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Government revenue and Expenditure Nexus: Empirical Evidence of Pakistan

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Abstract

Fiscal policy plays a significant role to acquire price stability, employment opportunities, and output increase. This study has examined co-integration and casual association in components of revenue and expenditure of Pakistan to develop appropriate fiscal policy. This research work focused on two models as a current expenditure (CE) was applied as the dependent variable in model 1 while in model 2, development expenditure (DE) was considered as the dependent variable. In both models, government revenue components such as shortest tax (DT), indirect tax (IDT), and non-tax income (NTR) were applied as independent variables. Secondary time series data from 1979 to 2020 was applied in this research work to check the stationarity of data unit root tests of Philips Peron (PP) and Augmented Dickey-Fuller (ADF) employed. Granger causality and Auto regressive distributive lag (ARDL) approach were applied for the empirical estimation of the study. ARDL bound test shows that co-integration exists in both models. The ARDL approach outcomes indicated as non-tax income, indirect tax, and direct tax have significant a relationship with current expenditure in the long run. Direct and indirect taxes have a significant relationship with development expenditure in the long run. Granger causality test estimates indicated as in both model shortest tax, indirect tax, and non-tax income has no causal relationship with current expenditure and development expenditure. In conclusion, estimates of this research supported the institutional separation hypothesis.

***Keywords*:** Current expenditure, Direct tax, Fiscal policy, Indirect tax, ARDL

1. Introduction

Fiscal and monetary policies are utilized by the governments of the world to manage their economic system. The stability in prices, employment opportunities, and increase in output occurs only due to better fiscal policy. Fiscal policy is utilized as economic means, to reduce the instability in output and employment. The government uses expenditure and revenue as its economic tools for economic growth. Expenditure of the government and revenue are the two basic fiscal policy tools (Chandia et al., 2018; Ahmad et al., 2018; Audi et al., 2022). Nowadays some developing countries face budget deficits because of population growth. The government's expenditure is increased on education, agriculture, health care, sewage, street cleaning, and security due to population growth (IGI Global, 2018). The government needs tax and non-tax income to cover the budget deficit. Tax and non-tax revenue play a very significant part in the country's economic development because the nation's standard of living is enhanced by these revenues (Shahid & Ali, 2015; Omodera and Dandago, 2019; Ali, 2022).

Pakistan is an emerging country and faces a budget deficit. The financial sector of Pakistan has faced different challenges both in expenditure and revenue. In Pakistan, both at the provincial and federal levels, tax collection is very low, which is due to problems in the tax structure and management. The administration tax income is low as compared to government expenditure. The expenditure of the Pakistan government is very high and it causes a budget deficit. The government of Pakistan spends most of its tax and non-tax revenue on security issues, non-development plans, interest payments, floods, subsidies, and energy (Raza et al., 2019). The most important, interesting, and noticeable topic of economic research is investigating the relationship between government revenue and expenditure. There are four dissimilar hypotheses such as (a) Tax-spend hypothesis (b) Spend-tax hypothesis (c) fiscal synchronization hypothesis (d) official parting hypothesis which are used to find the relationship between expenditure and revenue of the government. Tax-spend hypothesis concept is introduced by Friedman (1978). According to him, spending will increase only when the taxes will increase. In the tax-spend hypothesis a positive and unidirectional relationship from revenue to spending exist. Cutting in tax will be supportive for solution of budget deficit because when the government reduces the tax it will cause the budget deficit and as a result the government has to reduce his expenditure.

Fiscal synchronization is also called the simultaneous financial hypothesis. Fiscal synchronization shows the bidirectional causality which means that government takes the decision about the spending and revenue simultaneously. This hypothesis shows that causality moves in both directions which suggests that spending of the government causes the income of the administration and income of the government causes spending of the government. Both the variable theatres a significant role in achieving the budget equilibrium (Meltzer & Richard, 1981). Institutional separation hypothesis an another name is the “financial independence” or “institutional neutrality hypothesis”. This hypothesis shows that spending and revenue are independent, and no causality exists in administration spending and revenue (Hoover and Sheffrin, 1992). Many researches had been carried out which inspected the association among the expenditure of the government and income of the government. A few studies has been examined the relationship between spending and tax revenue (Mohanty and Mishra, 2017; Ghazo and Abu-Lila, 2018; Kiminyei, 2018; Irandoust, 2018) Mohanty and Mishra (2017) used Indian government spending

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and revenue to locate the association between them. A few studies have examined the association between the government of Pakistan's revenue and expenditure (Hussain, 2004; Aisha and Khatoon, 2009; Sadiq, 2010; Husain et al., 2010; Ali and Shah, 2012; Chandia et al., 2018, Raza et al., 2019; Senturk and Ali, 2022). According to the literature very rare has been found in Pakistan, which investigated the association between the components of spending and income of the government. Current spending and development expenditure was used as the component of expenditure while indirect tax, non-tax revenue and direct tax are used as the component of the revenue in the study.

Objects of this study are firstly one is to investigate the relationship and the second one is to find the connection between the components administration revenue and expenditure. This study will help the government and policymakers to overcome the budget deficit by easily understanding the association between the components of revenue and spending. In the first section of the paper introduction while in the second section literature review is discussed. In the third section data and methodology is described. In the fourth section results and in the fifth section the conclusion is described.

2. Data and methodology

This research work applied the secondary data from 1979 to 2020 to estimate the nexus in government revenue and expenditures. Current expenditure and development expenditure as component of government total expenditure, while non-tax income, indirect tax and direct tax used as components of government total revenue. Economic survey of Pakistan considered feasible secondary source in data access while employed software E-views 9.0 for empirical estimation. In this study to find the co-integration and causality of two models were developed on the basis of previous study (Chandi et al., 2018).

Model 1: $\mathrm{CE} = \alpha + \beta_1 \mathrm{DT_t} + \beta_2 \mathrm{IDT_t} + \beta_3 \mathrm{NTR_t} + \varepsilon_t$

Model 2: $\mathrm{DE} = \alpha + \beta_1 \mathrm{DT_t} + \beta_2 \mathrm{IDT_t} + \beta_3 \mathrm{NTR_t} + \varepsilon_t$

In both models CE as current expenditure, DE as development expenditure, DT as direct tax, IDT as unintended tax, NTR as non tax revenue, α as intercept term, $\beta_1, \beta_2, \beta_3$ illustrated the slope of parameters and ε_t considered error term. To find out the association between the Pakistan government revenue and expenditure, the ARDL model was employed in this investigation. In time series, ARDL approach has widely used for government revenue and expenditure. This approach was proposed by Pesaran et al. (2001), in order to incorporate variables at level or first change. ARDL model has some benefit over the Engle & Granger (1987), Johansen and Juselius (1990) model. First, the ARDL method is useful when variables are stationary at I(1) or I (0) or even mix order. Secondly in ARDL approach unit root pre testing is not required. Third it is also suitable when data is available in a less amount. Equations can be written as in ARDL form

ARDL Equation Model 1

$$\Delta(LCE)_t = \alpha + \beta_1 (LCE)_{t-1} + \beta_2 (LDT)_{t-1} + \beta_3 (LIDT)_{t-1} + \beta_4 (LNTR)_{t-1} + \sum_{i=1}^{P_1} \delta_1 \Delta(LCE)_{t-1} + \sum_{i=0}^{P_2} \delta_2 \Delta(LDT)_{t-1} + \sum_{i=0}^{P_3} \delta_3 \Delta(LIDT)_{t-1} + \sum_{i=0}^{P_4} \delta_4 \Delta(LNTR)_{t-1} + \varepsilon_t$$

ARDL Equation Model 2

$$\Delta(LDE)_t = \alpha + \beta_1 (LDE)_{t-1} + \beta_2 (LDT)_{t-1} + \beta_3 (LIDT)_{t-1} + \beta_4 (LNTR)_{t-1} + \sum_{i=1}^{P_1} \delta_1 \Delta(LDE)_{t-1} + \sum_{i=0}^{P_2} \delta_2 \Delta(LDT)_{t-1} + \sum_{i=0}^{P_3} \delta_3 \Delta(LIDT)_{t-1} + \sum_{i=0}^{P_4} \delta_4 \Delta(LNTR)_{t-1} + \varepsilon_t$$

In models Δ designates the first difference and δ_i as the short-run lively coefficients of ARDL models while β_i limits of long-run multiplier. In the ARDL Bound test there showed two bound values where the upper bound I(1) and the second inferior bound I(0) value.f-stat value showed lower than lower bound it indicated no co-integration exist and when F-stat value has higher than upper bound then it shows co-integration exist. F-stat value lies between upper bound and lower bound it showed no result. ARDL automatically select the lag length in both the model using Akiake information criteria.

2.1. Granger Causality Test

The causality moves from revenue to spending exist if the past revenue values explains the current spending, while if the past spending values explains the current revenue then causality from spending to revenue exist (Granger, 1969).

The causality can be measure using following models:

$$X_t = \alpha + \sum_{i=1}^{q} \beta_i X_{t-i} + \sum_{i=1}^{q} \gamma_i Y_{t-i} + \varepsilon_t \qquad (a)$$

$$Y_t = \alpha + \sum_{i=1}^{q} \theta_i X_{t-i} + \sum_{i=1}^{q} \delta_i Y_{t-i} + \varepsilon_t \qquad (b)$$

In calculation (a) Y_t granger causes X_t if the null hypothesis $H_0: \gamma_i = 0$ is disallowed (No causality) while alternative hypothesis $H_1: \gamma_i \neq 0$ (Causal association) is putative. In equation (b) X_t granger causes Y_t if the null

hypothesis $H_0: \theta_i = 0$ is disallowed (No causality) while alternate hypothesis $H_1: \theta_i \neq 0$ (Causal relationship) is accepted. In both the calculations (a,b) if the alternate hypothesis as $H_1: \gamma_i \neq 0$ and $H_1: \theta_i \neq 0$ as accepted shows bidirectional causality between $X_t$and. In both the calculations (a,b) if the null hypothesis is $H_1: \gamma_i = 0$ and $H_1: \theta_i = 0$ is putative shows no causality between $X_t$andY_t. Toda and Yamamoto granger causality requires high amount of data.

Some diagnostic tests were used in the paper to find the robustness of both the model. To find the Heteroskedasticity, Breush Pagan Godfrey Heteroscedasticity Test was used. To find the sequential correlation, Breush Godfrey Serial Association LM test was used. To find the misspecification of the models, Ramsay Reset Test was used. To checkered the constancy of the coefficients CUSUM and CUSUMSQ was applied.

3. Empirical estimation

Evocative figures illustrated mean median, maximum, minimum, and standard deviation in table 1 while estimates of the log of direct tax (LDT) are also indicated.

Table 1 Descriptive Statistics

	LCE	LDE	LDT	LIDT	LNTR
Mean	6.007	3.811	4.408	5.380	4.683
Median	6.177	3.179	4.669	5.286	4.426
Maximum	8.246	7.367	7.337	7.743	6.944
Minimum	3.228	1.529	1.230	2.998	1.854
Std. dev	1.492	1.758	1.819	1.369	1.462
Observations	40	40	40	40	40

Estimates of ADF and PP showed in table 2 which described as variables are significant and stationary at first difference I(1).

Table 2 Augmented Dickey Fuller (ADF) and Phillips-Peron (PP) Unit Root Test

	ADF		PP	
Variables	Intercept	Intercept and Trend	Intercept	Intercept and Trend
LCE	-2.329	-1.762	-2.329	-1.787
	(0.168)	(0.703)	(0.168)	(0.691)
LDE	0.408	-2.095	0.872	-3.275
	(0.980)	(0.531)	(0.994)	(0.085)
LDT	-0.849	-4.225	-0.740	-2.496
	(0.793)	(0.010)	(0.824)	(0.328)
LIDT	-0.241	-2.520	-0.225	-2.491
	(0.924)	(0.317)	(0.926)	(0.330)
LNTR	-2.054	-2.717	-2.061	-2.508
	(0.263)	(0.235)	(0.260)	(0.322)
ΔLCE	-5.299*	-5.826*	-5.361*	-5.826*
	(0.000)	(0.000)	(0.000)	(0.000)
ΔLDE	-10.280	-10.333	-12.680	-24.706
	(0.000)	(0.000)	(0.000)	(0.000)
ΔLDT	-4.443*	-4.326*	-4.469*	-4.348*
	(0.001)	(0.007)	(0.001)	(0.007)
ΔLIDT	-7.632*	-7.530*	-7.886*	-7.789*
	(0.000)	(0.000)	(0.000)	(0.000)
ΔLNTR	-7.806*	-8.186*	-7.821*	-8.340*
	(0.000)	(0.000)	(0.000)	(0.000)

* Significance at 1% level in the parenthesis values, Δ shows first difference

3.1. Auto Regressive Distributive Lag (ARDL) Model

In table 3, model 1 calculated with F-statistics value is 11.017, which is greater than upper bound at 1%, 5% and 10%. Result of model 1 showed co-integration exists among current expenditure, direct tax, unintended tax, and non-tax income. In model 2, the calculated F-statistic value is 4.154, which is better than the higher bound at 10 percent. The result of model 2 showed co-integration exits among development expenditure, shortest tax, indirect tax, and non-tax income.

3.1.1. Long Run Estimation

A long-run relationship exists where the probability value is lower than the significance value. The outcomes of Long run estimation indicated in table 4 illustrated as in model 1 all variables showed a significant long-run relationship with current expenditure. In model 2, direct tax and indirect tax variables have a significant relationship with development expenditure but non-tax revenue has no relationship with development expenditure.

Table 3 Bound Test Estimation

	F-stat	K	Lag Length	5%		10%	
				I(0)	I(1)	I(0)	I(1)
Model 1	11.017	3	(1,1,1,4)	3.23	4.35	2.72	3.77
Model 2	4.154	3	(1,0,1,3)	3.23	4.35	2.72	3.77

Table 4 Long run Estimation

Variables	Model 1	Model 2
DT	[0.507]*	[-1.158]*
	(0.000)	(0.029)
IDT	[-0.479]*	[3.410]*
	(0.018)	(0.005)
NTR	[0.772]*	[-0.449]*
	(0.000)	(0.509)
C	[3.071]*	[-7.965]*
	(0.000)	(0.000)

* Show significant at 5% shows probability value

3.1.2. Short Run Estimation

We use Error Correction Mechanism which is mostly known as ECM, to find short-run co-integration on the basis of long-run association. This information is based on the sign of ECM value. If the value is negative, it shows the convergence towards long-run equilibrium and if the value is positive then it shows divergence towards equilibrium.

Table 5 Short run estimations

Variables	Model 1	Model 2
DT	[0.044]	[-0.806]**
	(0.686)	(0.057)
IDT	[-0.061]	[3.962]*
	(0.696)	(0.002)
NTR	[0.100]*	[0.764]*
	(0.029)	(0.026)
ECM(-1)	[-0.615]*	[-0.695]*
	(0.000)	(0.000)

*, ** shows Significance at 5% and 10% respectively

Table 6 Granger Causality Test

Null Hypothesis	F-Stat	Prob.
	Model 1	
LDT does not granger reason LCE	2.057	0.143
LCE does not granger reason LDT	2.873	0.070
LIDT does not granger reason LCE	1.413	0.257
LCE does not granger reason LIDT	0.155	0.856
LNTR does not granger reason LCE	1.794	0.182
LCE does not granger cause LNTR	1.894	0.166
	Model 2	
LDT does not granger reason LDE	1.579	0.214
LDE does not granger reason LDT	0.653	0.587
LIDT does not grathe nger reason LDE	2.671	0.065
LDE does not granger reason LIDT	2.606	0.070
LNTR does not granger reason LDE	2.336	0.093
LDE does not granger reason LNTR	0.299	0.825

Model 1 in table 5, showed only LNTR has an optimistic and important association with current expenditure (LCE) while no other variable has a significant relationship with current expenditure (LCE). Error Correction Mechanisms (ECM) value is negative and significant as 0.615 indicated the 61% divergence remove in one year. Model 2 showed that direct a tax has negative and significant relationship with development expenditure at a 10% level. The indirect tax and non-tax revenue have a positive and significant relationship with development expenditure. Error Correction Mechanisms (ECM) value is negative and significant as -0.695 showed that 69% divergence will be removed in one year.

3.2 Granger Causality Test

Estimates of granger causality in table 6 showed in both models straight tax (LDT), indirect tax (LIDT), and non-tax income (LNTR) has no causal relationship with current expenditure (LCE) and development expenditure (LDE) because probability values of both the model are greater than critical value 0.05. It estimated no casual relationship in the institutional separation hypothesis exists in the study. The results of the granger causality test are contradicted by Naryan (2005), Sadiq (2010), and Ali & Shah (2012).

3.3. Brush-Godfrey Serial Correlation LM Test

In table 7, Breush- Godfrey serial association LM test showed no serial correlation because the P-value of model 1 and model 2 is greater than the critical value of 5%.

Table 7 Breush Godfrey Serial Correlation LM test Estimation

Model 1			
F-Statistics	0.948	Prob.	0.339
Model 2			
F-Statistics	0.095	Prob.	0.760

3.4 Breush Pagan Godfrey Heteroskedasticity Test

Table 8 Breush Pagan Godfrey Heteroskedasticty Test Estimation

Model 1			
F-Statistics	1.109	Prob.	0.393
Model 2			
F-Statistics	0.442	Prob.	0.885

In table 8, the Breush Pagan Godfrey test showed that no Heteroskedasticity exists in both models because P value of both models is greater than the critical value 5%.

3.5 Ramsay Reset Test

Table 9 Ramsay Reset Test Estimation

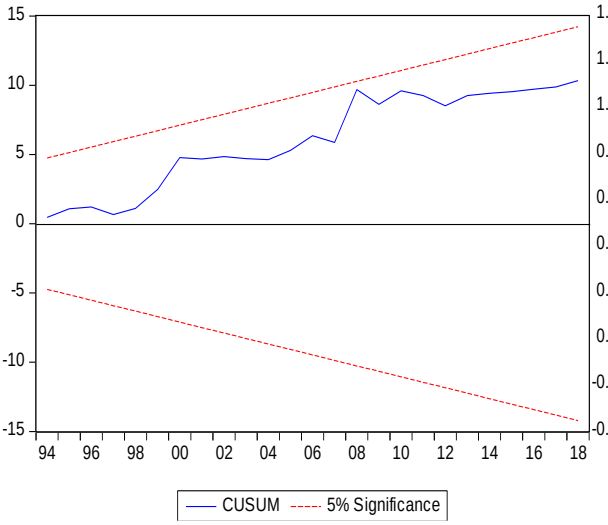
Model 1			
F-Statistics	0.136	Prob.	0.714
Model 2			
F-Statistics	1.963	Prob.	0.172

In table 9, Ramsay Reset test showed that in both models there is no misspecification. The P- the value of both models is greater than the critical value of 5%.

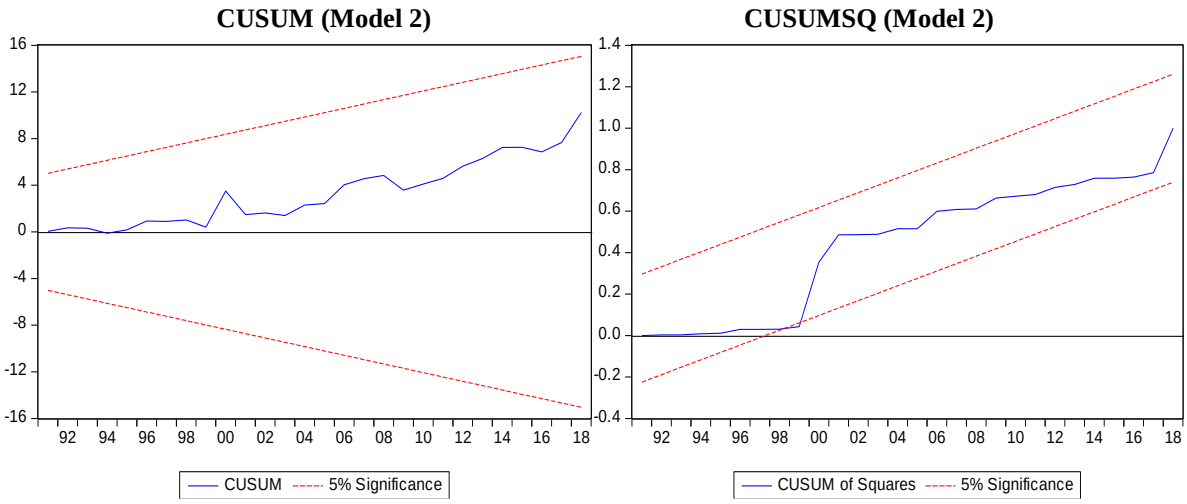
3.6. CUSUM and CUSUMSQ

The consequences of the figures show the that CUSUM and CUSUMSQ of both the models are within the critical bounds. Grade lying between lower and upper limits. This shows that estimations of ARDL are efficient. The graphs confirm the model is stable.

CUSUM (Model 1)



CUSUMSQ (Model 1)



4. Discussion

The discussion section of the study consists of results and economic reasons behind it. According to the consequences of the ARDL certain test, co-integration exists in government income and spending because in model 1 F-value is 11.017 and in model 2 F-value is 4.154 which was higher than the han upper bound value. Model 1 shows that in the long run the non-tax revenue, indirect tax, and direct tax of the government have a significant association with current expenditure. Model 2 showed in the long run direct tax and indirect tax a has a causal relationship with development expenditure but non-tax revenue has no relationship with development expenditure. Model 1 showed in the short run only non-tax revenue and has an important and positive relationship with current expenditure and ECM value showed that 61 percent divergence we removed moves in one year. Model 2 showed that in the short run direct tax, indirect tax and non-tax revenue a has a significant relationship with development expenditure. The ECM value of modes shows that 69 percent divergence will be removed in one year. Granger causality showed that direct tax, indirect tax, and non-tax revenue have no causal relationship with current expenditure and development expenditure, which chains the official separation hypothesis. The result showed that the government is not doing their current expenditure and development expenditure according to the direct tax, indirect tax, and non-tax revenue, and also government does not levy direct tax, indirect tax, and non-tax income according to their current expenditure and development expenditure. The institutional separation hypothesis shows that the administration of Pakistan's current expenditures and development expenditures are high as compared to the government revenue. This situation showed that Pakistan is facing a budget deficit which is not a good situation for any country (Hoover &Sheffrin, 1992).

5. Conclusion and suggestions

In budget deficit, rapid increase in government expenditure requires a ratio of amount in the form of revenue or tax revenue. Research suggests that non-tax income and tax income (indirect and direct tax) plays important role in government expenditure. Government expenditure has significant implications in economic activities. In this study, the relationship between the components of government revenue and expenditure was measured. The outcomes come of the study showed no autocorrelation and no heteroscedasticity which was measured the through Breush-Godfrey Serial Association LM test and the Breush Pagan Godfrey test respectively. The outcome of the Ramsey Reset test showed data is not misspecified. ARD designates designate co-integration among the variables in both models. In ARDL long run estimation model 1 showed as non-tax revenue, direct tax, and indirect tax has a significant relationship with current expenditure. Direct tax has a positive and significant relationship with current expenditure. An increase in direct tax increased current expenditure. The government is taking different measures to increase the direct tax. Indirect tax has a significant but undesirable relationship with the government's current spending in long run An increase in indirect tax decreases government expenditure. Indirect tax is a burden on the people of Pakistan because it is unequally distributed. Log of non-tax revenue (LNTR) has a significant and optimistic relationship with a log of current expenditure (LCE) in the long run.

Long-run estimation showed long-run direct tax has a negative and significant relationship with development expenditure which indicated an increase in direct tax decrease government expenditure. Indirect tax has a positive and significant relationship with development expenditure. Non-tax revenue has a negative and insignificant relationship with development expenditure. The ranger causality test was employed to find the causality. Estimation of the granger causality test showed as in models shortest tax, unintended tax, and non-tax revenue have no causal relationship with current expenditure and development expenditure. The results study showed that the institutional separation hypothesis exists in Pakistan. Government has to take different measures to overcome corruption and bring an effective progressive tax system to increase the direct tax and decline indirect tax because it is a burden on the people of Pakistan. This study can be extended in the future by including more other

macroeconomic variables and by including other components of government revenue that directly or indirectly affect government current expenditure.

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