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IMPACT OF ECONOMIC DETERMINANTS OF TAX BUOYANCY: A CASE STUDY OF PAKISTAN

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ABSTRACT

Pakistan has consistently experienced low tax buoyancy, limiting the government's ability to generate revenue in line with economic growth and contributing to persistent fiscal deficits. This study examines the economic determinants of tax buoyancy in Pakistan using annual time-series data covering the period 2001–2024. Specifically, it investigates the effects of manufacturing value added, agricultural value added, services value added, trade openness, broad money, inflation, and official development assistance on total, direct, and indirect tax buoyancy. Data were obtained from the Federal Board of Revenue (FBR) and the World Development Indicators (WDI). The Augmented Dickey–Fuller (ADF) test was employed to examine the stationarity properties of the variables, while the Autoregressive Distributed Lag (ARDL) bounds testing approach was used to estimate both the short-run and long-run relationships. The empirical findings confirm the existence of a long-run relationship among the variables. Broad money significantly and positively affects tax buoyancy, whereas inflation exhibits mixed effects across the estimated models. Official development assistance positively influences direct and indirect tax buoyancy, while trade openness produces mixed results. In contrast, manufacturing, agriculture, and services value added do not have a statistically significant effect on tax buoyancy, indicating structural weaknesses in Pakistan's tax system. The study concludes that macroeconomic conditions play a more important role than sectoral composition in determining tax buoyancy. The findings suggest that strengthening tax administration, broadening the tax base, and implementing structural tax reforms are essential to improve revenue mobilization and promote fiscal sustainability in Pakistan.

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INTRODUCTION

Pakistan has been facing persistently fiscal deficit, due to high expenditures, low revenue collection and increasing public debt (Khan, 2024) as tax to GDP ratio of Pakistan is 10.3% which is below than many developing countries, a constraint in government expenditures (Hussain et al., 2022) government of Pakistan heavily rely on indirect sources of tax and there is a lot of tax evasion too which makes revenue collection performance worse (Shafiq et al., 2022). Although the agriculture sector and retail sector has major contribution in Pakistan GDP but contribution in tax is disproportionally low (Salam, 2022) empirical studies shows that Pakistan tax buoyancy is low and with proportional to economic growth tax revenue is not increasing (Shehzada et al., 2025). Tax buoyancy measures the responsiveness of tax revenue to changes in GDP, which shows the effectiveness of the tax system (Ahmed et al., 2025).

The government has to borrow money because of low revenue collection and weak tax buoyancy, which leads to ongoing fiscal deficits (Malik and Meraj, 2024). High fiscal deficits raise public debt levels and the costs of servicing that debt, which makes it harder for the government to spend money on development (Masheed et al., 2024). Pakistan relies on outside funding and IMF programs because it can't raise enough money on its own (Hussain et al., 2022). Low tax buoyancy also shows that economic growth doesn't always lead to proportional revenue gains, which makes fiscal policy less effective. This creates a cycle where low revenues cause deficits, borrowing, inflationary pressures, and problems with the economy as a whole (Chandia et al., 2022).

The responsiveness of tax collections is nevertheless limited by structural issues such as a small tax base, numerous exemptions, administrative inefficiencies, and a sizable informal sector (Ahmed and Muhammad, 2010). Macroeconomic, structural, and institutional issues are among the many variables that affect tax buoyancy. According to empirical research, factors like GDP growth, inflation, trade openness, financial development, and the sectoral makeup of the economy all have a big impact on tax buoyancy (Hussain et al., 2022). According to empirical research, factors like GDP growth, inflation, trade openness, financial development, and the sectoral makeup of the economy all have a big impact on tax buoyancy (Dudine and Jalles, 2018). Monetization and industrialization tend to increase tax buoyancy in developing nations, while under-taxation in the agriculture sector frequently results in poor tax responsiveness. The success of revenue systems is also significantly influenced by institutional quality, governance, and the efficiency of tax administration (Sheikh et al., 2018). Because it directly contributes to ongoing budget deficits and growing governmental debt, low tax buoyancy is a particularly significant issue in Pakistan.

Review of Literature

The main factors influencing tax buoyancy in Pakistan must be objectively investigated in light of these difficulties. Policymakers can create successful tax reforms targeted at enhancing revenue performance and attaining fiscal sustainability by having a better understanding of these factors. Therefore, the purpose of this study is to use appropriate econometric tools to assess the macroeconomic and structural determinants impacting tax buoyancy in Pakistan, adding to the body of existing work and offering policy-relevant insights. The empirical literature on tax buoyancy shows a wide range of outcomes that are impacted by the efficiency of tax administration and the economic structures unique to each nation. Numerous studies conducted in Pakistan have demonstrated how tax responsiveness is changing.

Using a chain indexing method for the years 1981–2001, Mukarram (2001) discovered that whereas sales and direct taxes exhibited greater buoyancy, customs and excise charges remained rather stiff. Later, Sheikh et al. (2018) used cointegration tests to study the years 1980–2004 and found that tax buoyancy was less than unity in relation to GDP and trade volume. On the other hand, Shaikh (2012) discovered buoyancy estimates larger than one during the years 1974–2009, which he attributed to the manufacturing sector's diversification and the declining GDP share of agriculture. Similar variance is found in research conducted in other South Asian economies, such as Bangladesh and Nepal. Begum (2007) discovered tax buoyancy ratios greater than unity for both direct and indirect taxes using OLS for Bangladesh (1991–2005). For the years 1980–2011, Yousuf and Huq (2013) confirmed this, pointing out that customs charges were inelastic while total tax and VAT were buoyant.

Timsina (2007) noted that between 1975 and 2005, import and excise taxes in Nepal were inelastic, whereas income tax was elastic. According to Krushna (2015) India experienced strong buoyancy (more than unity) between 1950 and 2010, especially throughout the 1960s and 1970s. In a comparative study of Indian states from 2004 to 2014, Naqvi (2016) found that several states, such as Rajasthan and Goa, have poor buoyancy (less than one). A broader background is provided by studies conducted in developed countries and throughout Africa. Bayu (2015) discovered that whereas manufacturing had no effect on buoyancy, the services sector and budget deficits had a beneficial effect in Ethiopia. Leuthold and N'Guessan (1986) discovered that income and profit taxes were not lucrative for the Ivory Coast, but VAT and import taxes were. Bonga et al. (2014) revealed that while VAT and customs fees had little effect in Zimbabwe, individual and excise taxes had a considerable impact. Belinga et al. (2014) found that while property taxes stayed below unity, corporate and goods taxes had buoyancy coefficients greater than one in both the short and long term for OECD nations. Only VAT was buoyant in Trinidad and Tobago; according to Cotton (2012) income and trade taxes were not.

Lastly, macroeconomic drivers are highlighted by cross-national and specialist assessments. In their analysis of 25 developing nations, Ahmed and Muhammad (2010) discovered an adverse association between foreign donations and tax buoyancy, but a positive relationship with monetization and manufacturing. This is consistent with the findings of Musa et al. (2016), who pointed out that low product use and high inflation can lower overall tax income. When taken as a whole, these studies indicate that while sector-specific growth, especially in manufacturing and services, generally promotes buoyancy, excessive inflation and reliance on outside help frequently impede it.

Problem statement

The study aims to investigate the different economic determinants of tax buoyancy in Pakistan. The study employs time series annual data for the period 2001 to 2024 and used 4 models.

Objectives of Study

The following are the objectives of this study:

1. To evaluate the tax buoyancy of federal taxes in Pakistan across aggregate categories
2. To estimate the impact of structural economic variables like Agriculture, manufacturing, and the services sector
3. To identify the impact of macroeconomic factors like inflation, trade, and net official development assistance in determining the extent of tax mobilization.

Hypothesis of Study

1. Null Hypothesis: The sectors like agriculture, manufacturing, and services do not significantly impact federal total tax.
   Alternative Hypothesis: The sectors like agriculture, manufacturing, and services do have a significant impact on federal total tax.
2. Null Hypothesis: The sectors like agriculture, manufacturing, and services do not significantly impact federal total direct tax.
   Alternative Hypothesis: The sectors like agriculture, manufacturing, and services do have a significant impact on federal total direct tax.
3. Null Hypothesis: The sectors like agriculture, manufacturing, and services do not significantly impact federal total indirect tax
   Alternative Hypothesis: The sectors like agriculture, manufacturing, and services do have a significant impact on federal total indirect tax.

Tax Buoyancy

A key component of an economy's fiscal strategy, tax buoyancy is a metric used to assess a nation's tax performance. The sensitivity, responsiveness, proportionality, or percentage change in tax revenues or tax receipts to the percentage change in GDP. Tax buoyancy is an imprecise metric that does not distinguish between automatic and discretionary revenue growth (Sheikh et al., 2018). The tax buoyancy formula is as follows:

$$\text{Tax buoyancy} = \frac{percentage\ change\ in\ tax\ revenue}{percentage\ change\ in\ GDP}\ X\ 100 \qquad (1)$$

METHODOLOGY

Data

The data used are from the period 2001 to 2024. The dependent variables total tax revenue, direct tax total revenue, indirect total tax revenue, total direct tax, and total indirect tax have been collected from Federal Board of Revenue (FBR) and independent variables inflation rate, manufacturing value added, agricultural value added, services value added, trade openness, broad money and net official development assistance are collected from world development indicator (WDI).

Model Specification

The following econometric models are employed to test the impact of different economic variables on tax buoyancy. The models are augmented by Sheikh et al. (2018).

Model 1: Total Tax Buoyancy Model

$$TBT_t = \beta + \alpha_1 MVA_t + \alpha_2 AVA_t + \alpha_3 SVA_t + \alpha_4 TRADE_t + \alpha_5 ODA_t + \alpha_6 BD_t + \alpha_7 INF_t + \varepsilon_t \qquad (2)$$

Model 2: Direct Tax Buoyancy Model

$TBD_t = \beta + \alpha_1 MVA_t + \alpha_2 AVA_t + \alpha_3 SVA_t + \alpha_4 TRADE_t + \alpha_5 ODA_t + \alpha_6 BD_t + \alpha_7 INF_t + \varepsilon_t$ (3)

Model 3: Indirect Tax Buoyancy Model

$TBINDT_t = \beta + \alpha_1 MVA_t + \alpha_2 AVA_t + \alpha_3 SVA_t + \alpha_4 TRADE_t + \alpha_5 ODA_t + \alpha_6 BD_t + \alpha_7 INF_t + \varepsilon_t$ (4)

Description of variables

The following are the descriptions of the variables used in this study.

TBT: Total Tax Buoyancy (Total Tax as percentage of GDP)
TBD: Direct Tax Buoyancy (Direct Tax as percentage of GDP)
TBINDT: Indirect Tax Buoyancy (Indirect Tax as percentage of GDP)
MVA: Manufacturing Value Added (Percentage of GDP)
AVA: Agricultural Value Added (percentage of GDP)
SAV: Services Value Added (percentage of GDP)
TRADE: Trade (percentage of GDP)
ODA: Net Official Development Assistance received (percentage of Gross Capital Formation)
BD: Broad Money (percentage of GDP)
INF: Inflation (consumer prices annual %)
ε : error term

RESULTS AND DISCUSSION

Descriptive statistics of the variables given in Table 1 show that the total number of observations of all variables is 24. The mean of TBT is 9.165, and the maximum and minimum 11.11, 6.20 values are respectively. 3.33 is the mean value of TBD, 5.61 is the maximum value, and 2.409 is the minimum value of TBD. Whereas the mean value of TBIND is 5.63, the maximum value is 6.91, and the minimum value is 2.409. 12.13 is the mean value of MVA, the maximum value is 13.7, and the minimum value is 3.58. However, the standard deviation is 0.64. The mean value of AVA is 22.33; 34.1 and 19.9 are the maximum and minimum values. 28.74 is the mean value of trade, and the maximum and minimum values are 34.3 and 23.1, respectively. 6.60 is the mean value of ODA; the maximum and minimum values are 13.3 and 2.2817, respectively. Inflation has 9.72 mean value. The maximum value is 30.7, the minimum value is 2.52, and the standard deviation is 6.57.

Table 1. Descriptive statistics of the variables used in the analysis.

Variables	Observations	Mean	Maximum	Minimum	Std.deviation
TBT	24	9.165	11.116	6.206	1.251
TBD	24	3.531	5.6162	2.409	0.756
TBIND	24	5.633	6.919	3.587	0.648
MVA	24	12.139	13.758	9.373	1.359
AVA	24	22.335	34.144	19.937	1.182
SVA	24	53.080	56.219	50.731	1.408
TRADE	24	28.741	34.348	23.129	3.373
ODA	24	6.608	13.319	2.2817	2.724
BD	24	44.927	54.526	29.876	6.486
INF	24	9.7200	30.768	2.529	6.570

Table 2. Unit root analysis.

Variables	Test	Stationarity at	Significance at 1%	t-value
TBT	ADF	1st difference (with intercept)	0.0306	-3.282831
TBD	ADF	1st difference (with intercept)	0.0212	-3.434851
TBIND	ADF	1st difference (with intercept)	0.0212	-3.434851
MVA	ADF	1st difference (with intercept)	0.0053	-4.055809
AVA	ADF	1st difference (with intercept)	0.0182	-3.492943
SVA	ADF	1st difference (with intercept)	0.0014	-4.654959
TRADE	ADF	1st difference (with intercept)	0.0007	-4.940909
ODA	ADF	Level (with intercept)	0.0143	-3.590602
BD	ADF	1st difference (with intercept)	0.0387	-3.13208
INF	ADF	1st difference (with intercept)	0.0011	-4.758526

As shown in Table 2, TBT, TBD, TBIND, MVA, AVA, SVA, TRADE, BD, and INF are all stationary at first difference and non-stationary at level. Only variable OD is stationary at level. As variables have mixed order I(1) and (0), and the dependent variable is of order I(1). So, the ARDL bound test is employed in this data set.

F-test is used for checking for cointegration. As shown in Table 3, in the first model, the F-statistic is greater than the upper bound values, so there is the existence of cointegration in this model. In model 2, the F-statistic is greater than the upper bound at the 10% significance level, so there is the existence of cointegration. However, in model 3, the F-statistic is lower than the upper bound values at both 5% and 10% levels, showing no existence of cointegration.

To test the long-term relationship through the ARDL model. As shown in Table 4, the results of three models show that manufacture sector, agricultural sector, and service sector have an insignificant impact on tax buoyancy. In model 1, inflation and BD have a significant positive impact on tax buoyancy. 1 percentage increase in inflation TBT increases by 0.12 units. And a 1 percentage increase in BD, TBT increases by 0.16 percentage. However, MVA, AVA, SVA, and trade do not show a significant impact on TBT. R-squared is roughly 86%, and the F-statistic is 8.967, and Prob(F-statistic) is 0.0002, which shows that the overall model is significant.

In Model 2, a one percentage increase in the inflation rate results in a 0.06 decrease in tax buoyancy. One percentage increase in broader money results in a 0.06 percentage increase in tax buoyancy. And one percentage increase in ODA results in a 0.07% increase in tax buoyancy. And sectors have an insignificant impact on tax buoyancy.

In model 3, one percentage increase in the inflation rate results in a 0.07 decrease in tax buoyancy. One percentage increase in broader money results in a 0.06 percentage increase in tax buoyancy. And one percentage increase in ODA results in a 0.07% increase in tax buoyancy. And sectors have an insignificant impact on tax buoyancy.

Table 3. F-test for cointegration.

F-test for cointegration.		Significance Level (5%)		Significance Level (10%)	
Models	F-Statistics	Lower Bound	Upper Bound	Lower Bound	Upper Bound
Model 1	5.946734	2.730	4.163	2.277	3.498
Model 2	3.352709	2.730	4.163	2.277	3.498
Model 3	7.45176	2.170	3.210	1.920	2.890

Table 4. Long term estimation of tax Buoyancy models.

Variables	Model 1	Model 2	Model 3
MVA	-0.450978	-0.182485	0.007117
	(0.317754)	(0.229670)	(0.246953)
AVA	0.329816	0.040545	-0.481651**
	(0.274274)	(0.180450)	(0.182916)
SVA	-0.051327	-0.138785	-0.135923
	(0.253991)	(0.158784)	(0.208637)
TRADE	0.082572	0.056550	-0.050559
	(0.100112)	(0.078398)	(0.059166)
ODA	0.113863	0.079382	0.076659
	(0.073429)	(0.044612)	(0.045055)
BD	0.160904**	0.066731***	0.069265*
	(0.035387)	(0.022243)	(0.032563)
INF	0.121518**	-0.066349***	-0.078513***
	(0.030515)	(0.022594)	(0.019861)
C	-3.507299	5.211774	14.14493
	(19.86861)	(12.26084)	(16.77804)

Table 5. Error correction results.

Variables	Model 1	Model 2	Model 3
	ARDL(1,0,0,0,0,0,0,1)	ARDL(1,0,0,0,0,0,1,0)	ARDL (1,0,1,0,1,1,0,1)
d(MVA)	-0.450978	-0.182485	0.007117
	(0.317754)	(0.256023)	(0.246953)
d(AVA)	0.329816	0.040545	-0.165958
	(0.274274)	(0.180450)	(0.236383)
d(SVA)	-0.051327	-0.138785	-0.135923
	(0.253991)	(0.158784)	(0.208637)
d(TRADE)	0.082572	0.056550	-0.069265
	(0.100112)	(0.078398)	(0.080601)
d(ODA)	0.113863**	0.079382**	0.133975
	(0.073429)	(0.044612)	(0.067694)
d(BD)	0.160904**	0.066731**	0.063422*
	(0.038680)	(0.022243)	(0.030482)
d(INF)	0.121518***	0.009361**	0.024474
	(0.030515	(0.028837)	(0.023916)
CointRq(-1)	-0.672057***	-0.508141	-0.883605

Table 5 shows that, in Model 1, the coefficient is negative although significant (-0.672057), which shows that approximately 67.2% of the departure from the equilibrium. Inflation has an upward and significant impact on TBT in the short term. However, other variables like sectoral growth and trade don't have any significant impact on TBT in the short run.

In the second model, the value of the parameter is negative and meaningful (-0.508141), which shows that there is approximately a 50.0% departure from the equilibrium, although it is insignificant. Inflation has a direct and meaningful impact on TBT in the short run. However, other variables like sectoral growth and trade don't have any meaningful impact on TBT in the short run.

In Model 3, the value of the coefficient of ECM is negative although meaningful (-0.883605), which shows that approximately 88.3% of the departure from the equilibrium is accounted for, although it is insignificant. Inflation has a positive and meaningful influence on TBT in the short run. However, other variables like sectoral growth and trade don't have any significant impact on TBT in the short run.

CONCLUSIONS AND POLICY IMPLICATIONS

This study examined the economic determinants of tax buoyancy in Pakistan using annual data from 2001 to 2024 and the ARDL bounds testing approach. The findings reveal that macroeconomic variables play a more prominent role in explaining tax buoyancy than sectoral economic indicators. Broad money consistently exerts a positive and significant influence on tax buoyancy, whereas inflation demonstrates mixed effects across total, direct, and indirect taxes. Trade openness also produces varying effects across tax categories, while manufacturing, agriculture, and services value added do not significantly influence tax buoyancy. These findings suggest that economic growth in major productive sectors has not translated into proportional tax revenue, reflecting structural weaknesses in Pakistan's tax system and highlighting the limited responsiveness of tax revenues to changes in sectoral economic activity.

The findings imply that improving tax buoyancy requires structural reforms rather than relying solely on economic growth. Policymakers should broaden the tax base by enhancing tax coverage in under-taxed sectors, particularly agriculture and the informal economy, while strengthening tax administration, improving compliance, and reducing tax evasion. Monetary expansion should be accompanied by policies that channel financial resources toward productive investment instead of inflationary consumption. Furthermore, reducing dependence on external financial assistance through stronger domestic revenue mobilization and implementing sector-specific tax reforms can improve tax responsiveness, strengthen fiscal sustainability, and enhance Pakistan's capacity to finance long-term economic development.

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