

Research Article



The Dynamic Effect of Public Spending on Pakistan's Economic Growth and its Implications for Agriculture Sector: Evidence from 1972 to 2014.

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Abstract | This study aims to analyse the impact of public spending on economic growth in Pakistan. Various econometric techniques have been applied to estimate the relationship among public spending on education, health, road length, defence, trade openness, worker remittances, total cropped area and economic growth. Pakistan's economic growth rate fluctuated from 1972 to 2014. During this period for some years, the economic growth was high while it slowed down in some years. The study utilised Annual time series data from 1972 to 2014. Empirical evidence suggests that public spending has a significant positive influence on economic growth. Augmented Dickey-Fuller (ADF) has been used for investigating the unit root in time series data. Johansen's Cointegration test and error correction model (ECM) is applied to estimate the long run and the short run relationship amongst the variables. The long-run analyses revealed the existence of a positive relationship among variables. The coefficient of ECM term (-0.389026) was found to be negative and statistically significant, which validates stable long-run relationship among variables, with a speed of 39 per cent to restore disequilibrium in case of any shock. The empirical estimation reveals that public spending on education, health, total road length, trade openness, worker remittances and total cropped area have a strong positive impact on economic growth. Moreover, the study also examines the impact which Pakistan's economic growth has had on the Agriculture sector. While public spending on defence has failed to contribute to economic growth. The study suggests the allocation of more resources to education, health, transport and communication for increasing Pakistan's economic growth.

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Introduction

Public spending plays a vital role in economic development since it is a critical policy tool that stabilises the economy. According to Keynesian and Endogenous growth theories, public expenditures positively contribute to economic growth, which contributes towards an improved living standard of the population through better education, health, and infrastructure services and development (Loto, 2011).

Neoclassical economists lay particular emphasis on increased public expenditures as a vehicle for sustained economic development. Studies on the relationship between public spending and economic growth reveal that increased public investments in education, health and rural infrastructure raise efficiency of labour and boost economic growth (Asghar et al., 2011; Riasat et al., 2011; Srinivasan, 2013; Patricia and Izuchukwa, 2013; Strauss and Thomas, 1998; Fan and Rao, 2003; Abdullah, 2000).

Pakistan is an underdeveloped country that faces a deficit in the overall budget and has tended to rely on external financial aid and foreign loans to meet public expenditures. Pakistan on average spent 2.1 per cent of GDP on education during the last four decades. This figure is partly as compared to India which spends 4.1 per cent, Nepal 3.4 per cent and Bangladesh spends 2.4 per cent. Similarly, budgetary allocations to health remained static at around 0.65 per cent of GDP for the last few decades, which is far lower than neighboring South Asian countries. On the contrary, Defence expenditures in Pakistan have witnessed significant increases since they have accounted for 3.07 per cent to 9.07 per cent of Pakistan's GDP since independence ([Economic Survey of Pakistan, 2012-13](#)).

In this study, total road length is taken as a proxy for public spending on transport and communication. The existing road network in Pakistan is approximately 262,057 KM, which includes 185,063 Km of high type roads and 78,879 km of low type roads. The total road length was around 81436.9 KM in the decade of 1970s, increased to 262,057 KM in 2013-14 ([Economic Survey of Pakistan, 2013-14](#)).

Historically, Pakistan's economy has experienced wide fluctuations since independence in 1947. The growth of the economy was mostly satisfactory from 1961 to 1990. During the 1990s, the economy performed poorly, and the economic growth rate remained unstable due to macroeconomic instability. From 2000-01 to 2006-07, the economy once again attained momentum. Later, the economic growth declined due to factors such as energy crises, high inflation and massive floods during the second late 2000s. Pakistan's economy continues to face several challenges including rampant poverty, low literacy rate, inefficient transport and communication, health-related problems, fiscal deficit, lack of resources, terrorism, energy crises and dismal economic growth rate.

During the 1960's the agriculture sector registered an impressive growth of 5.1 per cent. During the 1970s, Agricultural growth rate dropped to 2.4 per cent ([Ahmad and Amjad, 1984](#)). While during the 1980s, agriculture again grew at around 5.4 per cent ([Ali, 2005](#)). In the 1990s, the Agricultural growth rate was 4.4 per cent. While during the 2000s, the output growth rate in agriculture remained 3.2 per cent.

Many researchers have studied the effect of public expenditures on economic growth in developed and underdeveloped countries including Pakistan. [Musaba et al. \(2013\)](#) found a significant long-run relationship between public spending and economic growth in Malawi using annual time series from 1980 to 2007. Moreover, he found Public spending on health, education, social protection, transport and communication as negatively linked to economic growth. [Muthui et al. \(2013\)](#) evaluated the influence of government spending on economic expansion in Kenya from 1964 to 2011. The econometrics results identified a long run positive relationship between public expenditure on health, education; infrastructure and public law and order and economic growth. However, defence expenditures had negative impacts on Economic growth in Kenya. [Ellahi and Kiani \(2011\)](#) found that public investment, private investment and consumption by the government had sound effects on economic growth of Pakistan in the short and long run. They also found that foreign aid had a negative influence on economic growth in the short run since it was not efficiently used for meeting the development needs.

[Asghar et al. \(2011\)](#) indicated the presence of a positive association between public expenditure on human capital and economic growth. Whereas, public expenditures on law and order and subsidies had a negative impact on economic growth in Pakistan.

[Okora \(2013\)](#) revealed that public spending has a positive influence on the economic growth of Nigeria in short and long runs. [Riasat et al. \(2011\)](#) analysed the role of educational expenditures concerning the economic growth in Pakistan. They established that effect of education expenditure in the long run and found no significant link between education expenditures and economic progress in the short run. [Akram et al. \(2008\)](#) revealed that health indicators have a long term positive impact on economic growth, while they had no short-term growth impact. [Babatunde \(2014\)](#) found that gross capital formation, total health spending and labour force productivity had a significant positive influence on economic growth. However, the life expectancy rate negative influenced economic growth.

[Fan and Rao \(2003\)](#) analysed the growth impacts of different types of government expenditures across different continents. They found that in Africa, public

expenditures on health and agriculture contributed significantly to economic growth. In Asia public investments in agriculture, education and defence provided substantial returns to economic progress. Whereas, all types of public expenditures except health had a significant influence on economic growth in Latin America.

The broader objective of the study is to analyse the dynamic effects of public expenditures on economic growth in Pakistan from 1972 to 2014. Moreover, the study also theoretically examines how economic growth in Pakistan impacted the agriculture sector. This study is expected to proactively contribute to the knowledge frontier since the empirical results accrued will provide useful inputs for policymakers to design consistent, predictable and transparent policies for overcoming problems that have historically affected Pakistan's economic growth.

Materials and Methods

Annual time series on various variables have been used for regression analysis from 1972 to 2014, a period of forty (42) years in this study. The data required for the study was sourced from World Development Indicator (WDI), Statistical Supplement to Economic survey (SSES) and State Bank of Pakistan (SBP).

The relationship among economic growth and public spending on education, health, road length, defence, trade openness, worker remittances, the total cropped area has been estimated through the following multiple regression model.

The following previous studies of [Asghar et al. \(2011\)](#), [Muthui and Thuku \(2013\)](#), [Musaba et al. \(2013\)](#), [Fasoranti \(2012\)](#), [Oyinbo et al. \(2013\)](#) and [Fan et al. \(2004\)](#) are consistent with the model of Economic Growth in this Study.

$$EG = b_0 + b_1 PSE + b_2 PSH + b_3 LRD + b_4 PSD + b_5 TO + b_6 TCA + b_7 WR + b_8 @TREND + U_i$$

where EG= Economic Growth (GDP) (Million\$); TO= Trade openness (Million\$); PSE= Public spending on education (Million\$); WR= Worker remittances (Million\$); PSH= Public spending on health (Million\$); TCA= Total cropped Area (Million hector); LRD= Length of road (Kms) @TREND= Technology; PSD= Public spending on

defense (Million\$).

Results and Discussion

The study has used annual time series data; therefore, it is prerequisite to check the stationarity of time series data before empirical estimation. The stationarity of variables has been checked through the ADF test.

Augmented dickey-fuller (ADF)

Table 1 shows the effects of the Augmented Dickey-Fuller (ADF) unit root test. The results indicate that all variables are statistically insignificant at 5 per cent level of significance. Therefore, all the variables are non-stationary at level. It is evident from the results that all the variables are statistically significant at 5 per cent level of significance. Therefore, all the selected variables are stationary at first difference in the model.

Table 1: ADF test for unit root.

Variables	Level		First difference		Conclusion
	Statistic value	Critical value at 5%	Statistic value	Critical value at 5%	
LGDP	-2.470364	-2.938987	-3.998078	-2.938987	1(1)
LPSE	-2.742125	-2.936942	-5.829643	-2.938987	1(1)
LPSH	-2.407811	-2.936942	-6.368550	-2.941145	1(1)
LRL	1.241869	-2.938987	-4.614484	-2.938987	1(1)
LPST	-0.906604	-2.936942	-5.540027	-2.945842	1(1)
LTO	-2.932621	-2.936942	-7.156698	-2.938987	1(1)
LWR	-0.213150	-2.936942	-3.657818	-2.938987	1(1)
TCA	-2.332035	-2.936942	-9.571099	-2.938987	1(1)

Now we determine whether the long run relationship among the variables exist or not.

Co-integration test for economic growth model

All the variables are stationary at first difference as shown in Table 1. Therefore, the Johansen cointegration analysis is justified. In Table 2, the output of the Johansen cointegration test is reported. The value of trace statistics suggests five cointegrating vectors and the maximum Eigen value suggest one cointegrating vector at a 5 per cent level of significance, which invalidates the null hypothesis and validates the alternative hypothesis. Thus, the results confirm the presence of long term relationship among the variables.

Table 2: Results of johansen cointegration test for

economic growth model.

Null Hypothesis	Alternative Hypothesis	Trace Statistics	5 % Critical Value	Max-Eigen Statistics	5 % Critical Value
R = 0	R ≥ 1	233.9231*	159.5297	66.20951*	52.36261
R ≤ 1	R ≥ 2	167.7136*	125.6154	45.26760	46.23142
R ≤ 2	R ≥ 3	122.4460*	95.75366	42.76767	40.07757
R ≤ 3	R ≥ 4	79.67832*	69.81889	27.30492	33.87687
R ≤ 4	R ≥ 5	52.37340*	47.85613	24.59486	27.58434
R ≤ 5	R ≥ 6	27.77855	29.79707	15.48630	21.13162
R ≤ 6	R ≥ 7	12.29225	15.49471	11.38590	14.26460
R ≤ 7	R ≥ 8	0.906344	3.841466	0.906344	3.841466

Estimation of determinants of economic growth

Table 3 reports the results of the multiple regressions model. The results established that public spending on education has a significant positive effect on economic growth. This result is consistent with the results of Asghar et al. (2011), Tamang (2011), Riasat et al. (2011), Patrica and Izuchukwa (2013), Akram et al. (2008) and Fan and Rao (2003) who concluded that public spending on education has significantly influenced economic growth. Public spending on health (PSH) is a critical factor in economic growth. Public expenditure on health has significantly influenced economic growth in Pakistan. The regression analysis shows that public expenditure on health has improved the economy over the years. The sign of the variable confirms the study of Babatunde (2014), Strauss and Thomas (1998), Martin (2005), Knowles and Owen (1995), Aurangzab (2003), Bloom et al. (2004) and Barro (1991) who indicated that public spending on health has played a significant role in increasing economic growth. Road length is taken as a proxy of public spending on transport and communication. Road length reveals a strong impact on economic growth. This implies that increased investment in the transport sector will augment the GDP of a country. The result reinforces the evidence provided by Jalilian and Weiss (2004), Jahan and Mcleery (2005), Strauss et al. (1998) and Canning and Pedroni (1999) who concluded that roads are significantly contributing towards economic growth. Public spending on defence has a positive but insignificant impact on economic growth, which exposes that defence expenditure in Pakistan are being through at the cost of developmental expenditure and therefore does not contributing towards economic growth. The findings are supported by the earlier study carried out by Hassan et al. (2003), Bose et al. (2007), Galvin (2003) and Karagol and Palaz (2004). Trade

openness has a positive effect on economic growth. The empirical results are in with Edward (1998) and Ismail et al. (2010). Worker Remittances (WR) has a positive and significant impact on economic growth. The empirical results support the findings of many previous studies conducted by Irfan (2011), Karagoz (2009), Jawaid and Raza (2012) and Jongwanich (2007). Total cropped area has shown a positive impact on economic growth, which indicates that agriculture is a primary productive sector of Pakistan's economy. The justification may be that agriculture has the second largest share in the GDP of Pakistan, as its share is less than servicing sectors (Economic Survey of Pakistan, 2030-14). Estimated results further reveal that technology (@trend is taken as a proxy of technology) has a positive influence on GDP in Pakistan. Technology contributes significantly to economic growth. The value of adjusted R, F-statistics and Durban-Watson statistics are 0.908089, 2462.270 and 1.765596 respectively, which explains the fitted model is good.

Table 3: Regression results of determinants of economic growth.

Dependent variable LEG			
Variable	Coefficient	T-statistics	Prob.
Constant	-2.197452	-3.363369	0.0020
LPSE	0.066938	2.462157	0.0192
LPSH	0.066938	2.462157	0.0192
LLRD	0.297763	3.773636	0.0006
LPSD	0.021153	1.554961	0.1295
LTO	0.221078	3.530180	0.0022
LWR	0.037012	3.321678	0.0022
LTCA	0.334407	1.738891	0.0914
@TREND	0.033174	10.92162	0.0000

R-squared: 0.908089; Adjusted R-squared: 0.897684; F-statistics: 2462.270; Prob(F-statistic): 0.000000; Durbin-Watson: 1.765596.

ECM results for economic growth

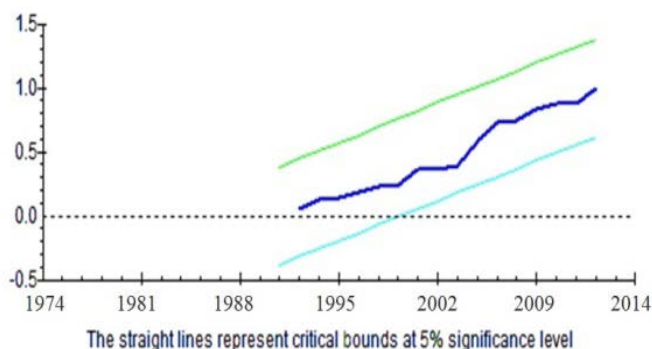
When the Co-integration among the variables has established, then ECM technique is valid to analyse the short-run relationship between variables. Table 4 below presented the parsimonious ECM test results. In the short run, PSD, LRD, WR, TO and TCA have a positive effect on EG. All variables except LRD are statistically insignificant at 5 per cent level of significance. Whereas PSE and PSH have shown a negative and insignificant effect on Economic Growth. Excluding PSE and PSH the rest of explanatory variables are against the economic theory.

The results illustrate no stable short-run correlation among the variables. The error correction term has a negative sign and statistically significant at 5 per cent level of significance that validates stable long-run equilibrium among variables, with a speed of 39 per cent to restore equilibrium in case of any shock. The total variation of 31 per cent in Gross Domestic Product (GDP) is accounted for by the change in explanatory variables included in the model. The value of F-statistics is statistically significant at 5 per cent level of significance. This implies that the overall fit is good. The D-W statistics is closer to 2, which shows the absence of autocorrelation problem.

Table 4: ECM results for economic growth.

Dependent variable D(LEG)			
Variable	Coefficient	T-statistics	Prob.
Constant	0.039344	7.733453	0.0000
D(LPSE)	-0.031718	-0.210903	.8343
D(PSH)	-0.031718	-0.210903	0.8343
D(LRD)	0.209245	1.904809	0.0658
D(LDF)	0.008391	1.294996	0.2046
D(LTO)	0.061211	1.438919	0.1599
D(LWR)	0.010531	0.832985	0.4110
D(LTCA)	0.146671	1.417287	0.1661
ECT01(-1)	-0.389026	-3.009753	0.0051

R-squared: 0.310436; Adjusted R-squared: 0.159594; F-statistics: 2.058018; Prob(F-statistics): 0.077796; Durbin-Watson: 1.563876.



Figures 1: Cumulative sum of squares of recursive residuals.

Graphical representation of CUSUM tests

The cumulative sum and the cumulative sum of squares test are proposed by Brown et al. (1975). This test is used for investigating the stability of the multiple regression coefficients. In time series data, this test is commonly used and considered very consistent. A graphical representation of CUSUM and CUSUMsq are presented below (Figures 1 and 2). The plots of both CUSUM and CUSUMsq does not cross the critical value line as shown in the figures presented

below. Hence the model coefficients are stable.

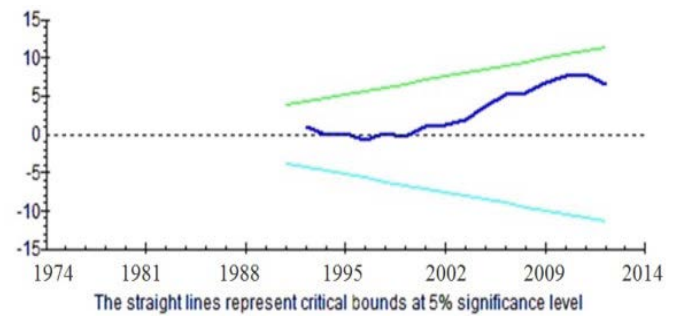


Figure 2: Cumulative sum of recursive residuals.

Conclusions and Recommendations

The core objective of this study is to analyse the influence of public expenditure on economic growth in Pakistan from 1972 to 2014. The study conducted the Augmented Dickey-Fuller Test (ADF) to check the stationarity of data. Johansen co-integration test and Error Correction Model have employed to determine the long run and short-run relationships among the variables. The results indicated the presence of a long term relationship between public spending and economic growth. The sign of the ECM term is negative and statistically significant, which reaffirms the stable long-run equilibrium relationship among the variables. The regression results revealed that public spending on education, health, road length, trade openness, worker remittances and the total cropped area had shown positive and significant influence on economic growth. However, the study found that there is a statistically insignificant influence of defence expenditure on economic growth. The main reason of insignificant growth impact of defence expenditure is its higher opportunity cost and enormous public financial, technological and human resources are diverted from economic, social and environmental programs to defence and military modernisation programs, which are unproductive and has no role in economic growth.

Moreover, the study in light of its findings based on evidence from 1972 to 2014 in Pakistan recommends four key takeaways for policymakers and economic and budgetary planners.

- Firstly, considering the substantial effect of education on overall economic growth in Pakistan; the government needs to allocate more resources to the education sector and also needs to ensure proper utilisation of education-related budgetary

allocations and reduce leakages.

- Secondly, public spending on health contributed significantly to economic growth in Pakistan. The government, therefore, needs to allocate more resources to the health sector, which will improve the health status, proficiency, productivity and living standards of the working labour class thereby bringing about economic stability.
- Thirdly, Length of roads has a vital association with the economic growth of Pakistan. Therefore, the government needs to invest even more to upgrade its highways and agricultural infrastructure, which will boost the economy and lead to sustainable economic growth.
- Fourthly, in line with its findings for sustained economic growth, the study recommends the government to reduce its defense expenditures and invest in other productive sectors, which will contribute to improved economic growth and social development in Pakistan.
- Finally, the Government needs to increase agricultural spending since public spending has a dynamic impact on Economic Growth and empirical evidence indicates that agricultural sector makes a vital contribution to economic growth.

Novelty Statement

In Pakistan, limited studies have been carried out about public spending on economic growth and its relationship with agriculture sector. This study analyses empirical evidence from Pakistan on the component of public spending and is a pioneering study exploring variables on public spending and economic growth.

Author's Contribution

Tanweer Ahmed: Principle autho who cunducted the study, conceived the idea and collected the data.

Kashif Saeed Khan, Zilakat Khan Malik, Fazal Wahid and Muhammad Nadeem Iqbal: Reviewed the draft, helped in writing and analyzed the data.

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