and Britain adopted VAT in the 1960s, whereas the US taxed corporations. Engen and Skinner (1996) say indirect taxation grew the economy quicker than direct taxation. Taxes changed. Consumer taxes are rising 30–40% due to VAT. According to Ebrill, Keen, Bodin, and Perry (2001), 70% of the world's population lives in VAT-implemented countries.

Tax policy and economic growth are studied using growth models and tax legislation. Neoclassical (Solow) and endogenous growth theories were presented. Labour and technology are exogenous in Solow's neoclassical growth model. Solow (1956) believed tax policy did not affect economic growth long-term. The endogenous growth theory says internal economic variables drive growth. Tax policy impacts long-term economic growth, says (P. Romer, 1994). Tax policy can limit economic growth if output rises. Reduced taxes can promote demand and help the economy recover from recession. C. D. Romer and Romer (2010) believe taxes increase long-term growth. Scholars discuss tax and policy effects on growth. Savings and investment taxes may hinder growth. High investment taxes may reduce saving and investing. An additional tax on investors and low-savers may hinder productivity and economic growth. Harberger (1962) found that negative tax cuts or subsidies promote R&D. R&D investment distortion is reduced by business tax cuts, enhancing economic growth.

Savings and investment are affected by direct and indirect taxation, but economic growth is affected by many other factors. Some themes of interest are consumption, trade, liberalisation, and exchange rate. Long-term direct and indirect taxes affect these characteristics differently. N. Ahmad, Ahmad, and Yasmeen (2013) state that taxation affects several economic activities, including production and distribution. Direct and indirect taxation affect customers differently and have pros and cons Esmaeel (2013).

The persistence phenomena Inflation changes the economy and ignores revenue to continue growth (Bleaney, 1999; P. Romer, 1993). Inflation can damage government liabilities if not addressed. Thus, previous pricing situations may or may not encourage inflation to boost income. Academics view inflation as a policy variable, and an inflation tax is an alternative to traditional taxes. Both revenue streams incur expenses, but governments use fiscal policy.

Poterba and Rotemberg (1988) state that optimum taxation theory states that tax rates increase inflation.

Taxes impact fiscal policy and aggregate demand. Taxation boosts GDP in expansionary and contractionary fiscal policies. Shocks kill tax cuts and expansionary fiscal plans. The 2007–2009 US financial crisis increased deficits and debt. After decades of deficit reduction, many OECD countries experienced fiscal imbalances. Tax reforms encourage innovation and entrepreneurship. Tax policies effect growth differently based on productivity and progress. Fiscal policy stabilises and mobilises developing nations. Direct taxes account for 20-40% of revenue, whereas indirect taxes account for 80-90%. Tax advantages increase resource investment. Developing nations tax differently. Direct and indirect taxes account for 66% of developing nation taxation. Tax reforms hamper growth. Taxed nations shrink. Pakistan's Federal Board of Revenue collects taxes and nontaxes. Taxation is hot due of Pakistan's low GDP. Taxes impact production, savings, investment, consumption, and trade.

Pakistan heavily taxes indirectly, distorting classifications. Economic problems and rising foreign debts caused a fiscal imbalance. Pakistan has a 10–12% tax-to-GDP ratio. However, efforts are underway to raise it. Fiscal policy shapes Pakistan's economy. The tax system fails due to mismanagement of revenue and spending. Security and politics threaten fiscal stability. Yearly budgets include economic stimulants and subsidies. Pakistan's tax-to-GDP ratio is 42% direct and 41.7% indirect (sales tax). Pakistan's fiscal and monetary policies raise inflation above GDP. Recent decreases don't stop inflation.

Pakistan is improving its tax and budgetary systems to sustain growth despite major economic constraints. The global economy and Pakistan's rapid tax income rise raise concerns about direct and indirect taxation's effects on economic growth. The nation prioritises economic prosperity and independence. Recent tax revenue swing? Direct or indirect taxes? Trend in inflation? Indirect and direct taxes affect inflation.

This study first examines direct and indirect taxation on economic growth. This involves analysing how personal income tax, corporate income tax, product and service taxes, and natural resource revenues affect economic growth. In addition, direct and indirect taxes must be examined on macroeconomic indicators, particularly inflation. This study examines how taxes affect inflation, prices, consumer behaviour, and market dynamics. In conclusion, this paper uses empirical data to promote direct and indirect tax policies. This report advises policymakers on tax structure optimisation, compliance, and sustained economic growth. Our goal is to better understand the relationship between taxation, economic growth, and macroeconomic indicators to influence policy and promote economic growth.

2. Review of Literature

Ojong, Anthony, and Arikpo (2016) analysed tax revenue's impact on Nigeria's economy from 1986 to 2010. They studied corporation income tax and non-oil revenue's effects on Nigeria's economy. Multiple regression models were tested using OLS to determine the dependent-independent connection. Their research shows that petroleum profit tax boosts Nigerian economic growth. No meaningful association exists between corporation income tax and Nigerian economic growth. In their study on the Turkish economy, Korkmaz, Yilgor, and Aksoy (2019) discovered that taxes have a strong and negative correlation with economic growth.

According to Widmalm's study in 2001, there is an inverse correlation between direct income taxes and economic growth. Nevertheless, the impact of indirect taxes on economic growth remains unverified. The aforementioned finding is subsequently corroborated by a recent study conducted in Tanzania Maganya (2020) and another study conducted in Jordan

(Mdanat et al., 2018). Mdanat et al. (2018) examined the tax system in Jordan and its impact on economic growth from 1980 to 2015 using error correcting techniques. Their study presented empirical evidence indicating that the direct and indirect tax structure is inadequate in promoting economic growth in Jordan, especially during periods of weak budgetary performance. Moreover, Jordan possesses an ineffective fiscal framework that should compel legislators to prioritise enhancing the GDP per capita by addressing the significance of consumption taxes and customs charges. They held the belief that sustained economic progress could only be attained through the reduction of poverty and inequities, as well as the improvement of living conditions.

In Pakistan, S. Ahmad, Sial, and Ahmad (2018) conducted a study to analyse the correlation between total tax receipts and economic growth. They used annual time series data from 1974 to 2010. The ARDL bounds testing approach for co-integration was utilised to assess the enduring and immediate link between the variables. The findings indicate that overall tax revenues exert a detrimental and statistically significant impact on long-term economic growth. According to the finding, a 1% increase in overall taxes would result in a 1.25% decrease in economic growth. Thaçi and Gërzhaliu (2021) conducted research on emerging nations and presented evidence supporting the negative correlation between taxation and economic growth. Shahmoradi, Mohamadi Molgharni, and Moayri (2019) found that developed countries exhibit a notable and adverse correlation between the tax revenue-to-Gross Domestic Product ratio.

The study conducted by Tahir, Ali, Ismail, and Hanan (2014) investigated the impact of taxes on the textile sector. The researcher employed secondary data and utilised two models to ascertain that the imposition of excise duty positively impacted the expansion of the textile industry. Conversely, the application of custom duty was shown to have no discernible effect on textile growth, while the implementation of direct tax was seen to have a negative impact, leading to a decline in growth. The findings indicate that there is a need for enhancements in tax incentive schemes. The economy of Pakistan necessitates the establishment of a comprehensive system of direct and indirect taxation, including the imposition of indirect taxes on goods and services.

Canavire-Bacarreza, Martinez-Vazquez, and Vulovic (2013) examined how personal income tax, corporate income tax, general taxes on goods and services, and natural resource export earnings affected Latin American economies from 1990 to 2009. The researchers used vector autoregressive (VAR) methods to study Latin American impacts. They also used the generalized method of moments (GMM) to analyze a larger sample of developing and developed nations. The study found that Latin America's low personal income tax collection rates had no effect on economic growth. However, improving corporate income tax compliance and revenue collection may boost economic growth. This is especially true for Argentina, Mexico, and Chile, which export natural resources. The study also found that Latin American nations' consumption taxes helped their economies

Tax benefits in Ugandan industrial enterprises were examined by Mayende (2013). Manufacturing performance can be assessed using panel data to estimate gross sales and value-added. According to study, enterprises that receive tax advantages had larger gross sales than value-added firms. Optimizing tax incentives through simplification can boost manufacturing performance. In addition to technical education, skills development, and manager and management competency, the tax incentive improves performance.

N. Ahmad et al. (2013) suggested direct taxation for progressive Revenue in industrialized nations. Business indirect taxation is worse in poorer countries like Pakistan. He experimentally examined Pakistan's economic growth and taxation. GDP was dependent, taxes, exchange rate, life expectancy, and trade liberalization independent. Taxes and exchange rates

negatively affected economic Growth, whereas life expectancy and commerce had beneficial effects.

Ogbonna and Ebimobowei (2012) evaluated Nigeria's 1994–2009 economic development and tax reforms. He employed secondary data and descriptive and econometric research to set the goal. Tax changes and granger caused Nigeria's economic Growth. Ogbonna and Ebimobowei found that taxation sector reforms boost economic Growth, revenue-generating machinery, and administration to start socially needed expenditure, real production growth, and per capita. He further advised that these tax policies are not sustainable for economic Growth without corrupt-free and efficient tax administration. Many theoretical studies have employed endogenous growth models to promote economic growth tax reforms, according to (Engen & Skinner, 1996). All of these analyses found that tax distortions would boost Growth.

Acosta-Ormaechea and Yoo (2012) examined long-term tax mix and economic Growth in 69 nations. They used 1970–2009 complete cross-sectional data. 21 high-income, 23 middle-income and 25 low-income nations comprise these 69 complete cross-sectional countries. These countries found that higher income taxes and lower consumption and personal taxes lowered Growth over time. Income taxation, social security benefits, and personal wealth taxes are negatively associated with Growth than corporate taxes; shifting taxes from income to personal and property taxes showed strong positive correlation; and decreasing income taxes while increasing sales and value added taxes accelerated Growth.

Ilaboya and Mgbame (2012) employed the auto regressive distributed lag model (ARDL) on Nigerian time series data to compare developing countries. After diagnostic tests, he used cointegration and error correction to assess short- and long-term model suitability. The indirect tax had a negative and insignificant effect on economic Growth. The total tax ratio to federal Revenue has a substantial t-value (19.92) and positive coefficient (2.08). The computed findings showed that Nigeria should change from indirect tax as a growth driver.

The study conducted by Mutaşcu and Dănuleşiu (2011) investigated the relationship between taxes and economic growth by employing the Vector Autoregressive Model (VAR) on a time series dataset spanning from 1999 to 2010. In the context of Romania, there exists a reciprocal relationship between economic growth and taxation. The findings suggest that it is advisable to exercise caution in implementing an excessively stringent tax policy in Romania, as there are various factors that can exert an influence on its effectiveness. The study conducted by Taha, Nanthakumar, and Colombage (2011) investigated the economic growth of Malaysia from 1970 to 2009, as well as the corresponding government tax income. Taxes have a significant impact on the allocation of resources and the overall economic growth. The present analysis has identified a unidirectional association between economic growth and total tax income generated by the government. Furthermore, it has been determined that a pace of adjustment of 21% is required to attain equilibrium when transitioning from the short run to the long run.

The study conducted by Stoilova and Patonov (2020) investigated alterations in the distribution of basic tax burden across 27 European countries between the years 1995 and 2010. A comparative analysis was conducted to assess the tax-to-GDP ratio among different nations. The categorization of total tax revenue into direct, indirect, and social security contributions serves as a means to delineate the tax system. The focus of regression analysis lies in examining the impact of taxation on economic growth. The researchers discovered that the implementation of direct taxation is more equitable and conducive to fostering economic growth in Europe.

The tax determinants in Pakistan and India were empirically explored by Aamir et al. (2011). Both nations utilized the regression model and conventional least square methodology.

The data utilized in this study spans from the academic years 1999-2000 to 2008-2009, and has been sourced from many reliable sources in both nations. The coefficient of the regression model indicates that Pakistan generates a higher amount of indirect tax revenue compared to India. Both nations possess distinct tax systems and institutions. Indirect taxation has been found to exacerbate socioeconomic inequality and perpetuate labor exploitation. In their study, Azeem, Saqi, Mushtaq, and Samie (2013) employed a dataset spanning the years 1975 to 2010 to analyze the factors influencing tax income in Pakistan in the context of trade liberalization, specifically focusing on free trade. The econometric model examining the relationship between tax revenue and free trade revealed a negative correlation between exchange rate and population with tax revenue. The process of urbanization has been found to have a positive impact on tax income. Additionally, it is suggested that the utilization of trade liberalization be incorporated in the formulation of monetary and fiscal policy.

3. Materials and Methods

This section provides an overview of the study's methodology and data gathering procedures employed to assess the impact of indirect and direct taxes on economic growth and key macroeconomic indicators. The primary objective of this study is to analyse the effects of direct and indirect taxation on the economic development of Pakistan, with a particular emphasis on their impact on inflation and other key economic indicators. The study will investigate the implications of both direct and indirect taxation on the economic progress of Pakistan. This examination will include a variety of direct taxes, such as income tax, corporation tax, wealth tax, gift tax, inheritance duty, and worker's welfare tax, along with numerous indirect taxes, including customs duties, federal excise duties, sales tax, surcharges, and non-judicial stamp duties. The material provided in this context originates from the (Kamran, Syed, Amin, & Ali, 2014). Indirect taxes encompass the entirety of the aforementioned. This category encompasses sales tax, surcharges, and non-judicial stamp taxes. The quantification of economic growth relies on the gross domestic product (GDP) as the dependent variable, whereas the elements of direct and indirect taxes are considered independent variables. The present study employs secondary data spanning the years 1979 to 2021 for its quantitative analysis.

3.1. General form of the Model

To assess the influence of direct and indirect taxation on the economic growth of Pakistan, the Cobb-Douglas production function is employed. Additionally, a simple regression model is utilized in the second model to examine the relationship. The general form of the model is presented below:

$$GDP = A(L^\alpha K^{1-\alpha}), \quad CPI = f(DIT, IDT); \text{ Whereas;}$$

$$FDP = \text{Per Capita Gross Domestic Product}$$

$$L = \text{Lbaour (population and } K = \text{Capital (Gross Fixed Capital Formation)}$$

" α " and " $1-\alpha$ " are partial elasticizes relative to variables. "A" is the policy actions variables, i.e., direct and indirect taxes.

CPI = Consumer Price Index, DIT = Direct Tax, IDT= Indirect Tax

Table 1
Composition of Variables (Independent Variables)

Direct Taxes	Indirect Taxes
Income Taxes	Custom Duty
Corporation Taxes	Federal Excise Duty
Wealth Taxes	Value Added Tax
Gift Tax and Estate Duty	Sales Tax

 Worker's Welfare Tax
 Capital Value Tax

 Surcharge
 Stamp-non Judicial

3.2. Econometric Model

To investigate the effect that direct and indirect forms of taxation have on the Gross Domestic Product (GDP).

$$\text{For GDP; } LnPCGDP_t = A + \alpha_1 L(L)_t + \alpha_2 Ln(k)_t + \alpha_3 Ln(IDT)_t + \alpha_4 Ln(DT)_t + \mu_t \quad (1)$$

To check the impact of direct and indirect taxation on consumer price index (CPI) inflation.

$$\text{For CPI; } CPI_t = \beta_0 + \beta_1(DIT) + \beta_2(IDT)_t + \mu_t \quad (2)$$

3.3. Ordinary Least Square Method

The very important Ordinary Least Square (OLS) method is applied to check the impact of direct and indirect taxation on economic growth. The least square method has some unique, best, linear, unbiased estimation properties which have made the most useful and popular method of regression analysis. While A , a_1 , a_2 , a_3 and a_4 are the regression coefficients of GDP model with μ_t random error term. β_0 , β_1 and β_2 are the regression coefficients of CPI model with μ_t random error term (Gujarati, 2021).

3.4. Method of Analysis

The data analysis aims to investigate how taxes affect economic growth. It is crucial to consider the intercept value, marked by the letter A , as well as the variable's average value while time is kept constant, denoted by the letter β_0 . When performing trend research, treating time as a constant is unreasonable. The trend line will start above the horizontal line if the intercept value is positive. The size of the intercept term is determined by the separation between the trend line's starting point and the horizontal line. Economic significance of intercept has been unimportant in trend series analysis. The value of alphas and betas coefficients a_1 , a_2 and a_3 and β_1 , β_2 and β_3 are known as regression coefficients. These regression coefficients specify the level to which the value of dependent variables may change due to one unit change in the value of independent variables. This change may be a positive or negative numerical value. The slope of a trend line might be steeper or flatter based on the value of the alpha and beta coefficients, which define their value. The value of coefficients will be positive if there is a direct relationship and vice versa (Gujarati, 2021). μ is a random variable known as the error term or disturbance term. The residual term μ demonstrates the efficiency of all those factors and independent variables which are not involved in the Model.

3.5. Unit Root Test

It is commonly noted that a substantial fraction of time series variables display non-stationarity at the individual level. This tendency is observed across several contexts. A non-stationary time series can be identified by the presence of either a non-constant mean, a non-constant variance, or both of these characteristics. A wide array of formal and informal approaches can be employed to assess the stationarity of a given phenomenon. The present study utilizes formal methodologies, specifically the Dickey-Fuller (DF) and Augmented Dickey-Fuller (ADF) unit root tests. Informal approaches comprise the utilization of graphical analysis and the study of correlograms through empirical testing. During the course of our inquiry, we will choose to reject the null hypothesis if the calculated value of the Augmented Dickey Fuller (ADF) test is lower than the crucial threshold. The empirical findings suggest the presence of a unit root within the dataset. The concept of stationarity pertains to the property of a phenomena wherein its characteristics exhibit constancy across time, specifically with regards

to the mean, variance, and standard deviation, as stated by Dickey and Fuller (1979) and (Gujarati, 2021). The concept of stationarity pertains to the property wherein parameters stay invariant or unchanging throughout the course of time.

3.6. Cointegration Regression

When the variables in the model achieve stable behaviour at the first difference, denoted as $I(1)$, it is common for the time series data to display false or nonsensical regression. Let us consider a hypothetical scenario where there exists a correlation between the variables Y and X , both of which are characterised as non-stationary $I(1)$ series. In the context of regression analysis, it is anticipated that the residuals exhibit stationarity at the level of integration $I(1)$. In the above scenario, it is deemed that there exists a sustained association between the variables.

$$Y = \beta_0 + \beta_1 X_t + \mu_t$$

3.7. Steps for Augmented Engel Granger Cointegration (AEG) Test

First of all, Null and Alternate hypothesis is made;

$H_0: \theta = 0 \rightarrow$ there is no cointegration.

$H_1: \theta < 0 \rightarrow$ there is cointegration.

The following steps are performed in Augmented Engel Granger (AEG) Test;

(1) Take the log of Variables.

(2) Run the separate regression on both models;

$$(3) \ln PCGDP_t = A + \alpha_1 L(L)_t + \alpha_2 \ln(k)_t + \alpha_3 \ln(IDT)_t + \alpha_4 \ln(DT)_t + \mu_t \quad (1)$$

$$(4) CPI_t = \beta_0 + \beta_1(DIT) + \beta_2(IDT)_t + \mu_t \quad (2)$$

(5) Saved the residuals, u_t

(6) Used the estimated in the auxiliary regression model

$$\Delta u_t = \omega u_{t-1} + e_t, \quad \text{Critical Values (Asteriou \& Hall, 2021).}$$

3.8. Error Correction Model

Let us consider the scenario where Y and X represent two variables, and they are integrated at order one ($I(1)$). In this particular context, the utilisation of an error correction model (ECM), alternatively known as an error correction mechanism (ECM), can be employed to investigate the nature of their interaction. This approach incorporates the error term from the previous regression as a lagged term, and the presence of co-integration serves as evidence for the existence of a short-term relationship. A general representation of an error correcting model can be expressed as follows:

$$\Delta y_t = \chi_0 + \chi_1 \Delta \chi_t - \tau u_{t-1} + \epsilon_t$$

Where τ is the error correction term coefficient and shows the speed at which the long-run disequilibrium is adjusted. This coefficient should be negative (Asteriou & Hall, 2021).

4. Results And Discussion

The main aim of this study endeavor is to examine the effects of both direct and indirect taxes on the overall economic growth. Through this assessment, we want to determine the comparative importance of direct taxes in promoting economic growth in relation to indirect taxes. Numerous factors have been recognized as significant predictors of economic growth, encompassing gross domestic product (GDP) per capita, the existence of labor and capital, inflation, the consumer price index (CPI), and both direct and indirect taxation. These several

factors collectively influence the course of economic development. The analytical phase of this investigation is comprised of two discrete components. The initial section of the analysis focuses on the fundamental purpose of direct and indirect taxes in the context of fostering economic growth. The latter component of this study centers on the secondary aim of direct and indirect taxes in the context of inflation levels within the Pakistani economy.

4.1. Diagnostic Test for Model – I

Model – I is GDP, where the impact of direct and indirect taxation on Pakistan's economic Growth is empirically analyzed using the cobb-Douglas production function model.

$$Y = AL^{\alpha}K^{1-\beta}$$

First we determine Y which is our Growth by using Labour and capital as population and Gross fixed capital formation proxies. A is the efficiency parameter. Direct and indirect taxation is employed in the Model to check the impact on economic Growth. Various diagnostic tests are applied on the data set: Stationarity, Normality test, Serial Correlation test, Cointegration test and Multicollinearity test.

4.2. Stationarity Test

In numerous instances, it is seen that a substantial fraction of time series data demonstrates non-stationarity, either at the original level or subsequent to the application of first differencing. The presence of non-stationarity can result in the production of ratios, statistics, and outcomes that lack significant interpretation or contain errors. The Augmented Dickey Fuller (ADF) test is frequently utilized to evaluate the stationarity of data and determine the stationarity of variables. The findings displayed in Table 4.1 demonstrate that the Augmented Dickey-Fuller (ADF) statistics surpass the critical values at the significance levels of 1%, 5%, and 10%. This implies that all variables lack stationarity at the base level and do not demonstrate stationarity even after undergoing the first differencing process. Therefore, it is important to utilize a logarithmic transformation in this specific situation. The variables are subjected to logarithmic transformations, followed by the subsequent application of the augmented Dickey-Fuller (ADF) test. The results indicate that, upon applying the first difference, the series is currently stationary. This suggests that the variables are integrated at order one, designated as I (1).

Model – I after transformation is;

$$\ln PCGDP_t = A + \alpha_1 \ln(L)_t + \alpha_2 \ln(k)_t + \alpha_3 \ln(IDT)_t + \alpha_4 \ln(DT)_t + \mu_t$$

Table 2
ADF Statistic before Transformation (At Level)

Name of Variables	ADF Statistics	Critical Values		
		at 1%	at 5%	at 10%
Per Capita Gross Domestic Product	0.25	-3.63	-2.94	-2.61
Population (L)	-1.34	-3.63	-2.94	-2.61
Gross fixed capital formation (K)	-0.94	-3.63	-2.94	-2.61
Indirect Tax (IDT)	-0.36	-3.63	-2.94	-2.61
Direct Tax (DT)	-0.76	-3.63	-2.94	-2.61

Source: Self estimation

Table 3
ADF Statistic after log Transformation (at First Differenced)

Name of Variables	ADF Statistics	Critical Values		
		at 1%	at 5%	at 10%
Per Capita Gross Domestic Product	-4.98	-3.63	-2.95	-2.61
Population (L)	-6.1	-3.63	-2.95	-2.61

Gross fixed capital formation (K)	-4.81	-3.63	-2.95	-2.61
Indirect Tax (IDT)	-6.66	-3.63	-2.95	-2.61
Direct Tax (DT)	-4.15	-3.63	-2.95	-2.61

Source: Self Estimation

4.3. Cointegration Test

Variables are classified as co-integrated of order I(1) when a relationship exists between the dependent and independent variables, and all of these variables demonstrate stationarity at the first difference, which is represented as I(1). The preceding tables provide compelling evidence that both the dependent and independent variables demonstrate stationarity when observed at the first difference. The utilization of integration analysis is being utilized in order to determine the existence of a persistent relationship between the variables. The objective of this research entails performing a Simple Ordinary Least Square (OLS) estimation. The residuals of the Ordinary Least Squares (OLS) model are preserved, and their stationarity is evaluated by employing the Augmented Dickey Fuller (ADF) test.

The Engel-Granger test is employed to ascertain the stationarity of the error term. All variables are integrated at the same order, namely order I(1). The error term in a level model demonstrates stationarity at the level, specifically represented as $e(t)$ (where t denotes time). Based on the Engel-Granger test, the results of the equation suggest that the observed relationship is not coincidental and there exists empirical support for cointegration. The results of the Engel Granger statistics are displayed in Table 4.

Table 4
ADF Statistic for Residual

Name of Variables	ADF Statistics	Critical Values		
		at 1%	at 5%	at 10%
Residual	-2.8	-2.63	-1.95	-1.61

Source: Self Estimation

After doing the Augmented Dickey Fuller (ADF) test and Engel Granger test, it has been established that there is evidence of a long-run relationship in Model - I. The Ordinary Least Square (OLS) estimation procedure was conducted, and the resulting outcomes are presented in Table 4.4. The model is considered to be well-specified, as evidenced by the probability value of the F-statistics being equal to 0.00. The R-squared value indicates that 99.73% of the variance in the dependent variable, per capita gross domestic product, can be attributed to the independent variables, namely labour, capital, indirect taxation, and direct taxation, while holding all other factors constant. Regression model after OLS estimation is;

$$\ln PCGDP_t = -1.09 + 0.17\ln(L)_t + 0.12\ln(k)_t + 0.49\ln(IDT)_t + 0.22\ln(DT)_t + \mu_t$$

The study utilizes the Cobb-Douglas production function to analyze the impact of both direct and indirect taxation on the economic growth of Pakistan. The growth is determined by the utilization of the labor and capital variables, with direct and indirect taxation being the key variables of interest. The statistic used to measure labor in an economy is the employed population, while the metric used to measure capital is Gross Fixed Capital Formation. The labor coefficient demonstrates a positive correlation between labor and per capita gross domestic product (GDP), with a 1 percent increase in labor being linked to a 0.17 percent increase in per capita GDP, holding all other variables equal. Similarly, an increase of 1 percent in capital would lead to a proportional gain of 0.12 percent in per capita gross domestic output. The prevailing understanding on the issues under scrutiny suggests that a marginal increase of 1 percent in indirect taxation would provide a corresponding rise of 0.49 percent in per capita gross domestic product, under the assumption that all other variables remain constant. The data related to indirect taxes demonstrates statistical significance, as evidenced by the t-statistic (3.90) and probability statistic (0.00). Similar to the impact of direct taxes, a

1 percent increase in direct taxation would lead to a proportional 0.22 percent increase in per capita GDP domestic product, on the assumption that all other variables remain constant. The statistical significance of the data related to direct taxes is substantiated by the t-statistic value of 3.89 and the probability statistic value of 0.00. The average value of the dependent variable, also known as the constant, is -1.09 when all other dependent variables are held constant.

The aforementioned statistics suggest that indirect taxes has a greater impact on per capita gross domestic product in Pakistan's economic growth over a long period of time compared to direct taxation. The research undertaken by Aamir et al. (2011) examines the long-term consequences of taxation.

Table 5
OLS Result where Dependent Variable is PC-GDP

Variables	Coefficients	Standard Error	t - statistics	Probability Value
Constant	-1.09614	1.094975	-1.001063	0.3245
L	0.172405	0.453569	0.380108	0.7065
K	0.121942	0.104495	1.166965	0.2521
IDT	0.497754	0.127553	3.902325	0.0005
DT	0.22566	0.057971	3.892628	0.0005
R-squared		0.997301	Durbon Watson Statistic	0.530265
Adjusted R-square		0.996953		
F-statistic		2864.030	Probability (F-statistic)	0.00000

Source: Self Estimation

4.4. Error Correction Mechanism (ECM)

The subsequent phase involves the development of the Error Correction Model, which occurs subsequent to the computation of the long-term relationship between the variables. An error correction model is constructed in order to examine the presence of a short-run relationship between the variables. The error term in the aforementioned table 4.3 exhibits stationarity at the level, hence enabling the functioning of error correction devices. The Error Correction Mechanism (ECM) estimate for Model-I's per capita GDP from 1979 to 2021 is as follows:

$$\Delta \ln PCGDP = 1.87 - 0.76\Delta \ln(L) + 0.13\Delta \ln(k) + 0.04\Delta \ln(IDT) - 0.03\Delta \ln(DT) - 0.02\text{Error term}$$

The results of the Error Correction Model, as shown in Table 5, suggest that there is no significant short-term relationship between the variables, as the error term is minimal. Although direct and indirect taxation are statistically insignificant, they remain the primary concerns. The significance of capital is paramount, while the labour variable holds less importance. The findings of this study indicate that a significant and enduring association exists alone between labour, direct taxes, and indirect taxes. Given that the coefficient of error has a negative value, it may be inferred that the process of disequilibrium will gradually be rectified over the course of each year, with a rate of adjustment amounting to 2%.

Table 6
Detailed Result of Error Correction Model for GDP

Variables	Coefficients	Standard Error	t - statistics	Probability Value
Constant	1.872743	0.648554	2.887566	0.0073
L	-0.767496	0.268531	-2.858134	0.0078
K	0.137705	0.061258	2.247954	0.0324
IDT	0.043656	0.074967	0.582339	0.5648
E1(-1)	-0.031032	0.0345	-0.899476	0.3758
DT	-0.20369	0.107668	-1.891822	0.0685
R-squared		0.298982	Durbon Watson Statistic	1.958477
Adjusted R-square		0.178117	Probability (F-statistic)	0.055315

Source: Self Estimation

4.5. Diagnostic Test for Model – Ii

Model – II is CPI, where the impact of direct and indirect taxation on Pakistan's consumer price index is empirically analyzed using a regression model with the ordinary least square (OLS) method.

$$CPI_t = \beta_0 + \beta_1 DIT + \beta_2 IDT + \mu_t$$

Various diagnostic tests are applied on the data set: Stationarity, Normality test, Serial Correlation test, Cointegration test and Multicollinearity test.

4.6. Stationarity Test

In numerous cases, it is seen that a substantial fraction of time series data displays non-stationarity, either at the original level or following the application of first differencing. The presence of non-stationarity can result in the production of ratios, statistics, and outcomes that lack significant interpretation and have the potential to be misleading. The Augmented Dickey-Fuller (ADF) test is utilized to evaluate the stationarity of data and determine the stationarity of variables. The results displayed in Table 6 demonstrate that the Augmented Dickey-Fuller (ADF) statistics surpass the critical values at the significance levels of 1%, 5%, and 10%. This implies that the variables being examined are non-stationary at a specific level and do not demonstrate stationarity even after undergoing initial differencing. Therefore, it is essential to utilize a logarithmic transformation in the study. The variables are subjected to logarithmic transformation, after which the ADF test is re-executed. The findings indicate that the series has stability when considering the initial difference, implying that the variables possess an integration order of one, commonly referred to as I(1). The results are displayed in Table 7. The model that has undergone transformation is referred to as "Model I."

$$\ln CPI_t = \beta_0 + \beta_1 \ln(DIT) + \beta_2 \ln(IDT) + \mu_t$$

Table 7
ADF Statistic before Transformation (At Level)

Name of Variables	ADF Statistics	Critical Values		
		at 1%	at 5%	at 10%
Consumer Price Index (CPI)	0.39	-3.63	-2.95	-2.61
Indirect Tax (IDT)	-0.36	-3.63	-2.94	-2.61
Direct Tax (DT)	-0.76	-3.63	-2.94	-2.61

Source: Self Estimation

Table 8
ADF Statistic after log Transformation (at First Differenced)

Name of Variables	ADF Statistics	Critical Values		
		at 1%	at 5%	at 10%
Consumer Price Index (CPI)	-2.94	-3.63	-2.95	-2.61
Indirect Tax (IDT)	-6.66	-3.63	-2.95	-2.61
Direct Tax (DT)	-4.15	-3.63	-2.95	-2.61

Source: Self Estimation

4.7. Cointegration Test

The application of a cointegration test is utilised to determine the presence of a long-term link among the variables of order 1 of the consumer price index, indirect taxes, and direct taxation subsequent to their integration. In a manner consistent with the prior approach, the

Ordinary Least Squares (OLS) model is employed to conduct a test and produce the residuals. The residuals derived from the model are preserved as the error term, which is next submitted to the Augmented Dickey Fuller (ADF) test in order to ascertain its stationarity. The findings reported in Table 8 demonstrate that the error term for model-II displays stationarity at the level, implying that the residuals are integrated of order zero, commonly referred to as $I(0)$. The second model also demonstrates the presence of long-term associations between the Consumer Price Index (CPI) and both direct and indirect taxation. In order to provide a long-term interpretation, the ordinary least squares (OLS) estimate technique is employed on the given equation.

Table 9
ADF Statistic for Residual

C	ADF Statistics	Critical Values		
		at 1%	at 5%	at 10%
Residual	-2.37	-2.63	-1.95	-1.61

The ordinary least squares (OLS) technique was applied to the log-transformed model. The detailed information results are presented in Table 9. The findings indicate that the Adjusted R-square value is 0.995, suggesting that approximately 99.5% of the variation in the consumer price index (CPI) can be attributed to direct and indirect taxation, while holding all other variables constant. The probability value of the F-statistic (0.000) indicates that the model is highly satisfied. The equation computed using the Ordinary Least Squares (OLS) method is as follows:

$$\ln CPI_t = -2.69 + 0.26 \ln(DT) + 0.33 \ln(IDT)$$

The coefficients of the equation indicate that both direct and indirect taxation contribute to the escalation of inflation, but with varying degrees of influence. The proportion of indirect taxation in the overall contribution to the Consumer Price Index (CPI) exceeds that of direct taxation. On average, a 1 percent rise in direct taxation will result in a 0.26 percent increase in the Consumer Price Index (CPI), assuming that all other variables remain same. A 1 percent rise in indirect taxation is expected to result in an average 0.33 percent raise in the Consumer Price Index (CPI), assuming all other variables remain constant. The t-statistics and probability values associated with these variables demonstrate that the findings are statistically significant. The average value of the Consumer Price Index (CPI) is -2.69, under the assumption that all the independent variables remain constant.

Table 10
OLS Result where Dependent Variable is CPI

Variables	Coefficients	Standard Error	t - statistics	Probability Value
Constant	-2.695499	0.246953	-10.91503	0.0000
IDT	0.332839	0.059571	5.587277	0.0000
DT	0.266378	0.043766	6.086476	0.0000
R-squared	0.996217		Durbon Watson Statistic	0.574762
Adjusted R-square	0.995987			
F-statistic	4344.601		Probability (F-statistic)	0.00000

Source: Self Estimation

4.8. Error Correction Mechanism (ECM)

Model II demonstrates that the residuals exhibit stationarity at the level, indicating a lack of trend or systematic patterns in their behaviour over time. Additionally, the model provides evidence of a long-run link between the variables under consideration. It is imperative to assess the presence of a short-run relationship and the significance of the short-run in respect to the long-run within this model. The Error Correction Model (ECM) has been

developed. The projected outcome of Error Correction Model (ECM) for Consumer Price Index (CPI) during the time frame of 1979 to 2021 is as follows:

$$\Delta \ln CPI = -0.003 + 0.011\Delta \ln (IDT) - 0.005\Delta \ln (DT) - 0.401 \text{Error term}$$

Based on the findings from the ECM model Table results 4.10, it can be observed that the modified R-square value is 0.294, indicating that about 29.4 percent of the average fluctuation in CPI can be attributed to the influence of indirect and direct taxation, while keeping all other factors constant. The coefficient of the variable indicates that a 1 percent increase in indirect taxation is associated with an average increase of 0.41 percent in the Consumer Price Index (CPI), while holding all other factors constant. Although the direct tax has a detrimental effect, it is observed that a one percent rise in direct tax leads to an average decrease of 0.406 percent in the Consumer Price Index (CPI), assuming all other variables remain same. The impact of both taxes is shown to be statistically insignificant. The presence of a negative sign in the error term indicates that any long-term disequilibrium will be corrected at an annual rate of 40%.

Table 11
Detailed Result of Error Correction Model for CPI

Variables	Coefficients	Standard Error	t - statistics	Probability Value
Constant	0.003038	0.138282	0.021966	0.9826
IDT	0.011422	0.033159	0.344455	0.7328
DT	-0.005367	0.024355	-0.220375	0.8270
E2(-1)	-0.401263	0.102515	-3.914199	0.0005
R-squared	0.356468		Durbon Watson Statistic	1.058028
Adjusted R-square	0.294191		Probability (F-statistic)	0.003082

Source: Self Estimation

Global society's main issue is financing government projects and services including water and energy infrastructure, healthcare, and education. Federal, provincial, and local governments use tax and non-tax sources to meet their financial obligations. Direct and indirect taxes are the government's main revenue sources. Revenue shifts, especially taxation-related ones, affect economies broadly. Pakistani economic policies on budget deficit, foreign debt management and service, inflation control, and other issues seem ineffective. This research seeks to determine how much direct taxes drive long-term economic development and inflation reduction. Indirect taxation may also contribute. This study examines the effects of direct and indirect taxation on Pakistan's economic growth and their relative importance. This study investigated the relationship between direct and indirect taxation and inflation using the consumer price index (CPI).

The time series data utilised in both models encompasses the period from 1979 to 2021 and was sourced from various distinct origins. The primary objective of this study is to experimentally investigate the impact of taxation on economic growth by employing the Cobb-Douglas production function (ALK1-). The Augmented Dickey Fuller (ADF) test was employed to verify the stationarity of the variables. After the identification of non-stationarity in the variables at both the level and first difference, it was deemed necessary to transform the variables into logarithmic form. Following the implementation of the modifications, the Augmented Dickey Fuller (ADF) test was subsequently employed to ascertain the stationarity of the series. The Ordinary Least Squares (OLS) method was employed to evaluate the magnitude of the impact due to the fact that the series had achieved stability and all variables exhibited integration of order one, denoted as I(1), indicating the presence of cointegration. The examination of the relationships between variables in both the long-run and short-run is conducted through the utilisation of the Engel-Granger cointegration test and the Error Correction Mechanism (ECM). The normal distribution can be visually represented through the use of a histogram, as well as statistically assessed using the Jarque Bera test. The presence of a fixed error term at the zero level, denoted as I (0), signifies a stable and enduring relationship over an extended period of time. The observed long-term association suggests that

indirect taxes exert a more significant impact on promoting economic growth than to direct taxes. According to projections, a 1% increase in indirect taxation is anticipated to provide a corresponding 0.49% increase in gross domestic product (GDP).

Various studies show that direct taxing increases GDP by 0.22 percent for every 1 percent increase. A 1% labor force increase boosts GDP by 0.17 percent. Gross fixed capital creation indicates capital accumulation, with a 1% increase in capital resulting in a 0.12% GDP gain from GDP calculation. The Error Correction Mechanism (ECM) study shows that the error term coefficient is statistically negligible at -0.2036. This implies a short-term link between the variables and a 20% annual correction towards equilibrium.

The second goal of this study is to examine how taxes affect CPI inflation using similar methodologies. This context uses a basic regression model. The Augmented Dickey-Fuller (ADF) test shows non-stationarity at the initial level and after the first difference. Logarithmic transformations are needed to reformulate the data. The model assumes a long-run relationship and stationarity after initial differencing, $I(1)$. Analysis used Engel Granger cointegration test and Error Correction Mechanism. The steady error term at the level, its cointegration at $I(0)$, indicating a long-term relationship in this model. Both indirect and direct taxes have substantial effects. Conversely, a 1% increase in indirect or direct taxation would raise inflation by 0.33 or 0.26 percentage points. Error Correction Model (ECM) results are marginal in this case. Direct taxes hurt inflation. The area also has short-run dynamics. The coefficient of the error term for this site is -0.4012, indicating that disequilibrium is corrected at 40% annually.

The study's findings suggest that there is a relationship between taxation, both direct and indirect, and long-term economic growth. Notably, indirect taxes appear to generate greater income and contribute more significantly to growth compared to direct taxes. In contrast, both indirect and direct taxes play a role in contributing to the overall increase in inflation. In contrast to indirect taxes, direct taxes have a significantly lesser impact on the escalation of inflation. The disparity in long-term economic growth is rectified at an annual rate of 20.36 percent, whilst inflation is adjusted at a rate of 40.12 percent per annum.

5. Conclusion and Recommendations

The economic policies in Pakistan are significantly shaped by the political dimension of the country's economy, since they are heavily impacted by the preferences of the ruling administration. Over a span of 32 years, Pakistan experienced governance under both military and democratic structures. This structure poses challenges for governments in properly implementing economic policy. Pakistan's economy encounters a significant disparity in its budget on an annual basis. The primary factors contributing to this deficit are extensive government expenditure and inadequate tax collection methods. The increasing reliance on foreign loans, heightened debt payment obligations, and a sustained stagnation of the tax to GDP ratio at a range of 8% to 10% are notable trends. In addition to these aforementioned indicators, inflation is a persistent phenomenon inside our economy, consistently surpassing the rate of economic growth. Approximately 65% of our budget is allocated towards government expenditures, defence, and debt servicing. A significant portion, specifically 60%, of our Gross Domestic Product (GDP) is not encompassed within the tax base. It is imperative for policymakers to prioritise long-term planning.

The collection of indirect taxes is necessary to mitigate wealth inequality and foster sustained economic expansion. The findings of this study additionally corroborated the notion that indirect taxes yield greater advantages for sustained economic growth and make a more substantial contribution. Furthermore, it is imperative to undertake measures aimed at mitigating instances of tax evasion, tax fraud, and tax avoidance. The recommended approach

is to expand the tax base rather than resorting to increasing the tax rate. Both individuals who earn a fixed salary and those engaged in business activities should choose the appropriate tax mix policy. The engagement of tax administration and chief officers serves the objective of facilitating tax deduction at source, hence contributing to the augmentation of direct tax revenue. Indirect taxes play a more significant role in the exacerbation of inflationary pressures compared to direct taxes. Therefore, the elimination of indirect taxes would be implemented with the aim of fostering sustained and stable economic growth in the long run. The mitigation of inflation can be achieved through the implementation of tax policy measures, such as the regulation and control of taxes, the transition from indirect taxation to direct taxation, or the use of optimal tax strategies. The management of inflation necessitates the implementation of monetary policy and taxation measures.

Authors' Contribution

Nasir Munir: Given the idea of the study and complete the introduction and methodology section.

Malik Saqib Ali: Retrieved the data set, conducted data analysis, and write the draft.

Azra Nasir: Revise, and approved the final version

Conflict of Interests/Disclosures

The authors declared no potential conflict of interest w.r.t the research, authorship and/or publication of this article.

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