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Exploring the Drivers of Government Expenditure Patterns in Pakistan

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Abstract
The study investigating the factors influencing government spending in Pakistan utilizes time-series data spanning from 1980 to 2019. The analysis modifies Wagner's law by incorporating political instability alongside variables such as GDP, debt, inflation, population, trade openness, oil price, and tax revenue. The long-term findings validate Wagner's law in both models, while the short-term results deviate from Wagner's law in Pakistan. This deviation suggests that industrialization progress has enabled the government to improve public expenditure by providing essential facilities. Additionally, the study reveals that the government's active role in national activities leads to an increase in its size. Inflation, population, oil price, real GDP, and political instability exhibit positive and significant connections with government expenditure in the long run for both models. Conversely, debt, nominal GDP, political instability, trade openness, and tax revenue demonstrate negative and significant connections with government expenditure in the long run for both models. However, the short-term results vary between the two models.
Keyword: Government expenditure, GDP, Oil price, Wagner's law, Political instability, ARDL

1. Introduction

1.1. Background of the study

Government spending plays a crucial role in managing the economy, whether in developed or underdeveloped nations. It is a key component of the financial system, derived from a portion of revenue that is allocated based on the restructuring of financial capacity within different government levels or the distribution of responsibilities among administrative tiers. Broadly speaking, public spending impacts collective resources and is closely tied to exchange rates and budgetary policies. Specifically, public expenditure refers to the value of goods and services supplied within the public sector. In Nigeria, public spending can be categorized into recurrent and capital expenditures, both of which significantly contribute to the country's economic landscape. Recurrent expenditures encompass the government's expenses related to supervision, such as salaries, wages, interest on loans, and maintenance costs. On the other hand, capital expenditures refer to the expenses incurred on capital developments, including transportation, airports, healthcare, education, telecommunications, and energy generation, as noted by Okoro (2013). These categories of expenditures are crucial for the effective functioning and development of a nation's economy. An increase in government spending on social, economic, and material infrastructures can positively contribute to economic growth. This is achieved by improving workforce efficiency and state output through investments in healthcare and education, and by reducing production costs, encouraging private sector investment, and improving enterprise productivity through investments in essential infrastructure such as highways communication, and energy. Gachunga (2019), Jibir & Aluthge (2019).

In emerging countries like Pakistan and Nigeria, providing infrastructure facilities to meet the needs of businesses, households, and other consumers is crucial for economic progress. A collaborative partnership between the government and the private sector is essential for providing critical infrastructural facilities that can stimulate economic expansion and growth. Government spending, whether capital or recurrent expenses, particularly on economic and social infrastructure, can be growth-enhancing. However, it is crucial to ensure that government spending is well-integrated and does not "crowd out" private sector investment. The government should prioritize high-value projects and be accountable for its spending in the economic sector, ensuring that public funds are not misused Lopez & Miller (2007).

Barro and Grilli (1994) define government spending as encompassing all government injections and investments, excluding transfer payments. Government spending is used for immediate satisfaction of societal needs or for future benefits, such as infrastructure investments or transfer payments. Government spending can be categorized into capital and current or ongoing expenses. Current expenditures refer to items with a limited duration of use or that can be consumed, and they include goods or services that are used up within a specific time frame.

Public expenditures can be categorized in various ways. According to British Economist A.C Bigot, there are two main types of expenditures: transfer and non-transfer. Modern economists further classify these expenses into development and non-development expenses. Development expenditures are undertaken by the state bank through different government entities, including federal and local governments, to promote economic growth through various projects. Non-development expenditures, on the other hand, include expenses related to law and order, protection, and pensions, which do not provide direct economic benefits. Farooq (2016) explains that these expenditures do not have a direct payback.

The primary goal of the government is to enhance societal well-being through various programs that address social, economic, and political aspects. These programs lead to an increase in public spending, particularly in developing countries like Pakistan where the private sector is relatively weak and noncompetitive. Wagner (1883) drew upon the experiences of industrialized nations to establish a connection between population growth, economic development, and government expansion. Over time, Wagner's observations evolved into Wagner's Law, sparking theoretical and practical discussions on the impact of government spending in various states Nwude & Boloupremo, (2018)

This time series study builds upon previous research to empirically analyze the determinants of government expenditure in Pakistan, incorporating multiple methods of government expenditures and GDP economic growth with political instability. Given the current economic challenges facing Pakistan, including political instability, this study is timely and relevant to various societal sectors. The primary objective of the study is to empirically examine the factors contributing to the growth of public expenditure. This study is expected to provide valuable insights into the complex relationship between government expenditure, economic growth, and political instability in Pakistan.

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The structure of this study is outlined as follows: Section 1 introduces the research focusing on modeling the determinants of government expenditure in Pakistan, while Section 2 reviews previous studies on the subject. Section 3 of this study presents the research methodology, Section 4 discusses the results, Section 5 provides the conclusion, and Section 6 lists the reference.

2. Literature Review

2.1. Theoretical literature review

A range of theories have been developed to predict the functional connections among various factors related to government expenditure. Here are some of the most famous theories in this area: [List of government expenditure theories]

2.2. The Wagner's Hypothesis /Law

The Wagner Law, proposed by Adolph Wagner between 1835 and 1917, is also known as the "law of increasing state activity." It was empirically analyzed in the late 19th century and posits that the growth of government is a function of economic development and industrialization. According to Wagner, as a nation's economy develops and industrializes, the share of public expenditure and per capita income also increases. The Wagner Law suggests that social progress and social welfare expand with the emergence of modern industrial society.

Wagner's hypothesis (1893) is supported by three main factors. Firstly, the process of industrialization leads to an expansion of the private sector into the public sector, resulting in an increase in government functions such as law and order (protection function) and administration. Secondly, the government plays a significant role in providing social and cultural services, including pension for the elderly, food subsidies, education, disaster relief, health, environmental protection, and other essential services. These factors contribute to the growth of government expenditure and support Wagner's hypothesis. Wagner's theory (1893) is substantiated by three key elements. Initially, industrialization prompts the private sector's involvement in public sector activities, leading to an augmentation of government functions like law enforcement and administration. Additionally, the government assumes a crucial role in delivering social and cultural services such as elderly pensions, food assistance, education, disaster relief, healthcare, environmental conservation, and various essential services. These aspects collectively drive the expansion of government spending and validate Wagner's theory. These investigations are conducted in various countries and employ diverse econometric tools such as the ARDL model, OLS model, co-integration analysis, Granger causality test, random fixed-effect model, and others over different periods. However, some studies do not support Wagner's law or demonstrate a negative relationship between public expenditure and economic growth, along with other variables. Examples of such studies include Kesavarajah and Mayandy (2012), Ali and Rehman (2015), Ali et al., (2016), Arshad ad Ali (2016), Ashraf and Ali (2018), Bagdigen and Cetintas (2004), and Demirbas (1999).

2.3. Peacock Wiseman hypothesis

The Peacock-Wiseman hypothesis, spanning from 1890 to 1955, examines the growth of public expenditure in Britain, building upon Wagner's law. The hypothesis posits that public expenditure does not increase in a linear fashion and is influenced by three main factors. Firstly, the displacement effect occurs when social disruptions lead the government to raise taxes to generate revenue, thereby increasing public expenditure to address these challenges. Secondly, the inspection effect arises when tax increases do not coincide with new disturbances, allowing the government to utilize these additional revenues for more efficient fiscal measures that were previously overlooked. This is known as the inspection effect. Lastly, the concentration effect pertains to the political structure of the country, where the central government's functions outpace those of other government levels (local and state) during periods of rapid economic growth. Several studies support the Peacock-Wiseman hypothesis, including Dada and Adesina (2013)

2.4. Baumol's law about public expenditure

Baumol's law on public expenditure suggests that if the output ratio remains constant between the public and private sectors, there will be a proportional increase in public sector expenditure. This is due to the labor-intensive technology used in the public sector, which results in a relationship between labor costs in both sectors. In the private sector, capital substitutes for labor, leading to an increase in wages due to technological advancements. However, in the public sector, expenses continue to rise due to wage costs. Some studies support Baumol's law, including Köppl-Turyna, Kucsera, and Neck (2017).

2.5. Keynesian theory about public expenditure

The Keynesian school of thought emphasizes a positive relationship between GDP and public expenditure, viewing the latter as an exogenous factor that impacts economic growth. Studies in various countries have applied different tools to examine the connection between public expenditure and GDP, along with other variables, using different time ranges to evaluate panel and time-series data. Some research findings support the Keynesian perspective, indicating a positive relationship between public expenditure and economic growth (Fernandez, 2017; Richter & Papars, 2012; Ali, 2022; Ackah, 2023). However, other studies have reported negative results, suggesting that public expenditure may not always have a positive impact on economic growth (Hasnul, 2015; Ali, 2022; Ali and Mohsin, 2023; Banai, 2021).

2.6. Musgrave theory About Public Expenditure

Musgrave proposed a three-tiered income categorization, consisting of low, medium, and high-income levels. At low-income levels, public sector demand is reduced, and only basic needs are met. As income increases from low to medium levels, the government provides basic facilities such as healthcare and education. In high-income countries, where income is more substantial, the demand for basic needs decreases, and a more luxurious lifestyle is developed. Apart from Musgrave's theory, there are other government expenditure theories, such as Colin Clark's hypothesis and Stanley Jevons' theory. However, the current study modifies Wagner's law for the context of Pakistan.

Prior research has shown that many studies have questioned what factors influence government expenditures in both developed and developing countries. While these studies have primarily focused on geographic, institutional, political, and economic factors, they have identified several factors that affect the supply or demand in the public sector. When these factors change, public spending is also affected.

2.7. Methodology and Data Specification

This section outlines the research methodology adopted in the present study. It offers insights into the data collection, definition, estimation, and model specification procedures employed for the investigation.

2.8. Empirical literature review

Table 1: Summary of Literature Review

So. No	Authors'	Country	Time space	Purpose	Model	Conclusion
1	Kimea and Kiangsi. (2018).	Tanzania	1968 to 2011	Investigated supportable inquiry of the connection among sectoral nation expenses and economic development	Johansen, vector error correction, ADF, PP test.	No significant connection
2	Turan and Karakas.(2016).	south Korea and turkey	1960 to 1970s	Investigated impact of trade openness and GDP per capita on government size for two countries	ARDL	significantly positive long duration connection but in case of short duration for Korea these variable are negatively Related
3	Olawale and Hassan. (2016).	five (5) African state	1990 to 2015	Investigated outside debt and size of public fund	pooled mean style estimation process	negative connection
4	Oyeleke and Akinlo. (2016).	Nigeria	1980 to 2013	Investigated the link between trade openness and Government expenditure	ARDL	long duration test show negative connection
5	Ogbonna. (2014).	Nigeria	1981 to 2013	Investigated government size and inflation dynamics	ARDL	significant and positive long duration connection
6	Aregbeyen and Ibrahim. (2012).	Nigeria	1970 to 2008	Investigated the networking within government al cost and revenue	ARDL	No long duration connection is exist but short duration connection is found among Variables
7	Saysombath and Kyophilavong . (2013).	Lao PDR	1980 to 2010.	Investigated the association with in revenue and spending	ARDL,	long duration connection be alive among Government expenditure and revenue for the Lao PDR but not short term be alive
8	Enders *et al*. (2011).	U.S	1975 to 2005.	Considered how RER is affected by technology and fiscal shocks	VAR	both the term of trade and RER whose reactions are left unlimited devaluation in light of expansionary Government expenses upset and enjoy in light of positive innovation shocks
9	Subhani *et al. (*2012).	Pakistan	1979 to 2010	Investigated the observation al unidirectional causality attach between the state revenue and expenditure	Granger Causality	unidirectional connection among the variables

Table 2: Variables, Units of measurements and source of Data for Model 1

Variables	Unit	Source
Government expenditure	Total expenditure of government in nominal term	SBP
GDP	GDP in Nominal term	WDI
Public debt	Total debt of federal government	SBP
Inflation	Rate of Inflation	WDI
Population	Total population	WDI
Political instability index	Annual	"Pakistan 58 years"
Trade openness	as a proxy of TO is (export + import/GDP)	WDI

Table 3: Variables, Units of measurements and source of Data for Model 2

Variables	Unit	Source
Government expenditure	Real expenditure of government as a share of GDP	IMF
Real GDP	Growth rate of real GDP	WDI
Oil price	Annual average price of crude oil	OPEC
Tax revenue	Total tax revenue is collected by federal government	SBP
Population	Population growth rate	WDI
Political instability index	Annual	"Pakistan 58 years"

The investigation utilized a secondary dataset comprising annual figures for nominal GDP, real GDP, debt, inflation, population, political instability, trade openness, oil prices, and tax revenue. This dataset covers the study period from 1980 to 2019. All data were sourced from multiple sources including the World Development Bank (WDI), International Financial Statistics (IFS), State Bank of Pakistan (SBP), and the book "Pakistan 58 Years" for political instability data.
Data for the variables were calculated in the local currency unit of Pakistan, both in nominal and real terms. Additionally,

natural lags of variables were taken, except for trade openness, political instability, population, real GDP, real government expenditure, and inflation.

3. Model specification for the both models

The current investigation utilized two government expenditure models, one measured in real terms and the other in nominal terms, as dependent variables. These models were examined in conjunction with several independent variables, encompassing nominal GDP, real GDP, debt, inflation, population, political instability, trade openness, oil prices, and tax revenue. These models (1 and 2) are adapted from Jibir, A and Aluthge, C. (2019).

Model 1: Taking Government expenditure as a nominal entity

GE = f (GDP + DEBT + POP + INF + TOP + PI) ……Equation 1

Where, GE= Government expenditure, GDP= Gross domestic product, DEBT= Public debt, Pop= population, INF=Inflation, TOP=Trade openness, PI= Political Instability (measured with index).

Model 2: Taking Government expenditure as a Real entity

GE/GDP=f (RGDPG + POPG + TAXR + OILP + PI)……Equation 2

In which, GE/GDP represents real government expenditure as a proportion of real gross domestic product, RGDPG signifies the real GDP growth rate, POPG denotes population growth, TAXR stands for tax revenue, OILP represents oil price, and PI indicates political instability.

3.1. Cointegration and ARDL Models

Granger (1981) proposed the concept of Cointegration, which was later refined by Engle and Granger (1987) among others. After assessing the stationarity of the series at both levels and first differences, Cointegration tests are applied to ascertain the relationship among the variables. Various methods for Cointegration exist, such as Engle-Granger (1987), Johansen-Juselius (1990), and Maximum Likelihood, which relies on Johansen (1991; 1995). However, if these methods encounter conflicting rules of integration, calculations may become ineffective. The conducted analysis involves a combination of integrated orders at both levels and first differences. Hence, the ARDL approach, popularized by Pesaran and Shin (1995), Pesaran and Smith (1997), and Pesaran, Shin & Smith (2001), is utilized. The ARDL approach offers several advantages: it can be used regardless of the equality of integration rules, it is suitable for small data sizes, it allows for a larger number of lags in the data formation process, and it provides valuable insights into structural breaks in the model or data.

Model 1 is expressed as follows:

$$\Delta LNGE_t = \alpha_0 + \sum_{i=1}^{k} \beta_{1i}\Delta LNGDP_{t-i} + \sum_{i=1}^{k} \beta_{2i}\Delta LNDEBT_{t-i} + \sum_{i=1}^{k} \beta_{3i}\Delta INF_{t-i} + \sum_{i=1}^{k} \beta_{4i}\Delta LNPOP_{t-i} + \sum_{i=1}^{k} \beta_{5i}\Delta PI_{t-i} + \sum_{i=1}^{k} \beta_{6i}\Delta TO_{t-i} + \sum_{i=1}^{k} \beta_{7i}\Delta GE_{t-i} + \emptyset_1 LNGDP_{t-1} + \emptyset_2 LNDEBT_{t-1} + \emptyset_3 INF_{t-1} + \emptyset_4 LNPOP_{t-1} + \emptyset_5 PI_{t-1} + \emptyset_6 TO_{t-1} + \emptyset_7 GE_{t-1} + \mu_t$$

Where α_o represents the intercept, μ_t denotes the disturbance term, Δ signifies the initial differentiation operator, and β_1 to β_7 represent parameters of long duration. Similarly θ_1 to θ_7 represent short-term parameters resulting from the ARDL error correction strategy. GE is the natural logarithm function of total public spending, LNGDP represents the natural logarithm function of gross domestic product, LNDEBT is the natural logarithm function of total public debt, INF denotes inflation, LNPOP is the natural logarithm function of population, PI signifies the index of political instability, and TO represents trade openness, representing the optimal lag interval.

$$\Delta GE/GDP_t = \alpha_0 + \sum_{i=1}^{k} \beta_{1i}\Delta GE/GDP_{t-i} + \sum_{i=1}^{k} \beta_{2i}\Delta RGDP_{t-i} + \sum_{i=1}^{k} \beta_{3i}\Delta LNOP_{t-i} + \sum_{i=1}^{k} \beta_{4i}\Delta LNTR_{t-i} + \sum_{i=1}^{k} \beta_{5i}\Delta PI_{t-i} + \sum_{i=1}^{k} \beta_{6i}\Delta LNPOP_{t-i} + \emptyset_1 GE/GDP_{t-1} + \emptyset_2 RGDP_{t-1} + \emptyset_3 LNOP_{t-1} + \emptyset_4 LNTR_{t-1} + \emptyset_5 PI_{t-1} + \emptyset_6 LNPOP_{t-1} + \mu_t$$

Where, LNOP is natural logarithm function of oil price, GE/GDP is government expenditure as percentage of GDP, RGDP is GDP growth rate and LNTR is natural logarithm function of tax revenue, other variables are already explained above.

4. Results and discussion

For the conducted examination used model of Jibir and Aluthge (2019) also discusses in literature. But when regress this model some variables are highly insignificant so discard these variables in both models i.e. oil revenue, trade openness and exchange rate.

4.1. Descriptive statistics

The act of descriptive statistics is well operating in economics research. Descriptive statistics display the individual features of the variables which are utilize in the calculation/estimation. More importantly aspects such as skewness, kurtosis and consequently normality are exposed. Table 4 and 5 contains summary descriptive statistics of the endogenous and exogenous variables of model (1&2) (government expenditure, nominal and real gdp, inflation population, political instabality, debt, tradeopness, oil price and tax revenue) utilize in this examination.

Descriptive statistics of both models verify the different test and express the variables of the model is normally distributed expect political instability, that reveals the fitness of model.

4.2. Unit root test

The estimation of unit root was implemented to observe non-stationarity in each variable under examination to prevent spurious calculation. The implementation of the ADF & PP test to check the stationary or non-stationarity of the time series data that is generally utilized in the area of economics. Two hypothesis were tested to check the unit root (Null and alternative hypothesis). Output of ADF test is prescribed in table.

The ADF test results presented in table 6. Test incorporates none, intercept and intercept and trend while stationarity tested at level as well as 1st difference. Look at the table 5 when estimated ADF against the level along constant, trend and intercept

and none, nominal and real GDP are stationary at level while other variables (GE, DEBT, INF, TO, POP, GE/GDP, OILP, TR and, PI) are not stationary. Because p-value is greater than 0.05, so null hypothesis is not rejected at all stages except nominal and real GDP. So we again estimate ADF at 1st difference all variables become stationary because p-value is less than 0.05 so null hypothesis is rejected and alternative is accepted.

Table 4: Descriptive statistics of variables used in model 1

	LNGE	LNGDPN	LNDEBT	INF	LNPOP	PI	TO
Mean	11.83448	15.01153	14.66134	8.066352	18.73058	0.441618	0.331632
Median	12.20820	15.02536	14.93292	7.645420	18.76052	0.107794	0.335151
Maximum	15.93725	19.27309	17.16916	20.28612	19.19340	3.897584	0.389095
Minimum	7.800450	10.64372	11.88449	2.529328	18.17292	-0.622666	0.233275
Std. Dev.	2.116126	1.764715	1.555454	3.817324	0.304640	1.071841	0.036448
Skewness	-0.481568	-0.025955	-0.165423	0.768741	-0.211892	1.272849	-0.787979
Kurtosis	2.357948	2.759912	1.953489	3.791918	1.847918	4.253207	3.303676
Jarque-Bera	2.233106	0.100562	2.007740	4.984972	2.511478	13.41851	4.293100
Probability	0.327406	0.950962	0.366459	0.082704	0.284865	0.001220	0.116887
Sum	473.3791	600.4612	586.4536	322.6541	749.2232	17.66472	13.26530
Sum Sq. Dev.	174.6415	121.4546	94.35803	568.3065	3.619412	44.80489	0.051809
Observations	40	40	40	40	40	40	40

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Table 5: Descriptive statistics of variables used in model 2

	GE/GDP	RGDP	LNOP	LNTR	PI	POP
Mean	21.39275	4.872707	7.287796	11.23407	0.441618	2.633000
Median	21.02705	4.846451	7.106150	11.59054	0.107794	2.700000
Maximum	29.48150	10.21570	9.205334	14.20961	3.897584	3.360000
Minimum	16.36260	1.014396	5.522752	7.399276	-0.622666	2.040000
Std. Dev.	3.271411	2.061902	1.253292	2.035371	1.071841	0.452589
Skewness	0.821139	0.228399	0.206520	-0.575000	1.272849	0.201415
Kurtosis	2.980316	2.760063	1.454057	2.150610	4.253207	1.612062
Jarque-Bera	4.495773	0.443725	4.267570	3.406609	13.41851	3.481073
Probability	0.105622	0.801026	0.118388	0.182081	0.001220	0.175426
Sum	855.7101	194.9083	291.5118	449.3626	17.66472	105.3200
Sum Sq. Dev.	417.3831	165.8061	61.25890	161.5667	44.80489	7.988640
Observations	40	40	40	40	40	40

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Table 6: Unit root testing using ADF test for model 1& 2

Variable Name	At level (ADF)			At 1st difference (ADF)			Integrating order
	Intercept	Intercept and trend	None	Intercept	Intercept and trend	None	
LNGE	0.2378	0.5662	0.7388	0.0015**	..	..	I(I)
LNGDP	0.0290*	..	..	..	..	..	I(0)
INF	0.0549	0.1907	0.1555	0.0000**	..	..	I(1)
LNDEBT	0.2820	0.1571	0.9999	0.0003**	..	..	I(1)
TO	0.5659	0.3634	0.2775	0.0000**	..	..	I(1)
PI	0.2462	0.0984	0.0643	0.0000**	..	..	I(1)
LNPOP	0.1670	0.0792	0.8141	0.5867	0.9996	0.0369**	I(1)
GE/GDP	0.5174	0.7247	0.5851	0.0000**	..	..	I(1)
RGDP	0.0038*	..	..	..	..	..	I(0)
LNOP	0.9177	0.4014	0.9863	0.0000**	..	..	I(1)
LNTR	0.5416	0.6981	0.4836	0.0000**	..		I(1)

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The output of Philips Parron test is prescribed in following table.
When carried out pp test output captured is accordance with ADF test. As in the situation of ADF test nominal and real GDP are stationary at level but all other variables are stationary at first difference.
Output of both test (ADF and PP) verify the variables at mixture of integrated order I(1) and I(0) which leads the applicability of ARDL Cointegration analysis.

4.3. Optimum lag length

In ARDL method, the selection of lag interval is vital application because the results reliability is determined by this application. There are many techniques to determine the optimal lag length. Among these techniques there include Akaike Information Criterion (AIC), Final Prediction Error, Schwartz Bayesian Criterion and Hannan- Quinn Criterion. The sample of this study is small so, it utilizes AIC because it reliable for the small sized sample. Results suggests that maximum lags of three is

appropriate for model 1and maximum two lags are picked for model 2.

Table 7: Unit root testing using PP test for model 1&2

Variables Name	At level (PP)			At 1st difference (PP)			Integrating order
	Intercept	Intercept and trend	None	Intercept	Intercept and trend	None	
LNGE	0.2151	0.5295	0.7388	0.0015**	..	..	I(1)
LNGDP	0.0086*	..	..	..	..	..	I(0)
INF	0.013*	..	..	..	..	..	I(0)
LNDEBT	0.6976	0.6791	1.0000	0.0002**	..	..	I(1)
TO	0.6437	0.3596	0.2775	0.0000**	..	..	I(1)
PI	0.2462	0.0984	0.0643	0.0000**	..	..	I(1)
LNPOP	0.0001*	..	..	..	..	..	I(0)
GE/GDP	0.5174	0.7247	0.5851	0.0000**	..	..	I(1)
GDP	0.0038*	..	..	..	..	..	I(0)
LNOP	0.9177	0.4014	0.9863	0.0000**	..	..	I(1)
LNTR	0.5416	0.6981	0.4836	0.0000**	..		I(1)

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4.4. Bound testing approach of ARDL

The Autoregressive Distributed Lag (ARDL) bound test is a method used in time series analysis to test for the existence of a long-run relationship between two or more variables. The test is based on the idea of cointegration, which implies that a linear combination of the variables is stationary. The ARDL bound test is particularly useful when the variables are non-stationary and integrated of different orders. It helps to determine the appropriate lag structure for the model and provides critical values for testing the null hypothesis of no cointegration. Results of bound test for both models are prescribed in tables given below.

Table 8: Bound test for both models (1&2):

	Test Statistic	Value	significance	I(0)	I(1)
Model 1	F-statistic	2.679396	10%	2.12	3.23
	K	6	5%	2.45	3.61
			1%	3.15	4.43
Model 2	F-statistic	5.666012	10%	2.26	3.35
	K	5	5%	2.62	3.79
			1%	3.41	4.68

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In order to interpret the results of the ARDL bound test, we look at the F-statistic and the critical values associated with the test. The F-statistic value of 2.679396 is compared to the critical values to determine the significance of the test. The test statistic is compared to the upper and lower critical bounds for a given significance level. If the F-statistic is greater than the upper critical bound, we reject the null hypothesis of no cointegration at that significance level. If the F-statistic is lower than the lower critical bound, we fail to reject the null hypothesis. The degrees of freedom for the F-statistic are typically calculated based on the number of regressors in the model. In this case, with K = 6, the degrees of freedom will be adjusted accordingly. In summary, the specific interpretation of the ARDL bound test results with an F-statistic of 2.679396 and K = 6 lies between upper and lower bound of critical region so the model suggests further detection of cointegration. However in second model the F-statistic of 5.666012 and K = 5 clearly greater than upper critical boundary of bound test. So the second model suggests existence of cointegration.

Table 9: Long Run Coefficients of ARDL Model 1

Long Run Coefficients	Selected ARDL model (1, 1, 0, 3, 2, 3, 0).			
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNGDP	-6.958117	3.478181	-2.000505	0.0592
LNDEBT	-4.358175	2.695188	-1.617021	0.1215
INF	0.411680	0.173566	2.371899	0.0278
LNPOP	72.076065	21.035844	3.426345	0.0027
PI	-2.297019	1.287398	-1.784234	0.0896
TO	-36.136954	16.175102	-2.234110	0.0371
Constant	-1184.399314	328.272220	-3.607979	0.0018

Computed by author's using Eviews 10

According to above table 9 long run coefficients of model reveals negative and significant connection with the government expenditure size at five percent level of significant. This results suggest that 1% increase in GDP there will be a -6.95% decrease in government expenditure. The finding of the ongoing study simplifies many studies such as Zareen & Qayyum. (2015) and Primož (2004). Reveals negative and significant connection among government expenditure and GDP. According to the theory of mainstream if government size is exceeding a certain limit then negative output is expected. Mostly advance welfare nation significantly expands the size of government activities but these nations face lot of problems mostly loss of efficiency in reallocating and excess burden of taxes. Due to these reason long term GDP is reduce but reveals significant connection with the size of government. These outcomes confirm by other studies Musaba, at al. (2013). But several examinations disagree

with these output because when growth of GDP is enhancing then expend the expenses of government that holds Wagner law Richter and Paparas (2012) and Akpan, U. F., & Abang, D. E. (2013).
Long run coefficient of debt reveals negative and insignificant connection with the government expenditure size at 5% percent level of significant. This results suggest that 1% increase in debt there will be a- 4.35 % decrease in government expenditure. Many studies that support this results are Shabbir & Yasin. (2015). Many studies contradict the output Ukwueze. (2015). Kakeeto, K. (2018), Positive and significant relationship among debt and government expenditure, Okafor, & Eiya. (2011). Obeng, & Sakyi. (2017).
Political instability coefficient reveals negative and insignificant connection with the government expenditure size at 5% percent level of significance. This results suggest that one unit increase in political instability there will be 2.29 percent decrease in government expenditure. Some studies support these findings like Fosu. (2010) and Annett. (2001).
Trade openness long run coefficient expresses negative and significant connection with the government expenditure size at 5 % percent level of significance. This results suggest that one unit increase in trade openness there will be 36.13 percent decrease in government expenditure. Some studies confirms this results as Aregbeyen, & Akpan. (2013). Some studies contradict the output positive and significant result as, Gachunga, M. J. (2019). Alexiou. (2009).
Long run coefficient of inflation reveals positive and significant connection with the government expenditure size at 5% percent level of significance. This results suggest that one unit increase in inflation there will be 0.41 percent increase in government expenditures. Few studies support this result like Ogbonna. (2014), Han & Mulligan. (2001) and Ezirim, Muoghalu, & Elike. (2008). Some studies showed negative and significant relationship as Okafor & Eiya. (2011), Nyambe & Kanyeumbo. (2015) and Attari & Javed. (2013).
Log of Population coefficient articulates positive and significant connection with the government expenditure size at 5% percent level of significance. This results suggest that one percent increase in population there will be almost 72 percent increase in government expenditure. This outcome strongly approved Wagner's law. The population of Pakistan increasing over time. Increasing population means further increase in demand for public goods like roads, hospital, schools, among others to meet the increasing population. The discovery is line with the results of previous examination like as Obeng, & Sakyi. (2017), Gachunga, M. J. (2019) and Jibir & Aluthge. (2019).

Table 10: Long Run Coefficients of ARDL Model 2

Long Run Coefficients	Selected ARDL model (1,2,2,2,1,2)			
Variable	Coefficient	Std. Error	t-Statistic	Prob.
RGDP	1.176888	0.308855	3.810491	0.0010
LNOP	2.508871	1.357649	1.847953	0.0781
LNTR	-0.426808	0.213363	-2.000385	0.0580
PI	2.071830	0.517851	4.000819	0.0006
LNPOP	13.655472	3.559378	3.836477	0.0009
Constant	-35.312987	19.571373	-1.804318	0.0849

Computed by author's using Eviews 10

Table 10 reveals the outcome of long run coefficients of model 2 extracted through ARDL technique. Long run effect of GDP reveals positive and significant connection with the government expenditure size at 1 percent level of significance. This results suggest that one percent increase in GDP there will be a 1.17 percent of GDP increase in government expenses. Positive relationship of GDP verify the Wagner's law (1883) for Pakistan which means growth level in long duration is significantly affect the government expenses size. When GDP is expending public expenses also increased to meet the demand of publicly produced commodities and services. Some examination verifies this output Gachunga. (2019), Jibir & Aluthge. (2019), Lopez & Miller. (2007), Richter and Paparas (2012) and Akpan & Abng. (2013). The output of this model contradict the first model.
Long run result of oil price show positive and insignificant connection with the government expenses size at 5% percent level of significance. This results suggest that one percent increase in oil price there will be a 2.50 percent of GDP increase in government expenditure. This outcome endorsed such as Adedokun, A. (2018).
Tax revenue coefficient reveals negative and significant connection with the government expenses size at 5% percent level of significance. This results suggest that one percent increase in tax revenue there will be a 0.42 percent of GDP decrease in government expenditure. This outcome approval such as Tax share is negative and significant effect on government expenditure in long run Obeng, Sakyi. (2017). Some studies contradict the results as Tax revenue significantly positive relationship with government expenditure Okafor & Eiya. (2011) and Gachunga. (2019).
Political instability index suggests the positive and significant connection with the government expenditure size at 1% percent level of significant. This results suggest that one unit increase in political instability there will be 2.07 percent of GDP increase in government expenditure. Here again second model results contradict with the first model.
Log of population coefficient depicts positive and significant connection with the government expenditure size at 1% percent level of significance. This results suggest that one percent increase in population there will be a 13.65 percent of GDP increase in government expenditure. This outcome strongly approved Wagner's law. Both model confirms this result.

4.5. Short run models

Results of short run for both models are prescribed as following:
In short run log of GDP have negative and significant relationship with the size of government expenses at 1% level of significance. Inflation reveals positive and insignificant link with government expenditure, similarly lag of inflation also reveals negative and significant relation with government expenditure at 1% level of significance. Short run coefficient of debt variable reveals negative and insignificant connection with the size of government expenditure. This result also contradicts the long run results of same model.
Some studies also support negative and significant relationship as Okafor & Eiya. (2011), Nyambe & Kanyeumbo. (2015) and

Attari & Javed. (2013). Both inflation and one lag of inflation are contradicting theoretical postulation that higher inflation increases the cost of publicly produced goods and services which in turn expand the level of government expenditure. Second lag of inflation reveals positive and significant connection with government expenditure at 1% level of significance.

Table 11: Short Run Coefficients of ARDL Model 1

Selected Model: ARDL(1, 1, 0, 3, 2, 3, 0)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNGDP)	-0.859161	0.114450	-7.506862	0.0000
D(LNDEBT)	-2.052937	1.616936	-1.269646	0.2188
D(INF)	0.083538	0.063201	1.321783	0.2012
D(INF(-1))	-0.166335	0.050804	-3.274056	0.0038
D(INF(-2))	0.159144	0.052824	3.012717	0.0069
D(LNPOP)	-47.759958	303.792826	-0.157212	0.8767
D(LNPOP(-1))	489.899881	358.028730	1.368326	0.1864
D(PI)	-0.133265	0.200524	-0.664583	0.5139
D(PI(-1))	0.839025	0.205690	4.079077	0.0006
D(PI(-2))	0.452189	0.193380	2.338344	0.0299
D(TO)	-17.022467	7.189247	-2.367768	0.0281
ECM (-1)	-0.471054	0.126517	-3.723252	0.0013

Computed by author's using Eviews 10

Short run estimates of population reveals negative and insignificant relation with the government expenditure size, one year lag of population also reveals insignificant but positive relation with the government expenditure. Short run results of political instability reveals negative and insignificant association with government expenditure, however first and second lag of political instability shows positive and significant association with government at 1% level of significance. These results also confirm the long run results of model 2. Trade openness reveals negative and significant relation with the government expenditure size at 5 % percent level of significance in short run.

Table 12: Short Run Coefficients of ARDL Model 2

Selected Model: ARDL(1, 2, 2, 2, 1, 2)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDP)	0.154874	0.129586	1.195142	0.2448
D(GDP(-1))	-0.285312	0.138792	-2.055678	0.0519
D(LNOILP)	1.441583	1.008291	1.429729	0.1668
D(LNOILP(-1))	-2.456081	0.900062	-2.728790	0.0123
D(LNTR)	-0.344360	0.234620	-1.467734	0.1563
D(LNTR(-1))	-0.379865	0.203564	-1.866068	0.0754
D(PI)	0.701828	0.377534	1.858979	0.0765
D(POP)	3.385281	11.446416	0.295750	0.7702
D(POP(-1))	-19.358942	12.564992	-1.540705	0.1377
ECM (-1)	-0.647498	0.150358	-4.306370	0.0003

Computed by author's using Eviews 10

Short run results of model 2 indicates that real GDP is positively and insignificantly associated with government expenditure, however second lag of real GDP show negative and significant connection with government expenses at 5% level of significance. Oil price show positive and insignificant relation with government expenses, though first lag of oil price show negative and significant connection with government expenses at 5%. Short run results of tax revenue and political instability confirm model 2 long run results. Population and its first lag variable reveals positive and insignificant connection with government expenditure. Error correction term of model 1 revealed negative and significant. Its coefficient is with the limit of one so short run model corrects with in a financial year. In model 2 ECM also depicts the same behavior.

Adjusted R^2 of first model is 0.93 means 93% changing occur in government expenses due to exogenous variables of the model and remaining 7% due to other factors. Adjusted R^2 value of second model is 0.88 means 88% changing occur in government expenses due to regressors of the model and remaining 11% due to other factors.

4.6. Diagnostic test

As follows the condition of ARDL model, test the model normality Heteroscedasticity and serial correlation but outcome of these test do not face any problem in both models because p–value of both heteroscedasticity and serial correlation tests is greater than 0.05 in model 1 and 2.

4.7. Stability test

Demonstration of stability test (CUSUM & CUSUMSQ) is offered by Brown, Durbin and Evans (1975). When information of stability test is plotted not merely reveals the significance level but also identify the structural breaks in model. If lines of both test (CUSUM and CUSUMSQ) moves among the top and lower bounded values at five percent significance then coefficient of the conducted examination are stable.

5. Conclusion

This study about the government expenditure in Pakistan adopting time series data covering the period among 1980-2019.The examination slightly changed the Wagner's law by including political instability with such variables GDP, debt, inflation, population, trade openness, oil price, tax revenue. It is confirmed by results that these variables are playing important role in describing the extension of government spending in Pakistan. This examination got several interesting outcomes that are suitable for the direction of future policy in government spending decision. Descriptive statistics reveals data is normally distributed except political instability and inflation. The stationery characteristics of the time arrangement data were confirmed. Only four variables were stationary at level while other variables are stationary at first difference. In order to apply ARDL methodology Bound test confirmed the long term Cointegration in the models. Long term outcome support Wagner law in both model but short run does not hold Wagner law far Pakistan, showing change for industrialization helped the government to develop the availability of the basic facilities which enhance public expenditure. The outcome also indicates if government play vital role in nation activities than size of government increase.

Inflation, population, oil price, real GDP, political instability are important determinants of government that show positive and significant connection in the long run in both models. However; debt, nominal GDP, political instability trade openness, tax revenue shows negative and significant connection in both models for long run. In short duration different variety of results in both models.

Table 13: Diagnostic tests for both models

Model 1			Model 2		
Test	Statistics	P-value	Test	Statistics	P-value
Autocorrelation Test	0.587845	0.4527	Autocorrelation test	0.079979	0.9234
Heteroscedasticity Test	1.822670	0.1009	Heteroscedasticity test	1.265500	0.3003
Normality test	0.911101	9.634099	Normality test	1.949746	0.377240

Computed by Author's using Eviews 10.

5.1. Policy recommendations

Some policy guidelines based on analysis are as follows:

- Government should use expenditures on such projects that enhance GDP in economy.
- Government should utilize better strategies for the promotion of trade openness for development and economic growth through transformation of different skills across the world.
- Government should adopt better fiscal and monetary policy to strengthen the economy.
- Government should adopt such polices that control political instability by spending money on such sectors that generate more employment opportunities and increase amount of revenues in the economy.

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