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Land Utilization, Development Expenditure, Agricultural Productivity and Economic Growth: Evidence from Pakistan

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Abstract

The main purpose of this study was to investigate and explore the association between land utilization, development expenditure, agricultural production and economic growth in Pakistan based on the time series data over the year of 1983 to 2014. Data were analyzed applying the Phillips-Perron (P-P) unit root test, and results were interpreted implying the cointegration test. OLS was adopted to assess the effect of land utilization, development expenditure and agricultural productivity on economic growth of Pakistan. The estimated results of cointegration test show that there presence a long-run association among development expenditure for agricultural sector, land utilization, agricultural productivity and economic growth in Pakistan. The results of OLS regression analysis show that development expenditure and agricultural productivity have a significant impact on economic growth of Pakistan while land utilization (total land used for crops) has a positive relation with economic growth but found statistically insignificant. This study suggested that the government should increase expenditure development for growth and development of agricultural sector that will enhance the economic growth of Pakistan.

Keywords: Agricultural productivity, Land utilization, Development Expenditure, Pakistan

Introduction

Agricultural sector is backbone of Pakistan economy and its contribution makes vital role in the economy of Pakistan. It has rich influence to the overall Gross Domestic Product (GDP), and provides employment to the labour force. It gives direction to imported machinery through export earnings and makes linking two-third population of the rural areas with this sector. The irrigation sector of Pakistan is the world largest irrigation system (GOP, 2015; MNFSR, 2015; Aslam, 2016). Major agricultural products are cotton, rice, sugarcane, wheat, maize, vegetables, fruits and livestock. Cotton, rice and sugarcane crops are cultivated in Kharif season; while wheat crop is cultivate in Rubi season (Raza et al., 2012; Zaheer, 2013; Chandio et al., 2016; Rehman et al., 2015). It is necessary to make more efficient usage of resources especially land and water. In agricultural commodities; Pakistan is the net importer of wheat, edible oil, consumer foods and pulses (Chandio et al., 2016; Rehman et al., 2016). The growth rate of Pakistan's economy has altered extensively since independence. Due to variations in the government policies, it cause several fluctuations like in subsidies, regulations and state ownership. In the agricultural sector, main huge fiscal expense of government is provision of subsidies. This subsidy covers subsidies on seed, fertilizer, tube wells and tractors. Furthermore, due to inefficiency in the state organizations, government planned recipient intervention has not reaped by the agricultural consumers (Hye et al., 2010; Chandio et al., 2016; Rehman et al., 2016). Figure 1. Shows that the public development expenditure for agriculture sector (Government through total revenue). For the growth of agricultural sector and rural economy development the public expenditure has increased 1 percent per year during 2001-02 to 2013-14. A number of sources of livelihood in the world; for instance

air, sun light, water and land, however, land is a main and a key component of living population of the world. It very much supports all form of lives and other source of production (Chandio et al., 2016) reported that majority of rural population, especially in developing economies depend upon land and as well as natural resources for satisfying their immediate and long term needs. The land area (land used for crops) is a basic inputs and plays an important role to enhance agricultural productivity and increase economic growth. Land is most valued asset of families in rural areas of Pakistan (Chandio et al., 2017). The rural households are largely surviving on farm land.

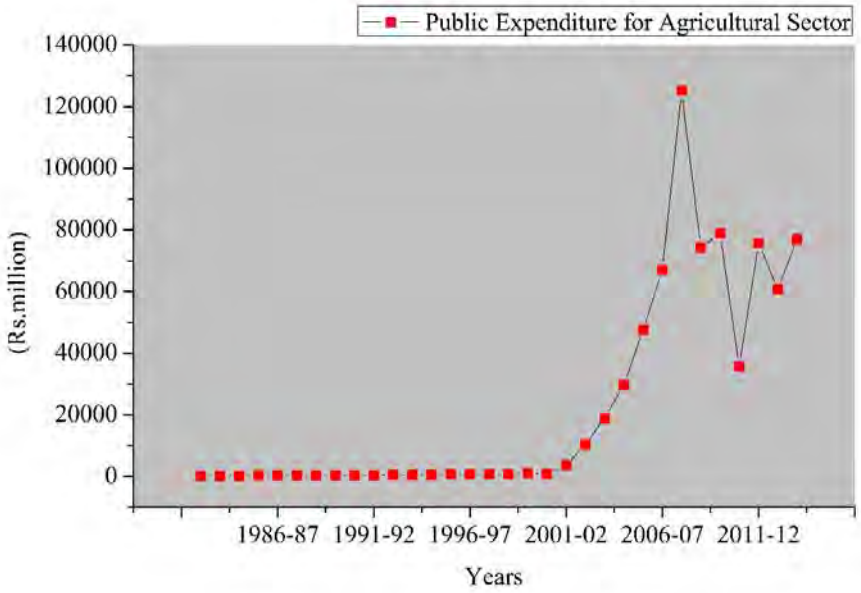

Figure 1. Public Expenditure for Agricultural Sector from 1983 to 2014 Source: (GOP, 2014)

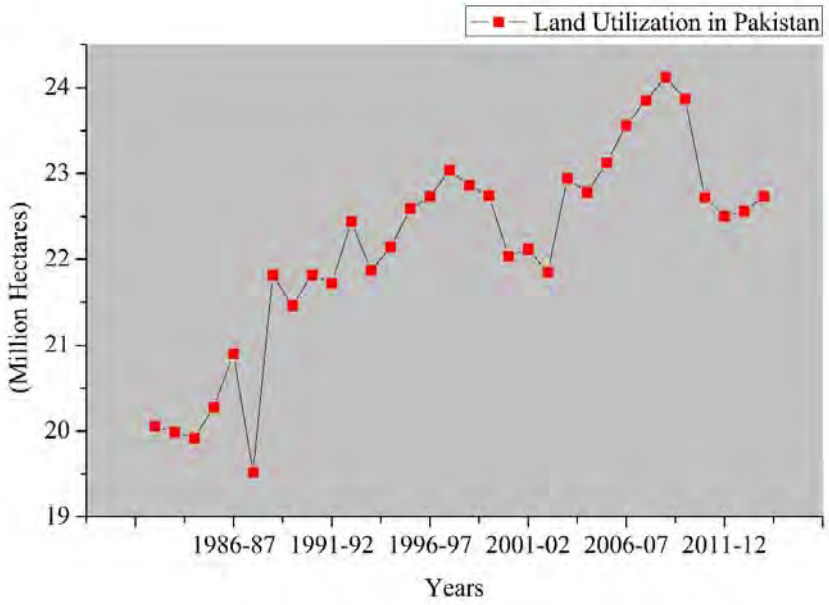

Figure 2. Land Utilization in Pakistan from 1983-2014 Source: (GOP, 2014)

Figure 2 shows that the land utilization (Total Cropped Area) under crops cultivation from 1983-2014. The public expenditure is an important source of government in Asian countries to enhance economic growth, which is indispensable component for the agricultural improvement. Public expenditure is perchance the single most important policy implement used by Governments mainly in developing economies to boost economic growth which is very much important component for sustainable development (Ewubare & Eyitope, 2015). Progress in economic sector brings a well living standard for rural households through insuring better health and education as well as improving infrastructure, agricultural productivity and food security (Loto et al., 2011). In developing economies, almost all the economic sectors demand more budgetary allocations in every year. Additionally, the hypothesis of Keynesian indicates that the public expenditure development boost the economic growth. Public expenditure is observed as an important factor that makes alterations in aggregate (Loizides & Vamvoukas, 2005). However, Gregorious & Ghosh (2007) argues that the association among public expenditure and economic growth has sustained to create a series of disbursement. However other various researchers concluded the influence of public expenditure upon economic growth which is not significant, some shows that impact is positive and significant. A study conducted in Nigeria by (Ewubare & Eyitope, 2015) investigated the impacts of public expenditure on agricultural production by using annual time series data over the period of 1980 to 2013. Augmented Dickey-Fuller (ADF) unit root test, Joanson co integration techniques, and OLS method were adopted to analyze the data. The findings showed that public expenditure and deposit money bank loan to agriculture have has a strong positive impact on agricultural production in Nigeria. Likewise, Iganiga & Unemhilin (2011) find out that the effects of federal government agricultural expenditure on agricultural productivity in Nigeria by using annual secondary data over the period of (1970-2008). They applied the Error Correction Model (ECM) and Cobb-Douglas growth model for data analysis. The researchers found that the federal government capital expenditure has positive impact on agricultural productivity. Similarly, Matthew and Mordecai1 (2016) observed that the impact of public expenditure on agricultural Production in Nigeria by using an econometric analysis. In this study researchers used time series data from the period of 1981 to 2014. For the analysis of data authors used the ADF unit root test, Error Correction Method (ECM), Johansen Co-integration test and Granger Causality approach. The findings of Johansen Co-integration test showed that there have a long-run association between the variables. Furthermore, the results of Error Correction Method (ECM) model revealed that agricultural Productivity has a significant negative effect on public agricultural expenditures. Francis (2013) study also found that agricultural expenditure has positive effect on the agricultural productivity. In Pakistan a study by Hye et al. (2010) analysed the association between agricultural product price, government expenditure and agricultural growth: Evidence from Pakistan, the study used a time series data from 1971- 2007. Researchers used ARDL Co-integration Procedure and Cobb Douglas production function for the analysis of data. Study results showed that there is a positive association among the government expenditures on agriculture and agricultural prices on agricultural performance. In the context of the empirical literature reviewed, our main purpose of this research is to investigate and explores the association in between land utilization, development expenditure, agricultural productivity and economic growth in Pakistan.

Data source, model specification and estimation strategy

Data Source

This paper used yearly time series data from published sources spanning the period 1983-2014. The data which is obtained for the Gross Domestic Product (GDP) (in Rs. million),

agricultural productivity (in Rs. million), development expenditure (in Rs. million) and land utilization (Total Cropped Area) (in million hectares), respectively. Time series data were obtained from Pakistan Bureau of Statistics, Statistical Year Books and Economic Survey of Pakistan (various statistical supplements).

Model Specification

A number of factors influenced the economic growth like as area under cultivation, development expenditure and agricultural productivity respectively. Therefore, this current study employed Cobb-Douglas production function model to capture the relationship between land utilization, development expenditure, agricultural productivity and economic growth in Pakistan as showed in equation (1).

$$GDP = \beta_0 + \beta_1 LANDU + \beta_2 DEXP + \beta_3 AGRPRO + \mu \quad (1)$$

Where GDP indicates gross domestic product, LANDU is the area under cultivation, DEXP represents development expenditure and AGRPRO represents agricultural productivity respectively. μ is the error term.

By applying natural logarithm to equation (1), a log-linear model is given as:

$$Ln\,(GDP) = \beta_0 + \beta_1 \ln(LANDU) + \beta_2 \ln(DEXP) + \beta_3 \ln(AGRPRO) + \mu \quad (2)$$

Where β_i denotes the coefficients, and the following is expected; $\beta_i > 0$. ln denotes natural logarithm. All the other variables have already been explained.

Estimation Strategy

The present empirical paper is constructed on the annul time series data from the period 1983-2014. First of all, Phillips-Perron (P-P, 1988) unit root test which containing trend and intercept was employed to clarify the stationarity in the variables. Additionally, after checking stationary of the variables, then Johansen cointegration test (1998, 1990) including (Trace Statistic and Max-Eigen Statistic) were used to inspect the long-run association between dependent variable and independent variables. Finally, the study OLS method was adopted to examine the association between land utilization, development expenditure, agricultural productivity and economic growth in Pakistan.

Results and Discussion

Results of P-P Unit root test (Including trend and intercept)

In this study, P-P unit root test was used to check the stationarity of the series and the estimated results of unit root test reported in (**Table 1**) shows that all variables are not attained stationarity at their level form while taking the first difference I(1) all variables became stationary , as representing the values of Phillips-Perron (P-P) Adj. t-Stat are larger than the critical values on the 5 percent level of significance.

Table 1: Results of Phillips-Perron (P-P) unit root test

Variables	Adj. t-Stat	Critical Value	Sig**	Level of Sig.	Order of Integration
ln GDP	-5.547891	-3.562882	0.0004	5%	I(1)
ln LANDU	-5.966116	-3.568379	0.0002	5%	I(1)
ln DEXP	-4.774016	-3.568379	0.0032	5%	I(1)
ln AGRPO	-9.852286	-3.568379	0.0000	5%	I(1)

Source: Author's Computed Results (E-view 9).

Results of Johansen Co-integration Approach

The study examines the long run association among dependent variable like GDP and three independent variables including land utilization, development expenditure and agricultural productivity over the period of 1982-2014 respectively. However, the Johansen Co-integration test are based on two tests which we are going to use the 1st is trace statistics and the 2nd is maximum eigenvalue. Results of Johansen tests of Co-integration are represented in **(Tables 2 and 3)**. The values of both cointegration tests like as Trace statistic and Max-Eigen statistic are (55.14688), (33.34626) which are greater than their critical values (47.85613), (27.58434), it means there presence a long term association among these four variables. Thus, this study rejects the null hypothesis of no co-integration. Additionally, both cointegration tests like as Trace statistic and Max-Eigen statistic indicate that one co-integrating equation at the 5 percent level.

Table 2: Johasan co-integration test including (Trace Statistic)

Eigenvalue	Trace Statistic	5 % Critical Value	Sig**	Hypothesis
0.709179	55.14688	47.85613	0.0089	*r = 0*
0.346640	21.80063	29.79707	0.3097	*r ≤ 1*
0.301848	10.30868	15.49471	0.2577	*r ≤ 2*
0.022233	0.607077	3.841466	0.4359	*r ≤ 3*

*stand for rejection of the hypothesis is at the 0.05 level.
Trace test shows one co-integrating equation at the 0.05 level.
Source: Author's Computed Results (E-view 9).

Table 3: Johasan co-integration test including (Max-Eigen Statistic)

Eigenvalue	Max-Eigen Statistic	5% Critical Value	Sig**	Hypothesis
0.709179	33.34626	27.58434	0.0081	*r = 0*
0.346640	11.49194	21.13162	0.5982	*r ≤ 1*
0.301848	9.701605	14.26460	0.2323	*r ≤ 2*
0.022233	0.607077	3.841466	0.4359	*r ≤ 3*

*means rejection of the hypothesis is at the 0.05 level.
Max-eigenvalue test shows one co-integrating equation at the 0.05 level.
Source: Author's Computed Results (E-view 9).

Table 4: Results of Regression Analysis

Variables	Coefficient	Std. Error	t-Statistic	Sig.
Constant	4.985305***	1.657975	3.006864	0.0055
Ln (LANDU)	0.084441	0.399668	0.211277	0.8342
Ln (DEXP)	0.189559**	0.091147	2.079694	0.0468
Ln (AGRPRO)	0.593155***	0.146252	4.055714	0.0004
R-squared (0.88)		F-statistic (68.44)	Durbin-Watson stat (1.39)	

Notes: ** and *** denote for 5% and 1% Significance level.
Source: Author's Computed Results (E-view 9).

Estimated Results of Regression Analysis

The determinants of economic growth in Pakistan from the period of 1983 to 2014 was estimated using OLS regression analysis, and the results are presented in Table 4. Analysis shows

that the overall significance of the model could be seen from the value of the coefficient of multiple determination i.e. R-square. The high value of R-square is 0.88 which shows that around 88 percent of the total change in economic growth is described by these three explanatory variables. The computed value of F-statistic is 68.44 which are highly significant. This suggests that the explanatory variables included in the model are significantly influenced on economic growth in Pakistan.

It is observed that development expenditure for agricultural sector and agricultural output have very strong impacts on economic growth in Pakistan. Hence, the utilization of land as a main input indicate its coefficient 0.084441; this implies that a 1 percent increase in land utilization (total cropped area) economic growth increased by almost 0.084 percent. The finding of our study is consistent with the finding of (Nawaz, 2011). Similarly, the development expenditure for agricultural sector displays its coefficient 0.189559; this implies that increase 1 percent in development expenditure will boost the economic growth in Pakistan by 0.189 percent. The calculated t-value for this coefficient is 2.07; this reveals that the coefficient of development expenditure is statistically significant at 5 percent. Finally, the coefficient of agricultural output is 0.593155, which is showing positive affect on economic growth. This implies that increase 1 percent in agricultural productivity will increase the economic growth about 0.59 percent. The calculated t-value for this coefficient is 4.05; this reveals that the coefficient of agricultural productivity is highly significant at 1 percent. The findings of our study are comparable with the findings of previous studies (for instance, Yee et al., 2002; Bhatia, 2008; Musaba et al., 2013; Iganiga & Unemhilin, 2011; Ewubare & Eyitope, 2015). They reported that development expenditure, agricultural productivity have a strong association with economic growth.

Conclusion and Policy implications

For economic growth and rural economy development public expenditure plays a pivotal role in developing countries. Economic growth brings better livelihood of the people through provision of better education, health, well-developed infrastructure and enhancement in agricultural production and ensuring food security. The main purpose of this study was to examine the association between land utilization, development expenditure, agricultural productivity and economic growth in Pakistan based on the time series data over the year of 1983 to 2014. Phillips-Perron (P-P) unit root test was used to analyse the data and check the stationarity of the series and results were interpreted by using the Johansen co-integration test. OLS method was adopted to inspect the effect of land utilization (total cropped area), development expenditure and agricultural output on economic growth in Pakistan. Lastly, for this study, E-view 9 statistical software was used. The results revealed that the determination i.e. R-square is 0.88 and the Durbin/Watson value is 1.39 and the computed F-statistics of 68.44 is significant at 1% level. Further, the empirical findings of the present study revealed that development expenditure and agricultural output have a very significant relationship with Gross Domestic Product (GDP), though the land utilization has a right positive association but statistically insignificant with GDP of Pakistan. Further, this research revealed that adequate funding is very much important for the economic growth as well as development of the agricultural sector in Pakistan, consequently for this sector to contribute significantly to the economy of Pakistan and it is as a major source of sustainable employment generation in Pakistan.Consequently, the present study suggested that the Government should increase expenditure development for growth and development of agricultural sector.

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