Impact of Personal Remittances on Economic Growth of Pakistan: A Multivariate Cointegration Analysis

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Abstract
The study targets the impact of personal remittances on economic growth in case of Pakistan for the time period 1980-2014. For this purpose, Foreign Direct Investment (FDI) and Human Capital are used as control variables. Using Augmented Dickey Fuller (ADF) and Philips-Peron (PP) unit root tests, all the variables came stationary at order one or I (1). Johansen Cointegration showed a long run relationship between personal remittances, FDI, human capital and economic growth. The results showed a positive long run impact of personal remittances, FDI and human capital on economic growth of Pakistan. Similarly, ECT (-1) term was -0.04 and also significant. Granger causality also showed a unidirectional causality running from personal remittances to economic growth. Moreover, the diagnostic tests showed normality of residuals, no autocorrelation and stationarity of residuals at level. Government should formulate such policies that encourage remittances in Pakistan by formulating reliable and efficient transfer mechanism to cheap transfer cost.
Keywords: Personal Remittances, FDI, Economics Growth

1. INTRODUCTION

Personal remittance is considered to be an important in economic development especially in recipient countries. It is one of the important sources of earning from developed countries which not only help in reducing current account deficit but also to achieve high economic growth. According to Arif (2012) during 1970-2008 5 millions Pakistani migrated to both developed and developing countries. Remittance sent from different countries has increased from 1637.06 to 1637.06 million US$.[1] Moreover personal remittance strengthens the abilities to invest in education, health and assets and to resist external shocks as well. A study by World Bank (2005) suggested that "recorded remittance have grown faster than official development assistance and FDI". Previous studies by (Iqbal & Sattar, 2005; Qayyum, Javid & Arif, 2008; Ahortor & Adenutsi, 2008 and Fayissa & Nsiah, 2010) have investigated the remittance effect on economic growth by using panel and time series data. A study by Irfan (2011) explored that personal remittance help to smoothen income, consumption and investment in human and physical capital. More over remittances help to prevent balance of payment crises by Irfan (2011).

Table 1: Pakistan worker working abroad

Years	2006	207	2008	2009	2010	2011	2012	2013	2014	2015
Total workers	183191	287033	430314	403528	362904	456893	638587	622714	752466	946571

Source: Bureau of emigration and overseas employment during 2006-2015

Current study used time series data and applies unit root using ADF and Phillips-Perron test. Moreover studies applied Johanson co-integration and VECM. Association among the variables is checked by the granger causality. In Empirical literature our study contributing in advance econometric technique's perspective as well as statistical significant results shows that long run co-integration exist the personal remittance, human capital, FDI and economic growth. VECM finding shows there is also short run causality among variables. There is positive effect of personal remittance on economic growth (Amjad,1986; Burney, 1987). So international migration of lobor has positive effect on economic growth in a long run. Diagnostic tests shows that there is no problem of

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[1] Government of Pakistan bureau of Emigration and overseas employment

auto-correlation and residuals are normally distributed.

Rest of the paper is organized as follows. In second section, literature has been reviewed. In third section, Data and Methodology is elaborated. Lastly, conclusion and policy implication is given.

2. Literature review

Previous literature discuss that remittances has a significant and positive impact on economic growth, poverty reduction, it also increase the private capital inflows while it's considered big source to lower the budget deficit. Recant study try to find out the impact of personal remittances on economic growth by using VEC (vector error correction model) and unit root test. Amjad (1986) & Burney (1987) show that during the past 3 century's remittances helps countries in many ways through direct and indirect channels of transfers of payment. Study shows that almost 60% of remittances spent on consumption pattern, occasions such as marriages, hajj and birthday parties and consumer durables. While remaining are saved or invested in agriculture, industrial and commercial development that indirectly helps in growth of economy. Remittances also help to improve the BOP, increase the national saving rate (NSR), reduces the current account deficit and external debt burden.

Iqbal & Sattar (2005) shows that remittances had become more important for foreign exchange earning especially from developed countries to developing countries. It helps to economy by lowering the account deficit at current time period. Credit rationing through remittances increased investment level that helps to increase the employment and output level. The total use of remittances on consumption of domestic and imported good & services may decrease the benefits of it. JR, 2005; Giuliano & Ruiz-Arrant, 2005) also confirms the positive impact of remittances on poverty reduction and it also helps to raise the living standard of people.

Arif (2012) investigate the importance and impact of remittances on economic growth and poverty reduction in Pakistan. Study found that benefits are associated with international migration of labor class in developing countries. Remittances create positive impact on social and economic growth in developing countries. Due to unemployment in developing countries the highly skilled labor migrates to develop countries to earn foreign currency and send that money to their home and to their country. Remittances helps to increase the capital inflows from 1075 $ million in 2000 to 6000 $ million in 2007 that helps to stabilize the exchange rate, poverty reduction, increase foreign exchange reserves and lower current account deficit. Study also finds that personal remittances help to improve educational as well as health system. Families of migrants spend their income for consumption purpose, for better life style purpose. Highly qualified and healthy society will increase the human capital in country that helps in economic growth.

Ahortor & Adenutsi (2009) investigated that in long time span remittances has more significant and positive impact on economic growth. It helps to increase the level of private capital inflow and overseas development assistance (ODA). Study observed that in the period of recession in developing countries, the foreign direct investment (FDI) and foreign capital decline very sharply but remittances help to economy in that recession period. Remittances have also negative impact on economy by brain drain and shifting of human capital and dynamic labor force. High inflation rate, over-dependency on external economy, increase in exchange rate and high controlled unemployment is may cause by remittances too. Study investigates the results through generalized method of moments (GMM) by using panel data of 31 small open developing countries from 1996 to 2006.

Fayissa & Nsiah (2010) found that remittances inflows is more effective and grow faster than official development assistance (ODA) and foreign direct investment (FDI). Remittances help GDP of country by investing in physical and human capital. Remittances considered helpful to lower the budget deficit because private investment, foreign aid and FDI is not considered enough to cover that. The return from private capital inflow (remittances) would be more if it is spent on real estate, small private businesses or invest in some other assets of that country. Study took panel data from 1980 to 2005 and used conventional neo-classical growth model to find out the impact of remittances on GDP. Irfan (2011) shows that personal remittances help to smooth income, consumption and investment in human and physical capital. Through better income and consumption level, GDP of country increase that is invested in development projects and on welfare of people which helps to reduces poverty. This study uses time series data of Pakistan from 1996 to 2008. To find out the results ordinary least square methodology has been used.

Yaseen (2012) also found positive impact of remittances on economic growth in many ways. International inflows can help financial institutes that increase the flow of foreign direct investment. Study found that it is the largest source of foreign earning which increases the 10 % of GDP of country. Migration of labor force from poor country to rich country increase the flow from 200 million US$ to 300 million US$. Remittances increase the level of saving of financial resources which further helps to companies by granting credit as loan in their market that increases the production and GDP on country. On the other hand if the families of migrants face problem of credit rationing that remittances helps them by financing money. The data is taken from 13 MENA countries from 2000 to 2010.

Datta & Sarkar (2014) shows positive impact of remittances on economic growth. Study shows that remittances help to prevent balance of payment (BOP) crisis. But it can affect negatively if the usage of remittances

is only on consumption and unproductive purpose. If this capital inflow invested on children education and on health maintenance than it helps to raise the human capital and GDP growth.

3. Methodology and Data

The study uses personal remittances, FDI and human capital as explanatory variables and GDP as explained variable. For the time period 1980-2014, all the data is collected from World Development Indicators (WDI).

Most of economic theories give us reasonable information about the impact of personal remittances on economic growth. But the validity of these theories appears to be an empirical issue. This study empirically examines personal remittances on economic growth by using advance econometric technique. This analysis is conducted by unit root test, Johansen co-integration test, vector error correction model, pair-wise causality test and diagnostic tests for model specification. These techniques provide a proper framework for the analysis of short run and long run relationship among variables.

Unit root test

Unit root test is applied before the estimation to check the stationary of each variable of data whether stationary or nonstationary. Stationary means that mean, variance and auto variance is constant over time T. If the data is nonstationary then the simple ordinary least square analysis have spurious results. Now unit root test is very famous over the previous few years to test the stationarity of data. For checking the stationarity of variables the studies applied two different unit root tests that are ADF and PP. But both tests are interrelated with each other and both are applied to find out a unit root results.

Johansen co-integration test

After unit root we test co-integration among these variables. Co-integration test concludes that the presence of a linear combination of non-stationary variables that are stationary. In a situation when co-integration does not exist in the data, it implies that linear combination is not stationary and the variable does not have a mean to where it returns. In existence of co-integration, this indicates that a stationary long-run relationship among the variables is present.

Johansen's technique is used to test the co-integration among the variables. First in Johansen's procedure we select the order of Vector Auto Regressive (VAR). LR-test adjusted on the VAR with taking a maximum of four lags.

Vector error correction model

An error correction model is a dynamical framework with the attributes that the deviation of the current state from its long-run relationship will be sustained into its short-run flow. An error correction model is not a model that amends the blunder in an alternate model. ECM is a model that estimate the speed of convergence at which the dependent variable again returns to equilibrium after any change in an independent variable. It is a theoretical approach utilized the long run and short run effect of one time to another time. ECM is used for stationary data or co-integrated data. The assumption of this model is that there should be co-integration relation among variables. King al (1991) first of all developed VECM identification with restriction of long run. Then Vlaar (2004) developed a two steps estimation of VECM in the work of Giannini (1992) C model. He utilizes both long run and short run restriction for over identified structural VECM.

Granger causality test

Johansen Co-integration concludes that there is causality between the series but it does not conclude the direction of the causal relationship. After to find a long run relationship among personal remittance, GDP, FDI and HDI we test for causality in the long run relationship that is final step of estimation. Granger causality has a procedure of two steps. First step relates to the estimation of the residual terms from long run relationship. Incorporating the residual as a right hand side variable, the short run error correction model is estimated at the second step.

Empirical equation for estimation is as follows

$$\ln(GDP_t) = \beta_0 + \beta_1 \ln(PR_t) + \beta_2(FDI_t) + \beta_3 \ln(HC_t) + u_t$$

Where

β_0 is intercept and other β_s are slope coefficients of the model.

$\ln(GDP_t)$: Natural log of gross domestic product at time t.

$\ln(PR_t)$: Natural log of personal remittance at time t.

$\ln(FDI_t)$: Natural log of foreign direct investment at time t.

$\ln(HC_t)$: Natural log of human capital at time t.

u_t: Represents error term.

For estimation data has extracted from world development indicator and time frame is 1980 to 2014. First we checked the order of integration by using ADF and PP which shows that all Variables of our model are stationary at Level and first difference I(1). Moreover these results supports that macroeconomic variables are stationary at I(1) by (Pesaran, M. H., & Pesaran, B, 1997). Results of unit root are given in table 1.

Table 1: Unit Root Tests

	Δgdp	Δpr	Δfdi	Δhc
ADF	-5.25[a]	-4.38[a]	-3.64[a]	-4.12[a]
PP	-5.26[a]	-4.38[a]	-3.64[a]	-4.12[a]

Note: [a] shows significance at 1%
Source: Authors' estimates

After estimating the unit root, Johansen technique is used to test the co-integration among the variables. Because all variables are at level so to capture the long run relationship among the variables Johansen co-integration test is applied by using two tests. One is Trace test and other is Max Eigen test. First we checked the trace statistics. Null hypothesis is that there is no co-integration among the variables. If the P value is less than 5% we reject the null hypothesis and vice versa. So our both test's Trace and Max Eigen results shows that all three variables of the model have long run relationship with GDP. Results are given in table 2.

Table 2: Johansen Co-integration Test

Hypotheses		Test Statistics	
H$_o$:	H$_1$:	Trace	Max Eigen
r = 0	r = 1	112.06[a]	82.64[a]
r ≤ 1	r > 2	29.42	24.60
r ≤ 2	r > 3	4.82	4.82

Note: [a]indicates significance at 1%.
Source: Authors' estimates.

When the variables are found to be co-integrated we run the VECM. Our target is to check weather personal remittance, FDI and human capital can affect GDP or not. Result of VECM shows that there is long run relationship between GDP, human capital and personal remittance and there is a speed of adjustment towards equilibrium in the short run as well as in the long run. Result of VECM is given in table 3.

Table 3: Vector Error Correction Model (VECM)

	Δgdp	Δpr	Δfdi	Δhc	ECT(-1)
Gdp	-	2.6	2.06	1.24[a]	-0.04[a]
Pr	0.007	-	-0.29	7.23	-0.001
Fdi	0.009	-0.35[a]	-	6.84[a]	0.01
Hc	0.007[a]	0.003[a]	0.009	-	-0.001

Note: ECT (-1) represents error correction term. [a] is significance at 1%.
Source: Authors' estimates.

Johanson normalized coefficients are given in table 4 which shows that all coefficients of the model are significant at 1% and signs are consistence with the economic theory as personal remittance has positive impact on economic growth. This result supports by the study (Qayyum, Javid & Arif (2008), Datta & Sarkar (2014). All johanson normalized coefficients have significant impact on economic growth in short run.

Table 4: Johansen Normalized Coefficients

Variables	Coefficients
Pr	-45.25[a]
Fdi	-190.65[a]
Hc	-12.97[a]

Note: [a] indicates significance at 1%.
Source: Author's estimates.

Pair-wise causality among four variables checked through the granger causality test. Pair-wise causality test shows that personal remittance, FDI and human capital has a unidirectional causality with the GDP. All three variables are significant so we reject the null hypothesis. Our null hypothesis is that PR does not cause GDP. So PR does cause GDP meaning that PR and GDP have one way association. Same as FDI and HC has unidirectional causality with GDP. Pair-wise causality result is given in table 5.

Table 5: Pair-wise Causality Test

Causality	W-stat	P-value	Remarks
PR→ GDP	10.44	0.00	Unidirectional causality
FDI→ GDP	4.74	0.09	Unidirectional causality
HC→ GDP	20.89	0.00	Unidirectional causality

Source: Author's estimates.

Residual diagnostic tests are given in table 6. Value of Jarque-Bera is greater than 5%, so we cannot reject the null hypothesis. It shows that residual is normally distributed. LM test p-value is 0.23 shows that there is no problem of autocorrelation as well as ADF test shows residuals are stationary at level with p-value of 0.03 which is less than 5%.

Table 6: Diagnostic Tests

Test	P-value	Conclusion
ADF Test	0.03	Residuals Stationary at Level
Jarque-Bera	0.32	Normality of Residuals
Lagrange-multiplier	0.23	No autocorrelation
Source: Authors' estimates.		

4. Conclusion and Policy Implication

Current research has developed the empirical evidence of personal remittance, human capital and foreign direct investment on economic growth by using Johanson co-integration from year 1980 to 2014. Unit root and PP is used to check the stationarity of the co-efficients. For short run dynamics VECM has applied and angle granger applied for long run relationship among the variables. VECM shows there is short run causality among the variables. Coefficients of the model have significant impact on economic growth in short run. Empirical result of Johanson co-integration shows that long run co-integration exists among the personal remittance, human capital, FDI and economic growth. Coefficient of Res (-1) term in the model is statistically significant which indicate that there is short run dynamics exists. In the last residual diagnostic tests shows that there is no problem of autocorrelation and residuals are normally distributed. By eliminating the resource constraints through remittance and investment in human capital can be increased which would increase the economic growth. Significant result shows that remittance is an important source to increase economic growth in case of Pakistan. Further empirical findings shows that in a long run through inflows of remittance is beneficial and growth in Pakistan would enlarge and broaden over time. Government should formulate such policies that encourage remittances in Pakistan by formulating reliable and efficient transfer mechanism to cheap transfer cost as well as issue regarding passport and abroad work permit by source countries due to local political pressure should be resolved. Moreover government should provoked the workers who working abroad in way that by directly negotiating and provide them healthy environment so that they will invest in Pakistan. In this way economic growth can be increased.

References

Ahortor, C. R., & Adenutsi, D. E. (2009). The Impact of Remittances on Economic Growth in Small-Open Developing Economics. *Journal of Applied Sciences, 9*(18), 3275-3286.

Amjad, R. (1986). Impact of Workers Remittances from the Middle East on Pakistans Economy: Some Selected Issues. *the Pakistan Development Review, 25*(4), 757-785.

Arif, A. Q. (2012). Impact of Remittances on Economic Growth and Poverty: Evidence from Pakistan. *Academic Research International , 2(1)*.

Burney, N. A. (1987). workers Remittances from the Middle East and their Effect on Pakistans Economy. *The Pakistan Development Review, 26*(4), 745-763.

Datta, K., & Sarkar, B. (2014). Relationship Between Remittances and Economic Growth in Bangladesh: An Econometric Study. *The Bangladesh Development Research Working Paper Series*.

Fayissa, B., & Nsiah, C. (2010). Can Remittances Spur Economic Growth and Development? Evidence from Latin American Countries (LACs). *Department of Economics and Finance Working Paper Series*.

Giuliano, P., & Ruiz-Arranz, M. (2005). Remittances, Financial Development and Growth. *IMF Working Paper*.

Iqbal, Z., & Sattar, A. (2005). The Contribution of Workers Remittances to Economic Growth in Pakistan. *research report, Pakistan Institute of Development Pakistan*.

Irfan, M. (2001). Remittances and Poverty Linkages in Pakistan: Evidence and some Suggestions for Further Analysis. *PIDW Working Paper*.

JR, R. H., & Page, J. (2005). Do International Migration and Remittances Reduce Poverty in Developing Countries? *World Bank, Washington, DC, USA, 33*(10), 1645-1669.

Pesaran, M. H., & Pesaran, B. *Working with Microfit 4.0: Interactive econometric analysis; [Windows version]*. *Oxford University Press* (1997).

World Bank, 2006, Global Economic Prospects: Economic Implications and Migration: Washington, DC).

Yaseen, H. S. (2012). The Positive and Negative Impact of Remittances on Economic Growth in MENA Countries. *The Journal of International Management Studies, 7*(1), 7-14.