Impact of Remittance on Economic Growth of Pakistan

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ABSTRACT

Purpose:
The purpose of this research is to analyze the impact of remittance on economic growth in context of Pakistan. Pakistan ranks eighth among remittance receiving countries. An improved understanding of this relationship can support policy makers.

Methodology:
The data for this study is collected from World Bank Data website from 1976 to 2018 for Pakistan. Economic growth proxied by GDP per capita growth is independent variable (DV) and Remittance, Household consumption, foreign direct investment, gross capital formation and trade as percentage of GDP as dependent variable (DV). OLS method and Granger Casualty Test is used to analyze the data.

Findings:
The study results show that remittance has both long term and short term significant positive impact on economic growth. Both OLS and Granger Causality confirm long-term relationship between remittances whereas short term relationship is only established by Granger Causality test.

Practical implications:
The outcomes of the research can be utilized by the policy makers in designing strategy for future migrant labor management.

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1. Introduction

Measurement of economic growth has always been of a great interest to researchers. There are several factors that contribute to economic growth of a country. However, since early 1970's it is believed for Pakistan that remittance sent back home by the migrant workers is source of direly needed source of foreign exchange and economic growth.

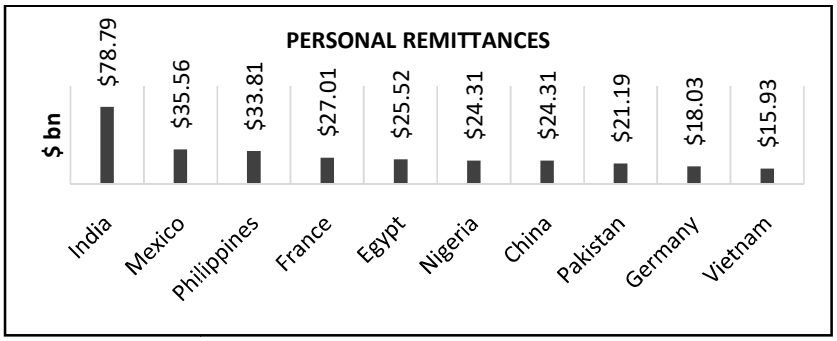

Figure.1: Remittance Receiving Countries
Source: World Bank

Pakistan ranks eighth in terms of recipient of personal remittance based on 2018 international statistics based on World band data. Hence, remittance is of quite significance for Pakistan. Remittances are always considered as a ready source of foreign funds that can fill the structural current account deficit of Pakistan. Pakistan has received an extensive amount of foreign debt which requires regular debt service. Remittances are a significant source of foreign exchange required finance the reserves and repayment of debts. Moreover, like many other developing countries, Pakistan relies heavily on heavily on financial inflows from abroad to fund its domestic investment.

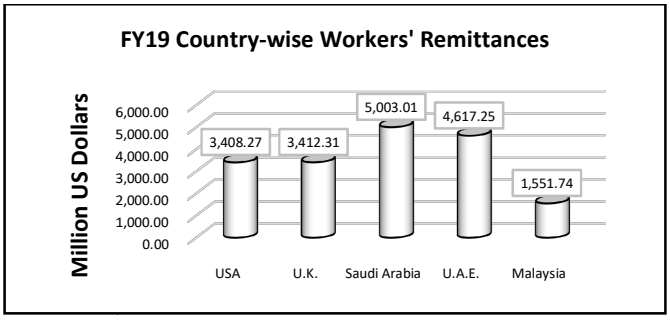

Figure.2: Remittance Source of Pakistan
Source: World Bank

Although non-resident Pakistani workers are widely spread around the world. Almost more than three-quarters of remittance in is received from the USA, the UK, Saudi Arabia, the UAE and Malaysia. Except Malaysia, other four countries are undergoing drastic changes in their polies regarding non-local population. Many of the workers have returned to Pakistan over the past few years and this number is expected to rise in the current year more. Because of the COVID-19 pandemic, many workers based in Gulf countries have lost their contracts. In this situation, it would be interesting to assess the relationship between remittance and economic growth in context of Pakistan to be able to understand future economic outlook of Pakistan.

The World Bank uses four categories to classify the countries of the world according to their income levels. have per capita incomes (2014, U.S. dollars) of, range between per person, range between per person, and have per capita incomes of.

Table.1. Categories of countries income wise

Categories	Income levels
low-income countries	$1,045 or less
lower-middle-income countries	$1,046 and $4,125
upper-middle-income countries	$4,126 and $12,735
High-income countries	$12,736 or more

Source: World Bank

As of 2018, Pakistan falls in the category of lower-middle-income country as the GDP per capita is $1,197.84.

Pakistan has a structural current account deficit which reflects that its domestic savings are not enough to finance the investments required for capital formation. This can be explained by the current account identity, CA = S – I. Hence, theoretically speaking, if the remittances received in Pakistan are invested in development of production capabilities, it will experience a growth in its production capability, hence economic growth. However, this is not always the case. The funds received through remittance might be used in purchase of capital that is not productive (i.e. gold), used in luxurious imports or in unproductive investments.

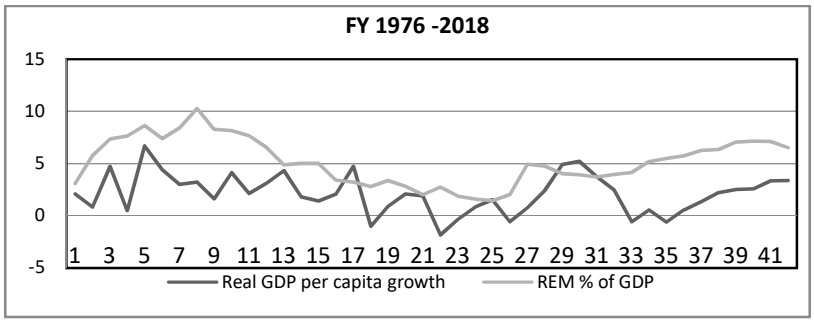

Figure.3: Historical Current Account Deficit
Source: World Bank

A graphic inspection of real GDP per capita growth and remittances received as percentage of GDP hints a significant relationship between the two variables.

2. Literature review

2.1. Relationship of remittance with economic growth among countries around the world

To gain general understanding of the relationship between remittance and economic growth studies from various regions and countries were considered.

Chami, R. et al. (2003) used data from 1970 to 1998 of 113 countries. In the panel estimation, the log of real GDP per capita was IV and log of investment to GDP ratio, and the log of worker remittances to GDP were DV. As per the results, remittance had a negative impact on the economic growth.

In another study of 162 countries utilizing data of the similar period, Catrinescu et al (2009) deduced that there is mild positive relationship between remittance and economic growth. This study use Dynamic Panel Data (DPD) estimators with log of real GDP per capita as DV. This study expresses IV in log of proportion of GDP – Remittances, gross capital formation, and net private capital flows.

Yet in another study related to same regime done on the 25 Latin America and Caribbean countries, Mundaca (2009) deduced that there is strong positive relationship between remittance and the economic growth. This study used GMM with the growth rate of output per capita as DV and gross fixed capital formation, remittances, and the degree of financial market development as IV.

Nyamongo et al (2012) used panel estimation on data of African countries from 1980 to 2009 found significant positive relationship of remittance with economic growth. The study used real GDP per capita growth as DV, while remittances as percentage of GDP, a set of financial development indicators, and an interaction variable as IVs.

Nwaogu and Ryan (2015) used GMM and OLS on data of 53 African and 34 Latin American -Caribbean countries from 1970 to 2009. This study regressed economic growth on FDI and remittance and found that remittance to have an insignificant impact in African countries while statistically significant impact in Latin America and the Caribbean countries.

2.2. Relationship of Remittance with Economic Growth in developing

Since Pakistan is a lower income developing country, some studies of the developing countries groups were utilized.

Jongwanich (2007) used GMM model on data from 1993 to 2003 of 17 developing countries of Asia and the Pacific. The study found that remittance has an impact on economic growth, but only marginally.

In another study of 39 developing countries, Pradhan et al (2008) used FEM and REM model on data from 1980 till 2004. This cross-sectional study shows that remittance has a positive but small effect on economic growth.

Giuliano and Ruiz-Arranz. (2009) carries out a study on 100 developing countries. They used the growth of the real per capita GDP as dependent variables in SGMM model. The data from 1975–2002 showed that economic growth is significantly affected by remittance which was represented as proportion of GDP. Moreover, it stimulates economic growth among lower income countries.

In contrast, Barajas et al (2009) used OLS and FEM IV on data of 84 emerging countries from 1970–2004 to discover that remittance has an insignificant impact on economic growth.

Rao and Hassan (2011) used Panel estimation on data from1974 to 2006 of 40 developing countries. In contrast with the other studies on the same period, this study deduced that remittance has an insignificant impact on economic growth.

Bettin and Zazzaro (2012) analysed data from 1970 to 2005 of 66 developing countries OLS and SGMM and found significant effect of remittance on growth. Similarly, Nsiah and Fayissa (2013) found a significant positive effect of remittance on growth among 64 developing countries from 1985 to 2004 with Panel FMOLS method was used in this study with real GDP per capita as DV and Remittances, the openness of the economy, capital/labor ratio, and economic freedom as regressors.

Fenny et al (2014) discovered a difference in relationship between the remittance and economic growth among developing countries and Small Island Developing States (SIDS). This study used ordinary least square and Generalized Method of Moments approach on data from 1971–2010. Interestingly, although remittance has

insignificant impact on the economic growth among the developing countries, it was found to have significant impact among the SIDS.

Eggoh et al (2019) conducted another study on 49 developing countries using the Generalized Method of Moments and the Panel Smooth Threshold Regression on data from 2001till 2013. The results showed that remittances have a positive and significant impact on economic growth in developing countries, while aid and foreign direct investments have insignificant impact.

2.3. Relationship of remittance with economic growth in South Asian countries

Three studies conducted in Bangladesh were of great importance since it is ranked at the top of the list of remittance receiving countries and it is situated in same region as Pakistan.

Ahmed (2010) used OLS with ratio of remittances to GDP, ratio of exports to GDP, ra tio of gross capital formation to GDP, and ratio of foreign direct investment inflow to GDP and regressed GDP per capita for 1995 – 2005 data. Remittances were found to have a negative impact on economic growth while exports and GCF were found to have significant positive impact.

Siddique and Selvanathan (2010) used Granger causality test under a VAR framework for 1977 – 2005 data. Per capita remittance and Per capita GDP were used as IV and DV to discover that remittance leads to economic growth in Banladesh, while in Sirilanka there was bilateral relationship between remittance and economic growth.

Hassan et al (2012) used OLS and GMM for 1974–2006 log of remittances to GDP ratio and a vector of control variables consisting of gross capital formation to GDP ratio, populations growth, government consumption to GDP ratio, M2 to GDP ratio, inflation rate. Datta and Sarkar (2014) used ARDL on log of real GDP and log of remittance on data from 1975 to 2011. Both studies found significant positive impact of remittance on economic growth.

Ali et al (2019) used Panel unit root tests and panel ARDL technique to analyze effect of Remittances, Foreign Direct Investment, Official Development Assistant, Export Earnings as percentage of GDP on Gross Domestic Product growth. The data from 1981 to 2018 of South Asian countries was used. Although level of significance and coefficients were found different for different countries, remittance was found to have positive effect on economic growth.

Using Granger-causality tests and Dumitrescu Hurlin Causality tests, Uddin (2020) found that remittance causes economic growth, but economic growth doesn't lead to increase in remittance. This study used data from 1975 to 2017 for South Asian countries (Bangladesh, India, Pakistan, Srilanka, and Nepal).

There are only few studies which found remittance to have negative impact on economic growth in Bangladesh. Most of the findings report positive relationship between remittance and economic growth.

2.4. Relationship of remittance with economic growth in Pakistan

Abdus and Zafar (2005) used data from 1973 to 2003 with real GDP growthas DV while workers' remittances, public investment, private investment, inflation rate, external debt, change in terms of trade, as per capita income and squared per capita

income as DV. The study found that remittance have significant positive impact on growth.

Waheed and Aleem (2008) came up with different findings. The study included data from 1981 to 2006 to discover that remittances and economic growth have significant positive relationship in short run whereas there is a negative relationship in long run.

Irfan (2011) conducted OLS on data from 1975 to 2009 using GDP as DV and Ratio of remittance to GDP, Population size and inflation as IV. The study found that remittance brings reduction in poverty and improvement in economic development.

Dilshad (2013) used time series empirical regression and correlation analysis on data from 1991 to 2012 with GDP as DV whereas size of labour force, GCF and remittances as IV. It was found that there is significant a significant positive relationship between remittances and economic growth. Munir (2016) used ADF and Philips-Peron (PP) unit root tests to analyse the 1980-2014 data with log of GDP as DVwhile log of remittance, log of FDI, and log of human capital IV to discover that personal remittances, FDI and human capital has positive long term impact on economic growth.

Siddique et al (2016) used OLS, Granger Causality, Cointegration and ECM to analyse 1980-2013 data to analyse GDP growth rate and poverty rate. This used personal remittances, secondary education, GCF and trade openness in model to find that remittances has positive impact on economic growth in short run. However, remittance does not have an impact on economic growth in long run. Khan et al (2019) sued ARDL model on 1976 -2016 data with nominal GDP and model with remittance, FDI, expenditure on household consumption and gross domestic savings (% of GDP) along with exchange rate, inflation rate, CPI (annual %). The study found that remittances have a significant positive effect on the economic growth in the short-run and the long-run.

2.5. Econometric model

The studies used a variety of variables to proxy economic growth which include GDP, GDP per capita, GDP growth, GDP per capita growth, Real GDP per capita growth, Real GDP growth, Log of real GDP, Log of real GDP growth and Log of real GDP per capita. Moreover, along with remittance the models included Gross capital formation, foreign direct investment, household consumption, broad money M2, private sector claims, domestic credit, Government consumption expenditure, trade, Exports, Trade openness, financial market development,Exchange rate, interest rate, Inflation, and Consumer prices etc.

Some of the studies followed The Cobb-Douglas production function to construct the model, a few studies used foreign funds inflow sources as regressors while some studies used remittance in isolation to analyse the relationship.

For this study, basic aggregate demand function has been to select the variables.

$$AD = C + I + G + X_n$$

Based on the studies that have been discussed in the literature, following model has been developed for this study.

$$GPCG = \beta_{0+}\beta_1 REM + \beta_2 FDI + \beta_3 GCF + \beta_4 HCON + \beta_5 TRA \text{----------(1)}$$

The variables and their expected relationship with the dependent variable have been summarised in the table below.

Table.2. Variables

Variable	Proxy or definition	Expected sign
GPCG	GDP per capita growth in current %	
REM	Personal remittances received as a % of GDP	+
FDI	Foreign Direct Investment inflow as a % of GDP	+
GCFF	Gross fix capital formation % of GDP	+/–
HCON	Household final consumption expenditure as a % of GDP	+
TRA	Trade as a % of GDP	+

Source: Author's own elaboration

3. Methodology

3.1. Variables

3.1.1. GDP Per Capita Growth (annual %)

Economic growth is defined as increase in production capability of a country as compared to its population. Basically, it is an indicator standard of living of a country's population. Economic growth is proxied by a long-term variation in real GDP per capita. Some studies have taken real GDP growth as economic growth proxy (Iqbal & Sattar, 2005), but it only reflects overall increase in production capacity of the country without taking into account the impact of this increase in resources on the population.

Since economic growth is defined as growth in gross domestic product per capita - GPCG (Parkins, 2016), it used as a proxy of economic growth for the purpose of research. GDP per capita is computed by dividing gross domestic product withmedian value of population during a year. In 2018, GPCG reached its peakof 3.68% in the data range used for this study.

3.1.2. Personal Remittances, Received (% of GDP)

Personal remittances are made up of the personal transfers and compensation foreign resident workers of a country. These transfers are usually made in cash through banks or other money transfer mechanisms by non-resident Pakistani workers to their families or personal accounts of the non-resident workers. It is recorded as a part of current account of Balance of Payments of Pakistan. In this study, we have taken remittance as a percentage of GDP (REM) which can be calculated by dividing Personal remittance by GDP, expressed as a percentage. in 1983, REMreached a peak of 10.25%, whereasin 2000, it touched the lowest level of 1.45%.

3.1.3. Foreign Direct Investment, Net Inflows (% of GDP)

Foreign direct investment inflows (FDI) are the net investment inflows to get controlling interest in aoperating in Pakistan as a proportion of GDP. It can be calculated by dividing sum of equity capital, reinvestment of earnings, other capital, and capital with GDP. It reached its peak in 20017 at 3.67 in 2007.

3.1.4 Gross capital formation (% of GDP)

Gross capital formation is money spent in an economy on expansion of the fixed assets and increase in the inventories. Fixed assets include land improvements, plant, machinery, and equipment purchases etc. Inventories include all the raw materials, work in progressand finished goods. For this study, GCF is taken as a proportion of GDP. It is calculated by dividing the values of GCF by GDP expressed in percentage. GCF reached its lowest value of 11.56 in 1960.

3.1.5 Households and NPISHs final consumption expenditure (% of GDP)

HCON in our model represents Households and NPISHs final consumption expenditure in Pakistan as a proportion of GDP. It includes final consumption of the households divided by GDP expressed in percentage. The lowest value of HCON was reached in 1991 at 68.22.

3.1.6 Trade (% of GDP)

TRA in this model represents Trade (% of GDP) in Pakistan. It is calculated by dividing sum of exports and imports by GDP. It was at its highest level 38.91% in 1990.

3.1.7 Data

In order to analyse the effect of remittance on the economic growth, time series data for this study was collected from 1976 till 2018 from world bank website. Although data for most of the variables is available since 1960, a later point in time was chosen as the Pakistan went through a major economic and physical structure change in 1971. The economy is believed to be back on track since 1975. Moreover, the phenomenon of immigration got stronger in Pakistan around mid-1970s.

3.2 Econometric Techniques

3.2.1. Unit Root Test

Unit root test is performed on all the time series to assess stationarity of the data. For this purpose, Augmented Dickey Fuller (ADF) Test is used. This test widely accepted as a tool for checking stationarity and order of integration of a data.

3.2.2 Ordinary Least Squares (OLS) Method

OLS method is used to analyse the long-term and short-term relationship between the independent and dependent variables.

3.2.3 Model stability

Stability of the model was primarily checked through Ramsey RESET Test. Moreover, residual normality was tested to assure strength of the model specification.

3.2.4 Multicollinearity, Heteroscedasticity and Autocorrelation

Some of the tests are conducted to assure the robustness of the data used for study. Multicollinearity among the variables was checked through pairwise correlation and VIF. For autocorrelation, Durbin Watson Statistic and Breusch-Godfrey Test is used. For Heteroscedasticity, Breusch-Pagan (BP) Test and White's chi square test is employed.

3.2.5 Granger Causality Test

The Granger causality test is utilised in this study to analyse the direction of causality in long run and short run relationship of GPCG with REM, GCF, FDI, TRA and HCON.

4. Results

4.1. Descriptive

Table.3.Descriptive Statistics

	Mean	Median	Max.	Min.	Std. Dev.	Skew.	Kurt.	Jarque -Bera	Prob.	Sum	Sum Sq. Dev.
GPCG	2.164	2.09	6.7	-1.84	1.873	0.085	2.648	0.274	0.872	93.04	147.351
REM	5.217	5.02	10.25	1.45	2.214	0.103	2.124	1.453	0.484	224.32	205.933
FDI	0.855	0.62	3.67	0.06	0.800	2.130	7.331	66.123	0.000	36.75	26.882

GCF	17.751	18.01	20.82	14.12	1.597	-0.485	2.418	2.294	0.318	763.29	107.076
HCON	77.606	79.21	83.82	68.22	4.134	-0.404	1.989	3.004	0.223	3337.05	717.686
TRA	33.088	33.33	38.91	25.31	3.394	-0.439	2.590	1.682	0.431	1422.78	483.833

Source: Author's own elaboration

Descriptive analysis of the variables shows that all variables have small standard deviation with respect to their scale. Moreover, except FDI, the null hypothesis of normality is retained by all the variables.

4.2. Stationarity

Table. 4. Augmented Dickey-Fuller Test at level

	Without intercept or trend		With intercept		With intercept and trend	
	t-statistic	Prob.	t-statistic	Prob.	t-statistic	Prob.
GPCG	-2.536036**	0.0125	-4.503334***	0.0008	-4.520580***	0.0042
REM	-0.087195	0.6478	-1.559316	0.4941	-1.623660	0.7665
FDI	-1.764284*	0.0739	-2.914917*	0.0523	-3.122966	0.1147
GCF	-0.251392	0.5896	-2.036441	0.2708	-3.023536	0.1382
HCON	0.074852	0.7011	-1.438680	0.5543	-1.457623	0.8283
TRA	-0.320260	0.5641	-2.362703	0.1582	-2.783190	0.2112

ADF t-statistic critical value at 1%, 5% and 10% level of significance without intercept and trend -2.621185, -1.948886 and -1.611932; with intercept -3.600987, -2.935001 and -2.605836; and with intercept and trend -4.198503, -3.523623 and -3.192902.*,** and *** significant at 10%, 5% and 1% level

Source: Author's own elaboration

At level, GPCG is stationary at 1% level of significance at intercept and intercept with trend, while at 5% level of significance without intercept or trend. FDI is significant at 10% level without intercept or trend and with trend. However, FDI is stationary at 10% level of significance.

Table.5. ADF results at first Difference

	Without intercept or trend		With intercept		With intercept and trend	
	t-statistic	Prob.	t-statistic	Prob.	t-statistic	Prob.
GPCG	-10.4504***	0.0000	-10.3314***	0.0000	-10.1990***	0.0000
REM	-6.2252***	0.0000	-6.1351***	0.0000	-6.0615***	0.0001
FDI	-4.3687***	0.0001	-4.3140***	0.0014	-4.2877***	0.0080
GCF	-7.2315***	0.0000	-7.1655***	0.0000	-7.0348***	0.0000
HCON	-7.7579***	0.0000	-7.6707***	0.0000	-7.7880***	0.0000
TRA	-7.3094***	0.0000	-7.2121***	0.0000	-7.3752***	0.0000

ADF t-statistic critical value at 1%, 5% and 10% level of significance without intercept and trend -2.621185, -1.948886 and -1.611932; with intercept -3.600987, -2.935001 and -2.605836; and with intercept and trend -4.198503, -3.523623 and -3.192902. *,** and *** significant at 10%, 5% and 1% level

Source: Author's own elaboration

All variables - PCG, REM, FDI, GCF, HCON and TRA - are found to be stationary at first difference at 1% level of significance.

4.3. Regression Analysis: Long-term Relationship

The long-term relationship of GPCG with REM, HCON, GCF, FDI, and TRA is analysed by running OLS regression on the variables at level. Two Models Have been used to examine long term relationship between REM and GPCG. In Model I, REM is assessed along with four other variables which theoretically contribute towards GPCG along with REM. In Model II, only REM is analysed separately.

Model I : $GPCG = \beta_0 + \beta_1 REM + \beta_2 FDI + \beta_3 GCF + \beta_4 HCON + \beta_5 TRA$------(2)

Model II: $GPCG = \beta_0 + \beta_1 REM$ ----------(3)

Table. 6.Long-term relationship / Restricted Model

Variable	Model I Coefficient	Std. Error	Model II Coefficient	Std. Error
C	9.823830	10.23581	0.314733	0.678576
REM	0.557632***	0.200750	0.354433***	0.11995
HCON	-0.136067	0.110999		
GCF	0.200462	0.216136		
FDI	0.339116	0.386995		
TRA	-0.116592	0.101708		
R-squared	0.249503		0.175567	
Adjusted R-squared	0.148084		0.155458	
Akaike info criterion	4.061544		3.969457	
Durbin-Watson stat	1.790758		1.635441	
F-statistic	2.460128		8.731125	
Prob(F-statistic)	0.050721		0.005164	

Dependent variable GPCG, *** significant 1% level of significance

Source: Author's own elaboration

The regression results show that REM is the found statistically significant in both Model I and Model II. There is a very strong evidence to reject the null hypothesis that REM does not have an impact on GPCG.

In Model I, one percent increase in the proportion of remittance with respect to GPCG leads to 0.5576 point percent increase in GPCG. Other variables are around statistically insignificant. Coefficient of determination shows that 24.95% variations in the GPCG are explained by the model. At almost 5% level of significance, there is strong evidence to reject the hypothesis that this model does not have an impact on GPCG, $F(5, 37) = 2.4601$, $p < 0.10$.

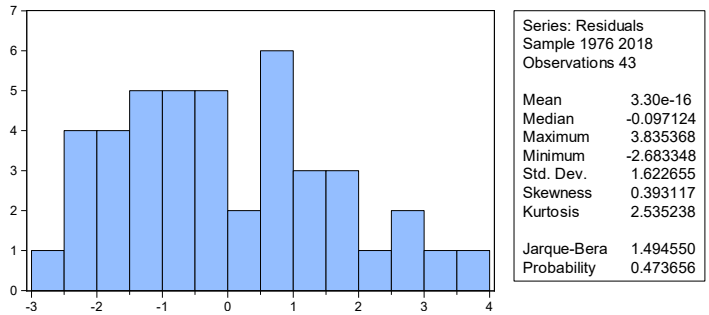

Figure.4: Series Residual normality Of Long-Term Models

Source: Author's own elaboration

Jarque-Bera test statistic of the Model I error term is 1.494550 with $p > 0.10$ suggests that null hypothesis of normality is retained. Skewness and Kurtosis are quite close to zero and 3 respectively. Although the value is not absolutely zero, it is quite close to the criteria value.Since error term of the regression follows normal distribution, the computed F follows F distribution with nominator df of 5 and denominator df of 37, F (5,37).

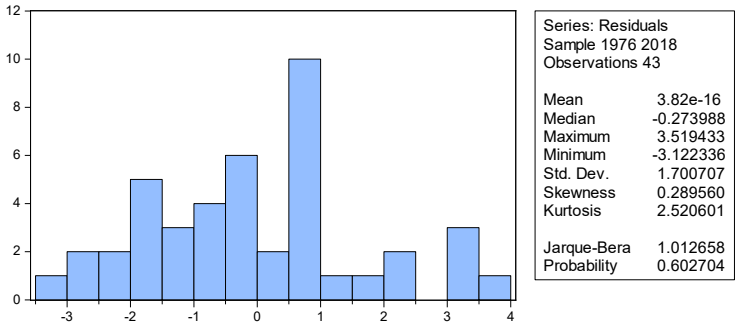

Figure.3. Model II Error Term Normality Test
Source: Author's own elaboration

Jarque-Bera test statistic of the Model II error term is 1.012658with p > 0.10 which suggests that null hypothesis of normality is retained. Skewness and Kurtosis are quite close to zero and 3 respectively. Although the value is not absolutely zero, it is quite close to the criteria value. Since error term of the regression follows normal distribution, the computed F follows F distribution with nominator df of 1 and denominator df of 41, F (1,41).

Table.7. Stationarity Test of The Error Term

	ADF t-Statistic	Prob.*
Model I	-5.882367	0.0000
Model II	-5.337189	0.0000

Source: Author's own elaboration

4.4. Regression Analysis Short-term Relationship

The short-term relationship of GPCG with REM, HCON, GCF, FDI, and TRA is analysed by running OLS regression on the variables at first difference. Two Models Have been used to asses long term relationship between REM and GPCG. In Model III, ΔREM is assessed along with four other variables which theoretically contribute towards ΔGPCG along with ΔREM. In Model II, only ΔREM is analysed separately.

Model III : $\Delta GPCG = \beta_0 + \beta_1 \Delta REM + \beta_2 \Delta FDI + \beta_3 \Delta GCF + \beta_4 \Delta HCON + \beta_5 \Delta TRA$----------(4)

Model IV: $\Delta GPCG = \beta_0 + \beta_1 \Delta REM$----------(5)

Table.7. Short-term relationship between IV and DV

Variable	Model III Coefficient	Std. Error	Model IV Coefficient	Std. Error
C	0.014699	0.347968	0.01968	0.344467
D(REM)	0.282099	0.349687	0.214646	0.343065
D(FDI)	0.485037	0.836603		
D(TRA)	-0.005824	0.160546		
D(HCON)	-0.287354	0.195067		
D(GCF)	-0.359101	0.369925		
R-squared	0.093800		0.009692	

Adjusted R-squared	-0.032062	-0.01507
Akaike info criterion	4.584682	4.482961
Durbin-Watson stat	2.775858	2.849519
F-statistic	0.745262	0.391466
Prob(F-statistic)	0.594846	0.535084

Dependent variable GPCG, ***, **, * statistical significance1%, 5% and10%

Source: Author's own elaboration

The regression results show that REM is the found statistically insignificant in both Model III and Model IV. There is a strong evidence to retain the null hypothesis that REM does not have an impact on GPCG in short run.

Coefficient of determination shows that 9.38% variations in the d(GPCG) are explained by the model. There is strong evidence to retain the null hypothesis that this model does not have an impact on GPCG, $F(1, 41) = 0.745$, $p > 0.10$.

4.5. Model Stability

Table.8. Ramsey RESET all models

	F-stat Value	df	Probability
Model I	0.209078	(1, 36)	0.6502
Model II	0.003874	(1, 40)	0.9507
Model III	0.159257	(1, 35)	0.6923
Model IV	0.059301	(1, 39)	0.8089

Source: Author's own elaboration

The Ramsey RESET test results show that the null hypothesis that all modelsare correctly specified retained. $F(k-1,n-k) < 4$, $p > 0.10$.

4.6. Multicollinearity

Variable	Model I Cerented VIF	TOL	Model II Cerented VIF	Tolerance TOL
C	NA		NA	
REM	2.776754	0.360	NA	
HCON	2.958511	0.338		
GCF	1.673581	0.598		
FDI	1.347041	0.742		
TRA	1.674575	0.597		

Source: Author's own elaboration

The issue of multicollinearity does not hold for Model II as there is only one independent variable. In Model 1, the is imperfect collinearity at mild, yet acceptable level. The Variance Inflation Factor (VIF) is less than 5 and Tolerance (TOL) factor is above 0.3. The variables do not require remedial procedures for multicollinearity.

4.7. Autocorrelation

4.7.1. Graphical Method

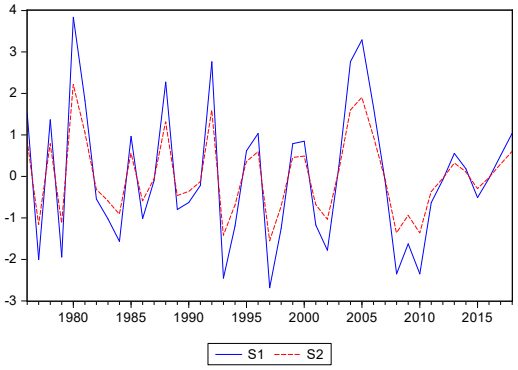

Figure.4. Model I Autocorrelation graphical analysis

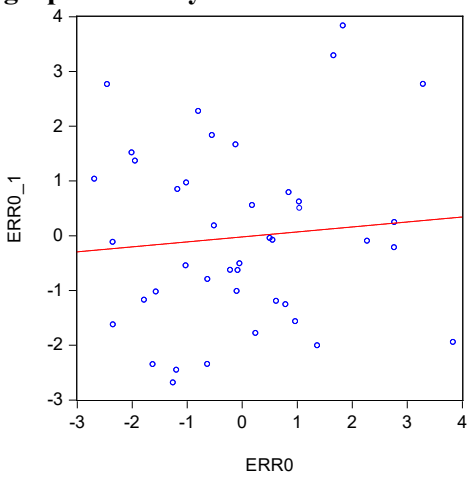

Figure.5.Model I Autocorrelation error term with one lag

Source: Author's own elaboration

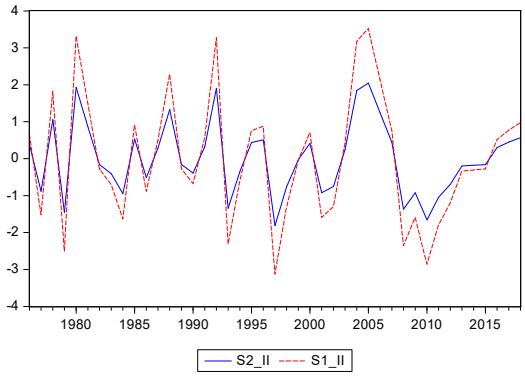

Figure 6 Model II Autocorrelation graphical analysis

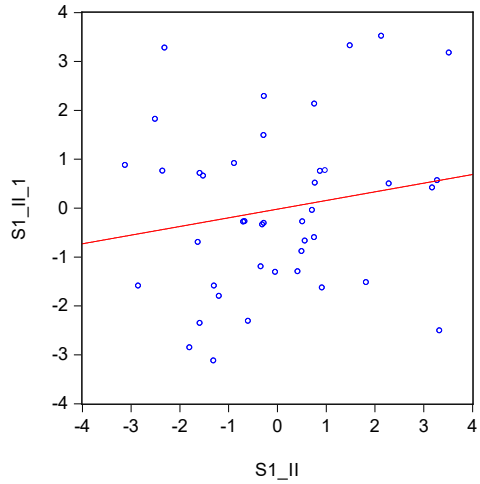

Figure.7. Model II Autocorrelation error term with one lag

Figure.4 and Figure 6show S1 (error term from the regression) and S2 (error term from the regression divided by the standard error of the regression) plotted as line graph for Model I and Model II. This graphical representation shows some see-saw kind of movement which might be an indication of auto correlation.

Figure.5 and Figure.7show a scatter plot of error term with one lag with a regression line for Model I and Model II respectively. It can be seen that there is weak positive relationship between error term and its single lag value in both models.

4.7.2. Durbin-Watson Test

Table.9.Dubbin-Watson Scale

Status	Boundaries	Model I		Model II	
		Values	Durbin-Watson Statistic	Values	Durbin-Watson Statistic
	0	0		0	
Strong evidence of autocorrelation					
	dl	1.111		1.246	

Chances of positive autocorrelation				
	du	1.583	1.344	
No positive or negative auto correlation			1.790758	1.635441
	4- du	2.417	2.656	
Chances of negative auto correlation				
	4- dl	2.889	2.754	
Strong evidence of negative autocorrelation				
	4	4		

Source: Author's own elaboration

Error! Reference source not found. shows that Durbin-Watson statistic for the regression analysis for Model I and Model II is 1.791 and 1.635 respectively. As per the Durbin-Watson Scale in Table.9, the test statistic lies between du and 4- du. Hence, it can be concluded that the residuals of both modelsdo not have correlation with one-lag error term.

4.7.3. Breusch-Godfrey (BG) Test

Table .10. Breusch-Godfrey Serial Correlation LM Test

	Model I		Model II	
	Value	prob	Value	prob
F-statistic	0.465429	0.6317	0.846168	0.5262
Obs*R-squared	1.113997	0.5729	4.522059	0.4769

Source: Author's own elaboration

Table.12. shows Breusch-Godfrey Serial Correlation LM Test results. There is a strong evidence to retain the null hypothesis that there is no serial correlation of five period lag F(k - 1, n - k) <4, p> 0.10. It can be concluded that there is no statistically significant auto correlation although there is weak positive relationship between there error term and it value at one lag.

Hence, the regression analysis does not require remedial procedures for autocorrelation.

4.8. Heteroscedasticity

4.8.1. Graphical Analysis

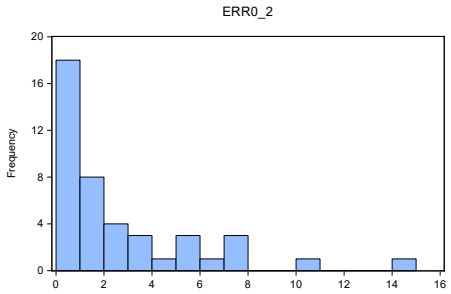

Figure.8. Histogram of squared error term

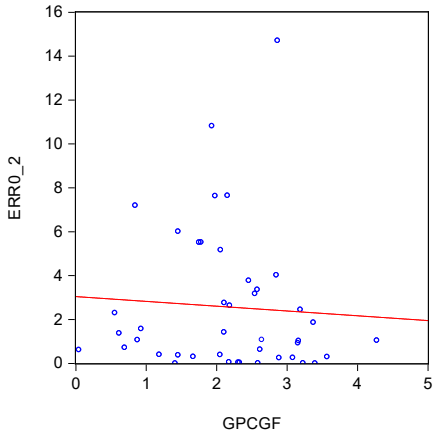

Figure.9. Squared residual VS fitted GPCG

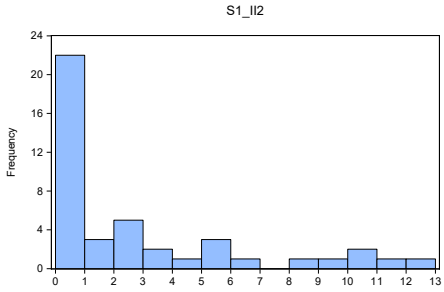

Figure.10. Histogram of squared error term

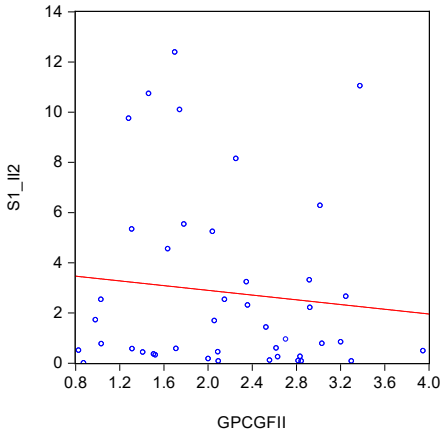

Figure.11. Squared residual VS fitted GPCG

Source: Author's own elaboration

Figure.8 and Figure.10 shows histogram of squared error term of the regression analysis of Model I and Model II. Some of the squared error term values are different. Figure.9 and Figure.11 also shows very weak symptoms of heteroscedasticity in both models. These can be a symptom of heteroscedasticity. Further, testing is required to confirm the results.

4.8.2. Breusch-Pagan (BP) Test

Table.11. BP Test

	Model I		**Model II**	
	Value	**prob**	**Value**	**prob**
F-statistic	1.665006	0.1674	0.455571	0.5035
Obs*R-squared	7.897984	0.1619	0.472543	0.4918
Scaled explained SS	4.488782	0.4814	0.326631	0.5676

Source: Author's own elaboration

The test results indicate that there is a strong evidence to retain the null hypothesis that the variance of the error term is homoscedastic for both model I and Model II.

4.8.3. White's chi square Test

Table.12. White's test

	Model I		**Model II**	
	Value	**prob**	**Value**	**prob**
F-statistic	1.291147	0.2792	0.398319	0.6741
Obs*R-squared	23.2187	0.2782	0.839664	0.6572
Scaled explained SS	13.19624	0.8688	0.580392	0.7481

Source: Author's own elaboration

The test results indicate that there is a strong evidence to reject the null hypothesis that the variance of the error term is homoscedastic for both Model I and Model II, $p > 0.10$. Hence, the regression analysis does not require remedial procedures for heteroscedasticity.

4.9. Granger Casualty Test

The tests so far indicate that only GPCG is I(0) series, whereas the other series – REM, GCF, FDI, HCON and TRA - are I(1). At level, all variables are cointegrated as the residual of their

regression is stationary. Hence, we can conclude that these variables have a relationship in the long run.

Table.13. Granger Causality at level

	Granger cause on GPCG		Granger cause of GPCG	
Variables	**F-statistic**	**Prob.**	**F-statistic**	**Prob.**
GCF	1.0425	0.3867	7.88386***	0.0004
TRA	3.11526**	0.0393	0.96786	0.4195
REM	4.04115**	0.0149	2.3938*	0.0861
FDI	1.74521	0.1769	0.77722	0.5151
HCON	1.12625	0.3526	1.17959	0.3324

*, ** and *** statistically significant at 10%, 5% and 1% level

Source: Author's own elaboration

Table.13 shows a VAR system at level representing long run relationship of GPCG with REM, FDI, GDF, TRA and HCON. Granger Causality test in this table show there is strong evidence to reject the null hypothesis that TRA and REM do not Granger cause GPCG. Moreover, there is very strong evidence to reject the null hypothesis that GPCG Granger cause GCF and weak evidence to reject the null hypothesis that GPCG Granger cause REM. Hence, we can conclude that there is bilateral granger causality between REM and GPCG in long run. Moreover, there is unidirectional granger causality from TRA to GPCG and GPCG to GCF in long run.

Table.14. Granger Causality at first difference

	Granger cause on d(GPCG)		Granger cause of d(GPCG)	
Variables	**F-statistic**	**Prob.**	**F-statistic**	**Prob.**
d(GCF)	0.7153	0.5501	9.33485***	0.0001
d(TRA)	0.81064	0.4974	0.70189	0.5579
d(REM)	6.58403***	0.0014	4.89651***	0.0065
d(FDI)	1.11307	0.3582	2.54116*	0.0738
d(HCON)	0.18927	0.9029	0.61458	0.6106

*, ** and *** statistically significant at 10%, 5% and 1% level

Source: Author's own elaboration

The first difference of all the variables is stationary which represents the short run relationship of GPCG with REM, FDI, GDF, TRA and HCON. Table.14 shows a VAR system in first differences of these variables. There is very strong evidence to reject the null hypothesis that REM does not Granger cause GPCG. At the same time, there is very strong evidence to reject the null hypothesis that GPCG does not Granger cause GCF and REM in short run. Moreover, there is a weak evidence to reject the null hypothesis that GPCG does not Granger cause FDI in short run. Hence, we can conclude that there is bilateral granger causality between REM and GPCG in short run. Moreover, there is unidirectional granger causality from GPCG to FDI and GCF in short run.

5. Discussion

As per the OLS results, Remittance has strong long-term impact on the economic growth. However, in short run, the impact of remittance on the economic growth is not statistically significant.

The Granger Causality Test (GCT) further reinforces long-term relationship results of OLS Method. Moreover, these results indicated that remittance and economic growth have bilateral impact on each other in both long run and short run. These results are in confirmation with (Siddique et al, 2016; Munir et al, 2016; Khan et al, 2019). Some of the

previous studies in context of Pakistan indicate that remittance has an positive impact on in long run (Iqbal & Sattar, 2005; Dilshad, 2013), while some studies only indicated that this positive impact is related to short run (Waheed& Aleem, 2008).

Regarding other variables included in the study, foreign direct investment, gross capital formation, trade and household consumption do not a statistically significant impact on economic growth in long run as per OLS results. However, the causality test revealed that trade causes economic growth and economic growth leads to gross capital formation.In short-run, OLS method results show that all the variables, like remittance, were statistically insignificant. In contrast, the granger causality reveals that economic growth causes foreign direct investment and gross capital formation.

6. Policy Recommendations and Conclusion

Government should ease the money transfer procedures and facilitate remittance funds transfer through official channels especially at the time where many NRP workers are returning with their end of services benefits in their personal baggage.

A higher proportion of household consumption with respect to GDP in an economy suggest that it belongs to lower income category. The granger causality shows that higher value of this statistic leads to higher proportion of remittance in later years. This might be an indication of a phenomenon that more workers send their earnings to Pakistan in tough times of economy.

Although migration of workers abroad creates brain drain, the remittance received from these works supports economic growth in both long run and short run; and has a positive impact on gross capital formation and trade. It is probably this increase in capital formation is short run that leads to increase in the production capacity of the country. Hence, it leads to increase in output per capita.Government should work on labour pacts with migrant receiving countries to ensure reduction return of these workers from these countries. Moreover, Government should ease the visa processes for the workers seeking jobs abroad. Although Bangladesh ranks first in terms of migrating workers around the world, proportion of Bangladeshi workers to UAE was at its lowest due to visa related issues (Analysis of Manpower Export, 2018). Moreover, a huge portion of our Pakistani migrant worker are residents of Gulf countries which have adopted localisation strategy for employment. Policy makers should look for employment opportunities for NRPs in countries in other regions.

Demand for skilled workers and remote freelancer is increasing dramatically. Freelancing gigs performed for businesses abroad can serve as ready substitute of migrant remittance. Government should provide support is this area by improving the laws, banking facilities and most importantly internet services.

The bilateral relationship between remittance and economic growth shows that the earnings sent by the NRP workers result in economic growth and at the same time this economic growth attracts more remittance earnings. Probably the confidence in the economy encourages the NRP workers to send their saving to Pakistan. Hence, government should work on building confidence of NRP workers in Pakistani investment opportunities. The relationship between remittance. The more these funds are utilised in investment opportunities, the more economic growth will result.

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