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INVESTIGATION OF THE IMPACT OF FOREIGN REMITTANCE ON AGRICULTURAL DEVELOPMENT IN PAKISTAN: A Time Series Analysis

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Abstract

The present study investigates the impact of foreign remittance on agricultural development in Pakistan, from different regions of the world. Segregated time series data of remittance, agricultural GDP, primary school enrollment and gross fixed capital formation in agriculture sector were taken for the period 1972 to 2012. Co-integration technique was employed to analyze the long-run impact of these variables on agricultural GDP. The coefficients of remittance from Kingdom of Saudi Arabia, UAE, United Kingdom and other Gulf and European countries were found to be significant and positive in the long-run, but it was non-significant in the short-run. The effect of remittance from advanced countries as USA, Canada and Australia showed a negative and significant effect on agricultural GDP in the long-run but it was non-significant in the short-run. The variables of primary school enrollment and gross fixed capital formation were also significantly and positively associated with agricultural GDP growth in the long-run. The findings reveal that remittance play a vital role to meet needs of the agricultural sector. This study suggests that government should devise a policy to encourage migrant's households in rural Pakistan and use remittance in productive activities. The results also suggest that policies should also be devised to promote primary education and increase the fixed-capital formation in agriculture sector.

Key words: Cointegration, Remittance, ADF-Test, Kingdom of Saudi Arabia, UAE, United Kingdom.
JEL Classification: E24.

I. Introduction

Capital takes central place in the process of growth and development. There are two main sources of capital formation, i.e., domestic and foreign. Domestic capital is raised by residents of a country while foreign capital is provided by the residents, companies, firms or government of one country to some other country. Developing coun-

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tries are not intelligent enough to raise handsome amount of domestic capital and that's why they rely heavily on foreign means of capital. Savings and investment are determinants for economic growth of a country. Developing countries face a wide gap between savings and investment because of the low per capita income. This gap can be filled by inflow of the foreign capital. Foreign Direct Investment (FDI) and remittance are considered the most important sources of foreign capital inflows.

Remittance allow a country to consume more than it produces, as a country can import more than it export and invest more than it saves [Cornnell and Conway (2000)]. Remittance is considered more stable than any other external inflow like Foreign Direct Investment (FDI) and the foreign aid. Sustainable inflows of remittance bring opportunities to lower borrowings from the world market. The research suggests that remittance help the home countries in distress situations and during the bad economic conditions [Sorenson (2004)]. Remittances also play an important role in economic growth of developing countries, and thus, it is considered a vital area of the economic research work. Furthermore, this field requires healthy research to investigate the impact of remittance on various aspects of economic growth, in such a way that healthy policies can be encouraged and devised. Remittance also plays its role in poverty reduction by increasing income of mass population and credit inflow through remittance speed-up investment in the home country. Those people save extra money, invest it in manufacturing and agricultural projects. Moreover, greater saving leads to greater investment and ultimately contributes positively to economic growth of a country [Calaro (2008)]. Remittances also boost-up capital stock by improving health and educational facilities [Kemal (2001)].

Since 1970, millions of people have migrated from Pakistan, making a great network of migrants' connections in many parts of the world. According to an estimate, about seven million people i.e., 4 per cent of the population of Pakistan are living in different countries and a significant proportion from amongst them is living in developed countries [GOP (2014)]. A large number of migrants have agricultural background and belongs from the rural Pakistan; and therefore, most of the remittance is being utilized in the agricultural related activities. This remittance is mostly used to purchase more land, agricultural machinery and other agricultural inputs. Thus, it directly affects the socioeconomic status and living standard of agricultural households of the migrants families. Remittance, also enhance the efficiency of agriculture sector by providing finance for agricultural inputs and finally playing its crucial role in growth of the agricultural GDP [Quinn (2009)]. It has also been found that remittance receiving households are shifting their agricultural investment from crop production to the livestock production (Miluka, et al. (2007)].

The researchers of the present study did not find any work (during the last decade) which had highlighted the impact of remittance, specifically on agriculture sector in Pakistan. Only one study was based on the primary data (during 2013) which was confined only to one district. The present study gathered the macro-level data at the country level for the pe-

riod of 1972 to 2012 and is different from the previous studies in a manner that it divides incoming of the remittance from various regions of the world. Keeping in view the significance of capital and the agriculture sector in the economy, the present study analyze the segregate impact of remittance coming from different regions of the world, on agricultural growth. On the basis of these findings some policy measures and suggestions are made. The remaining part of the paper is organized as follows: Section II presents review of the literature, whereas Section III provides the empirical framework. Section IV discuss the empirical results while Section V concludes the paper and give policy recommendations.

II. Review of Literature

Nishat and Bilgrami (1991) studied the association between workers' remittance and the agricultural economy in Pakistan. They used a Simple Keynesian model and found the remittance multiplier as 2.43. According to the Two-Gap model[1] the lack of investment capital and foreign exchange was a major constraint to the development. The inflow of remittance can provide the essential foreign capital needed instead of using 9foreign loans and aid which have their own inherent problems. Workers' remittances were more effective and were found to have significant and positive impact on agricultural development. Adams and Richards (1998) demonstrated that in rural Pakistan, (especially) the international remittance have a significant positive effect on accumulation of irrigated and rain-fed land. The authors attributed this result to the tendency in order to spend remittance on land which offered a higher rate of return rather than the nonfarm assets, such as vehicles, bikes, etc. However, neither the international nor the internal remittance had a statistically significant effect on accumulation of livestock assets (a key asset for rural households), possibly because of the lower rates of return on animal husbandry and its labor-intensive nature.

Fayissa and Nsiah (2005) studied that sources to promote agricultural growth were the main topics discussed by the researches in developing countries. Physical and human capital, technological upgrading, official economic assistance, and flow of foreign capital inflows were attributed to the major factors for promotion of agricultural economic growth. The study investigated the aggregate impact of remittance on agriculture, using panel data from 18 Latin American countries for the period of 1980 to 2005; and it was found that remittance had significant impact on agriculture of countries where financial system was less developed. Policy implication of the study suggested that developing countries could improve the growth performance by tying remittance with other traditional growth enhancing sources like physical and human capital. Taking a large sample of cross country data, Giuliano and Arranz (2005) discussed the relationship between remittance, agricultural and non-agricultural growth. Findings of the study showed that remittance promoted both, the agricultural and non-agricultural economic growth ; in

[1] Two gap models of economic development that focus on two constraints: the need for savings to finance investment, and the need for foreign exchange to finance imports.

the less developed countries, by providing capital and allocating it in better ways. However, Generalized Method of Moments (GMM) approach was used to control the endogeneity of remittance and the financial development. Findings of the study also proposed that remittance promote economic growth through investment channels in countries where financial sector is unable to meet the credit needs of its population.

Gupta, et al. (2007) studied remittance, its impact on agriculture and the financial development. Methodology of the study employed the Ordinary Least Square (OLS) and used the data of 76 countries with 233 observations. Impact of remittance on Sub-Saharan African (SSA) countries was analyzed. Although the SSA countries received small proportion of remittance as compared to the total remittance, yet the study investigated that stable and privately transferred remittance helped to reduce poverty and endorsed the financial development. Latif and Ashfaq (2013) estimated the economic impact of remittance on rural economy in district Sialkot, Pakistan, by collecting data of 88 households and conducted analysis using the regression model. The study found that major destinations of the overseas migrants were Kingdom of Saudi Arabia, UAE, Kuwait, Oman, Italy and Greece. The variables included in the model were found to be highly significant. The findings revealed that migrants' households use major proportion of remittance on households' consumption and the productive investment, like agriculture and livestock sectors.

III. Empirical Framework

In this study, remittance from different countries of the world is divided into three groups. The main purpose of this division is that people from different categories/classes of different regions (urban and rural) approach towards different destinations of the world. It has been seen that majority of people from rural areas go to Kingdom of Saudi Arabia, United Arab Emirates and other Gulf countries and mostly, the educated class of the urban society goes to USA, Canada and other European countries. A large proportion of migrants permanently settle in developed countries and their interest and flow of remittance to Pakistan, slow-down; though they also invest (in Pakistan) in non-agricultural activities. The migrants to Kingdom of Saudi Arabia (KSA), Emirates belong to rural areas and thus, their major remittance is consumed in agriculture and its allied activities. Due to these factors/reasons, it is necessary to estimate the impact of remittances on agriculture sector coming from different regions of the world.

1. Data and Variable Specification

Annual time series data in logarithmic form for the period 1972 to 2012 relate to agricultural gross domestic product and the remittance (in million rupees)[2], primary

[2] Remittance from different regions of the world was divided into three groups: Group-1, Kingdom of Saudi Arabia, UAE and the other Gulf countries; Group-2, United Kingdom and other European countries; Group-3, USA, Canada, Australia and others.

school enrollment (000 numbers), and gross fixed capital formation in agriculture sector (million rupees). The State Bank of Pakistan, Pakistan Bureau of Statistics, and Economic Survey of Pakistan are the main source of data. Description of the above mentioned variables is given in the following sub-sections.

a) *Foreign Remittance*

According to the hypothesis developed in this study, remittance is expected to be positively associated with higher agricultural growth. Thus, the sustainable level of remittance from different regions of the world is expected to be an important factor for accelerating the real agricultural output in Pakistan.

b) Primary School Enrollment

Education, one of the major factors in economic growth and development is assumed to have positive association with the agriculture sector development. Primary school enrollment is expected to have a strong impact on growth performance of the agriculture in Pakistan [Ali (2008)].

c) Agricultural Gross Fixed Capital Formation

In agriculture, the Gross Fixed Capital Formation (GFCF) consists of resident producers' investments, non-residential buildings, roads, agricultural machinery, transport equipment, vineyards and orchards, breeding livestock, dairy livestock, draught animals, sheep and other animals (reared for their wool) during a given period. It also includes certain additions to the value of non-produced assets realized by producers or institutional units. Agricultural Gross Fixed Capital Formation (AGFCF) is assumed to have significant relationship with agricultural GDP growth and works as an engine to enhance the agricultural output in Pakistan.

2. Empirical Model

To investigate the impact of remittance on agricultural growth in Pakistan, the following analytical framework is used:

$$AGDP = f(REM_1, REM_2, REM_3, PSE, AGFCF) \quad (1)$$

The equation can be written as:

$$AGDP = \beta_0 + \beta_1 REM_{1t} + \beta_2 REM_{2t} + \beta_3 REM_{3t} + \beta_4 PSE_t + \beta_5 AGFCF_t + \mu_t \quad (2)$$

Scatter plot of these variables reveal that the whole data is non-linear. Therefore, the natural log of variables is taken to convert the variables to linear form.

$$LnAGDP = \beta_0 + \beta_1 lnREM_{1t} + \beta_2 lnREM_{2t} + \beta_3 lnREM_{3t} + \beta_4 lnPSE_t + \beta_5 lnAGFCF_t + \mu_t \quad (3)$$

where, LnAGDP = Natural Log of Annual Agricultural Gross Domestic Product; $LnREM_1$ = Natural Log of Remittances from Kingdom of Saudi Arabia, UAE and other Gulf countries; $LnREM_2$ = Natural Log of Remittances from United Kingdom, and other European countries; $LnREM_3$ = Natural Log of Remittances from USA; Canada, Australia and others countries; LnPSE = Natural Log of Primary School Enrollment; LnAGFCF = Natural Log of Gross Fixed Capital Formation in Agricultural sector; μ_t is an error term which is assumed to be independently and normally distributed with zero mean and constant variation; and β_s are the coefficients to be estimated.

3. Estimation Procedure

a) Testing for Unit Root

Augmented Dickey-Fuller (ADF) test [Dickey and Fuller (1981)], is commonly applied for testing stationary and also to make μt white noise. The ADF equation is required to estimate the following by OLS.

$$\Delta Y_t = \alpha_2 + \beta_2 t + (\Phi_2 - 1) Y_{t-1} + \sum\nolimits_{i=1}^{k} \prod_i \Delta Y_{t-i} + \mu_t \quad (4)$$

where, Y_t is the series under investigation, t is a time trend and μ_t are assumed to be white noise residuals. To capture the auto-correlated omitted variables that would otherwise enter the μ_t, error term this test involves the adding of unknown number of lagged values of dependent variable on the right hand side of Equation (4). There are several approaches, but the present study use the Lagrange Multiplier (LM) test. The ADF-test statistic also check the null hypothesis that time series has a unit root, i.e., $H_0 : (\Phi_2 - 1) = 0$, against the alternative hypothesis of stationary time series $H_1 : (\Phi_2 - 1) \neq 0$. Joint hypothesis of unit root and no-trend, i.e., $H_0 : (\Phi_2 - 1) = \beta_2 = 0$, can be tested, against the alternative hypothesis $[H_1 : (\Phi_2 - 1) = \beta_2 \neq 0]$ of trend stationary. The number of lags in the ADF-equation is chosen to ensure that serial correlation is absent, using the Breusch-Godfrey statistic.

b) Testing for Cointegration

Johansen and Juselius (1990) formulated a general framework to examine the multiple co-integrating vectors which allows estimation of all possible co-integrating relationship which exists among variables. The following Vector Autoregressive (VAR)

model is a basis of multivariate cointegration of Johansen Maximum Likelihood approach [Johansen 1988)].

$$Z_t = A_1 Z_{t-1} + A_2 Z_{t-2} + \ldots\ldots\ldots + A_k Z_{t-k} + \mu_t \quad (5)$$

where, Z_t is an (n x 1) vector of $I(1)$ variables having both endogenous and exogenous variables, A_i is an (n x n) matrix of parameters, and μ_t is (n x 1) vector of white noise errors. This equation can be estimated by Ordinary Least Square (OLS) because each variable in Z_t, is regressed on lagged values of its own and all other variables in the system. As Z_t is assumed to be non-stationary, it is convenient to rewrite Equation (5) in its first difference or error correction form [Cuthbertson, et al. (1992)] as:

$$\Delta Z_t = £_1 \Delta Z_{t-1} + \ldots\ldots\ldots + £_{k-1} \Delta Z_{t-k+1} + \Omega Z_{t-k} + v_t \quad (6)$$

where, $£_1 = -(I - A_1 - A_2 - \ldots\ldots A_i)$, $(i = 1, \ldots\ldots, k-1)$, *and* $\Omega = -£_1 = -(I - A_1 - A_2 - \ldots\ldots A_k)$

The above specification provides information about the short-run and long-run adjustments to changes in Z_t by estimating $£_1$ and Ω, respectively. Information about number of co-integrating relationship among variables in Z_t is given by the rank of matrix Ω. The model may have some variables which are $I(0)$ and are insignificant in the long-run co-integrating space, but effect the model in short-run. Under this case, Equation (6) can be written as:

$$\Delta Z_t = £_1 \Delta Z_{t-1} + \ldots\ldots + £_{k-1} \Delta Z_{t-k+1} + \Omega Z_{t-k} + €D_t + v_t \quad (7)$$

where D_t represents the $I(0)$ variable, which are often included to take an account of short-run shocks to system, such as policy interventions. The trace statistic is used to test the null hypothesis of distinct co-integrating vectors which is less than or equal to r (i.e., no co-integrating vector) against alternative of r > 0; i.e., one or more co-integrating vectors [Johansen and Juselius (1990)].

c) Error Correction Mechanism

The Error Correction Mechanism (ECM) explains the dynamics of short-run adjustments toward long-run equilibrium. The ECM specification is based on the idea that adjustments are made to get closer to long-run equilibrium relationship. Hence, links between cointegrated series and ECM are intuitive. An error correction behaviour induce cointegrated stationary relationship and vice versa [Mckay, et al. (1998). It may be assumed that variables X_t and Y_t are cointegrated and relationship between these two can be expressed as ECM. Assuming that X_t is the cause of Y_t and both variables are considered in logarithmic forms, the ECM can be written as:

$$DLX_t = \alpha_0 + \alpha_1 DLY_t + \alpha_3 ECT_{t-1} + v_t \quad (8)$$

where, D represents the first difference operator and μ_t is a random error term, the ECT_{t-1}, is one period error correction term from the co-integrating regression. Equation (8) states that DLX_t depends on $DLY_{t,}$ and on the error correction term (ECT); and if the later is non-zero the model is out of equilibrium. Considering DLY_t as zero and ECT_{t-1} as positive, mean that DLX_t is above its equilibrium value. Since α is expected to be negative, the term $\alpha_3 ECT_{t-1}$ is negative and therefore, DLX_t also becomes negative in order to restore the equilibrium. This means that if X_t is above its equilibrium value, it will start falling in the next period to correct the equilibrium error [Gujarati (1995)].

IV. Empirical Results

1. Unit Root Results

Augmented Dickey-Fuller test was performed for testing the unit roots in variables by using Microfit software 4.1 [Pesaran and Pesaran, (2001)]. Table 1 shows that all variables (AGDP, REM_1, REM_2, REM_3, LAGFCF) in the trended and non-trended mod-

TABLE 1

ADF - Unit Root Results of the Selected Variables in Level and 1st Difference Form

Variables	Non-Trended	Trended	Φ_3- Statistics	Conclusion
AGDP	-0.3352	-2.9140	4.73	
AGDP	-4.6041	-4.5290		*I(1)*
REM_1	-0.3234	-0.9986	2.25	
REM_1	-3.8097	-4.2597		*I(1)*
REM_2	-0.8601	-1.2877	1.79	
REM_2	-4.2207	-4.7344		*I(1)*
REM_3	-0.5839	-2.5277	3.21	
REM_3	-4.6389	-4.6172		*I(1)*
LPSE	-0.7196	-1.6776	2.34	
LPSE	-4.2513	-4.3831		*I(1)*
LAGFCF	-1.0451	-2.7760	4.66	
LAGFCF	-4.8596	-4.8846		*I(1)*
C.V.*	-3.2700	-4.1500	6.73	
C.V.**	-2.9500	-3.5400	5.45	
C.V.***	-2.6100	-3.3000	4.87	

Source: Authors' estimation.

Note: C.V, *,**,*** are critical values for 1, 5 and 10 per cent significance level, respectively.

els are non-stationary at level form and become stationary after the first difference. Joint hypothesis test of constant, time trend and unit root are tested by using the Φ_3 - statistics. The values show that these variables are non- stationary at level form and become stationary after first difference.

2. Cointegration Results

In Johansen's procedure, the first step is to select the order of Vector Auto Regressive (VAR). The results indicate that the Akaike Information Criterion (AIC) and Schwarz Bayesian Criterion (SBC) criteria, select the order of VAR 2 and 1, respectively. It is evident that adjusted LR-test statistics rejected the order zero (0), but did not reject a VAR of the order one (1). The present study has short time series (39 observations). Thus, in order to avoid over-parameterization, and also in light of the statistics (Table 2), the order of VAR one (1) is selected.

3. Estimation of Co-integrating Vectors

The second step in the Johansen's procedure is to test presence and number of co-integrating vectors. Johansen procedure consist of two tests for co-integration, trace test and maximum Eigen value test. Adjusted LR-tests, Akaike Information Criterion (AIC), and the Schwarz Bayesian Criterion (SBC) were carried out on the Vector Autoregressive (VAR) with a maximum of four lags. The Johansen co-integrating results of the existence and number of co-integrating vectors among the time series data in the agricultural growth model are presented in Tables 3 and 4. The results show that there was one co-integrating vector in data series, as first statistic value for the test was greater than 95 per cent critical value.

TABLE 2

Selecting the Order of VAR for Agricultural GDP Growth Model

List of Variables included in Unrestricted VAR					
LAGDP	$LREM_1$	$LREMG_2$	$LREMG_3$	LPSE	LGFCF
Order		AIC	SBC	Adjusted LR Test	
4		206.7789	092.7655	-	
3		149.0977	063.5876	062.4541	[0.004]
2		132.3958	075.3892	097.5887	[0.024]
1		133.5845	105.0811	120.7963	[0.189]
0		-209.6254	-209.6254	373.6028	[0.000]

Source: Authors' estimation.
AIC=Akaike Information Criterion, SBC=Schwarz Bayesian Criterion.
Note: p-values are in parenthesis.

Results of Table 4 (maximum Eigen Values) reveal that as the first statistic and value of test are greater than 95 per cent critical value, there is one co-integrating vector in the data series. According to Harris (1995) the number of co-integrating vector is one when null hypothesis is rejected for the first time. It can safely be said that there

TABLE 3

Cointegration Results for Agricultural GDP (AGDP)
Growth Model Based on Trace Values

Cointegrating LR Test based on Trace Values of the Stochastic Matrix						
List of Variables included in the Cointegrating Vector						
LAGDP	$LREM_1$	$LREM_2$	$LREM_3$	LPSE	LGFCF	Intercept
H0 (No Cointegration)		H1 (Cointegration)		Test Statistic		95 % C. Values
r = 0		r = 1		198.7011		102.56
r <= 1		r = 2		101.1170		75.98
r <= 2		r = 3		58.9472		53.48
r <= 3		r = 4		32.3582		34.87
r <= 4		r = 5		08.0674		20.18
r <= 5		r = 6		01.9444		09.16

Source: Authors' estimation.
Note: *r* is the number of cointegrating vectors.
Table 3 (trace values) reveal that there is one cointegrating vector in the data series, as first statistic value for the test was greater than 95% critical value.

TABLE 4

Cointegration Results for Agricultural GDP (AGDP)
Growth Model Based on Maximum Eigen Values

Cointegratig LR test based on Maximum Eigen Values of the Stochastic Matrix						
List of Variables included in the cointegrating Vector						
LAGDP	$LREM^1$	$LREM^2$	$LREM^3$	LPSE	LGFCF	Intercept
H0 (No Cointegration)		H1 (Cointegration)		Test Statistic		95 % C. Values
r = 0		r = 1		97.5841		40.53
r <= 1		r = 2		42.1698		34.40
r <= 2		r = 3		26.5890		28.27
r <= 3		r = 4		24.2908		22.04
r <= 4		r = 5		06.1229		15.87
r <= 5		r = 6		01.9444		09.16

Source: Authors' estimation.
Note: *r* is the number of cointegrating vectors.

is one co-integrating vector among the concerned data series. Following the testing procedure, restricted intercept and no trend were found appropriate model to identify and assess relationship among the Agricultural GDP, remittance and other explanatory variables.

All variables were non-stationary at the level form and they became stationary after the first difference. Thus, these five variables were selected to explain the long-run relationship with the AGDP index. These coefficients represent the estimates of long-run elasticity of remittance from first, second and third group of countries, primary school enrollment and the gross fixed capital formation in agricultural sector in the AGDP model. These long-run elasticities are presented in Equation (9).

$$LAGDP = 0.338LREM_1 + 0.293LREM_2 - 0.079LREM_3 + 0.413LPSE + 0.294LAGFCF \quad (9)$$

4. Error Correction Model Estimates Results

The results of ECM presented in Table 3 are taken from the model selected on criterion of the goodness of fit, data coherence, and with consistency to the theory [Hendry and Richard (1982)]. The long-run elasticity of REM_1 used as proxy variable for remittance (from first region) was 0.338 with a positive sign, significant at 5 per cent level of significance. It was concluded that one per cent increase in the REM_1, increase agricultural GDP by 0.338 per cent in the long-run. The estimated long-run elasticity of REM_2 is 0.293. This is statistically significant at 10 per cent level of significance. The value of long-run elasticity implies that one per cent increase in remittance from the United Kingdom and other European countries leads towards 0.293 per cent increase in agricultural GDP in Pakistan. Therefore, the remittance sent by migrants living in UK and other European countries have a positive and significant impact on development of agriculture sector in rural Pakistan. Results of the study shows that REM_1 and REM_2 are positively related to agricultural GDP and are also in accordance with the study of Miluka, et al. (2007) and Hamilton, et al. (2003). They found that remittance spur agricultural development in Albania as families of migrants spent on purchase of agriculture land, latest agricultural machinery, raw material such as seeds and fertilizers, for farming. Moreover, some families also shift their agricultural investment from crop production to livestock breeding. The results also show that one per cent increase in remittance from USA, Canada, Australia and other advanced countries; agricultural GDP decrease by 0.079 per cent which is significant at 10 per cent level of significance in the long-run. The short-run elasticity of REM_3 was 0.045 and was non-significant. The sign of the coefficients explained positive association between Agricultural GDP in short-run and a negative relation in the long-run.

Results of the study are also similar to findings of Niaz, et al. (2010) who found that recipient families generated different forms of economic activities, such as micro-

level business, investment in real estate, and purchase of commercial land, etc., from the remittances sent by the migrants in Dir (lower) Pakistan. Jokish (2002) also supported the results of this study by indicating that thousands of farmers from the highland provinces of Cañar and Azuay, Ecuador, immigrated to metropolitan New York. The remittances had neither led to agricultural abandonment nor had been dedicated to agricultural improvements. The study of Drinkwater, et al. (2003) was also in harmony with these results, as they examined the effect of remittance on agriculture employment which was found to be negative but were insignificant. Burgess, et al. (2005) also found that remittances do not support any clear short-term effect on agricultural GDP and there was a negative correlation between agricultural GDP growths; however, the long-term economic impact of workers' remittance seems to be uncertain.

The long-run elasticity of primary school enrollment showed a positive sign with agricultural GDP. The estimated elasticity is 0.413 which is positive and statistically significant at 5 per cent level of significance. The results indicate that one per cent increase in primary school enrollment increase the agricultural GDP by 0.413 per cent in the long-run and only 0.112 per cent in the short-run. The results of variables show that improvement in education level account for a significant contribution towards agricultural development and that education is an important determinant of agricultural development.

The results also showed that gross fixed capital formation in the agriculture sector are positively related to agricultural GDP growth. The calculated long-run elasticity is 0.294 which is statistically significant at one per cent level of significance and 0.074 in the short-run which is significant at 5 per cent. The sign of coefficients explain positive association between the gross fixed capital formation in the agriculture sector and agricultural GDP in the long-run and short-run. It is also pointed out that present the study is consistent with the results of Bouoiyour and Saloua (2002) who estimated that GFCF and education attainment (both) have positive impact on growth of agricultural sector in Morocco.

The coefficient of error correction term (Table 3) has a negative sign which is according to the theory and tells about adjustment measures towards the long-run equilibrium. The error correction term has coefficient of -0.139 which is highly significant and show that deviation of growth from the long-run equilibrium level is corrected by about 13.9 per cent in a year. All diagnostic tests provide satisfactory results. The LM-test indicated that there was no problem of serial correlation among the residuals. As the computed value was greater than 0.05, the null hypothesis of serial correlation among residuals was rejected. The RESET-test also verified the correct functional form of the model. The Jarque-Bera test gave conclusion about normal distribution of the residuals and Hetroscedesticity test shows that the homoscedasticity is there. The R^2 value of 0.63 indicated that about 63 per cent variation in the dependent variables was explained by the factors included in the model. Similarly, Durbin-Watson statistics also verified the fact of no serial correlation among the residuals.

TABLE 5

Short-Run and Long-Run Error Correction Model Estimates

Regressors	Short-Run	S.E of Short-Run Elasticities	Long-Run	S.E of Long-Run Elasticities
Constant	-	-	1.397 (2.04)**	0.683
DL REM_1	0.075 $(0.97)^{ns}$	0.078	0.338 (2.46)**	0.832
DL REM_2	0.089 $(1.005)^{ns}$	0.088	0.293 (1.86)*	0.029
DL REM_3	0.045 $(0.87)^{ns}$	0.052	-0.079 (-1.92)*	0.043
DLPSE	0.112 $(0.42)^{ns}$	0.262	0.413 (2.69)**	0.153
DLAGFCF	0.074 (2.24)**	0.033	0.294 (3.38)***	0.087
ECM1(-1)	-0.139 (-2.13)**	0.065	LM Test 0.464	RESET Test 0.391
Jaeque-Bera Normality Test		0.350	Heteroscedasticity Test	0.967
R^2 0.63			D.W 1.94	

Source: Authors' estimation.

Note: t-ratios are given in parenthesis. *, **, *** indicate significance level at 10 per cent, 5 per cent and 1 per cent, respectively. NS denotes the non-significances of coefficients. By dividing long-run elasticities with S.E., t-ratios are calculated.

V. Conclusions and Policy Recommendations

Policy recommendations based on empirical work are given as under:

1. It is evident from the statistical analysis that remittance from the Kingdom of Saudi Arabia, UAE, other Gulf countries, UK, and the European countries play an important role in the growth of agriculture sector. The policymakers should devise policies to provide migrant households with promising investment opportunities and incentives in agriculture that will further contribute to productive and sustainable agricultural development.
2. Negative impact of remittance on agricultural GDP from the advanced countries. like USA, Canada, Australia, does not mean that this is necessarily bad for agricultural development. This study recommends that the government and other concerned bodies need to mobilize the head of the recipient families, to utilize remittance in the agricultural productive activities. Therefore, great efforts should be made to facilitate migrants and their families to redirect remittance to the agricultural sector.
3. The government should facilitate the stakeholders by giving subsidies on agricultural machinery and agricultural inputs, to encourage foreign workers to invest in the agricultural sector.

4. The government should enlighten the visa and foreign policies to motivate workers to earn from foreign countries and invest in Pakistans' agriculture sector.
5. The statistical analysis made it clear that gross fixed capital formation had a positive impact on agricultural development. Therefore, efforts should be made to encourage the gross fixed capital formation in agricultural sector. Investment in this sector is expected to enhance productivity of agriculture significantly in the long-run.
6. The coefficient of primary schools enrolment was positive and highly significant in the long-run which showed that education improves human capital of the country and leads to enhance productivity of the labor force. Thus, the results strongly suggest that the primary education should remain a priority agenda for the government and in this regard, specific steps should be taken to promote the basic education. Budget allocation should be increased to enhance the primary schools enrolment.

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