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(Research Article)

Analysis of WDI data to investigate the impact of foreign remittances on the economic growth of Pakistan

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Abstract

Remittances are one of the largest sources of financial inflow for developing countries and it imparts a considerable importance to economic growth. The purpose of our study is to analyse the impact of foreign workers' remittances on GDP and in succession on economic growth. We processed annual time series data over the period 1980-2019. ADF unit root test was used to check the stationarity of variables. To check the short run and long run relationship between foreign workers' remittances and GDP of Pakistan, ARDL (bounds) test was applied. As a result of our analysis, we found a significant positive relationship between remittances and economic growth of Pakistan. Our results provide thoughtful guidelines to policy makers who can use these insights to decide relevant and favourable policies and legislations.

Keywords: GDP: Remittances: Export: Gross Fixed Capital: World Bank Data

1. Introduction

The foreign remittances sent back to the native country by compatriots have a significant and positive impact on the economy of developing countries [1]**.** For external fundings, remittances are considered as the second most significant source after Foreign Direct Investment (FDI). it represents the second most significant source of external funding in the developing countries. Although, compared to FDI, it stands as a more stable source of foreign finance for developing economies [2]. With the help of remittances, it is quite easy to boost financial flow in any country's economic system [3]. Remittances speedily increase the economic growth and increase the saving and investment [4]**.**

The World Development Indicators (WDI) data, provided by the World Bank, offers good economic and financial information for countries around the world. WDI data for any country may include information on remittances, economic growth, and other relevant economic indicators. You may consider any analyse data for any time period, or examine short-term or long-term trends, or look at annual data or other time intervals. Specifically, people may obtain data on remittances as a percentage of GDP or as an absolute amount. This can help to assess the importance of remittances to the economy. WDI data can provide valuable insights into the relationship between remittances and economic growth, but it's important to approach the analysis with a clear research question, proper methodology, and an understanding of the limitations and nuances involved in studying economic relationships. Additionally, considering qualitative information and case studies can complement quantitative analysis when studying the impact of remittances on economic growth.

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In this study, economic growth of Pakistan is investigated in terms of foreign remittances by considering data obtained from WDI website i.e., a World Bank collection of development indicators. We applied linear regression to analyse and evaluate this relationship. We calculated the coefficient of determination (R_2) in the regression test that helped to determine the effects of remittances on economic growth. We determined F-statistics for the fitness of the regression model. The purpose of the F statistics is to know the significance of a modal. ADF units' root test is applied to figure out the stationarity. As the sample size is large, here unit roots test for all variables is significant except GDP, so we applied ARDL.

Section 2 of this paper presents literature review, and our methodology is discussed in section 3. Section 4 provides results of our analysis and finally section 5 concludes this paper.

2. Literature Review

This study investigates the effect of foreign remittances of Pakistan by using data from the period 1980 to 2019. Result obtained by applying Johansson cointegration test has confirmed the positive and meaningful relationship between these variables. In [5], authors investigated the effect of remittance inflow on Pakistan's economy and showed that remittances have significant and positive effects on the economic growth of Pakistan both in the short-run and the long-run. Their findings showed that GDP is affected by the migrant remittance, foreign direct investment, exchange rate, inflation, and gross domestic savings. Other researchers [6] investigated the effect of remittance to promote economic growth in Pakistan and concluded that GDP is affected by remittance inflows**,** FDI, money supply, fiscal deficit, inflation, population growth, and investment. The investigations showed the role of workers' remittances to promote economic growth. [7] examined the relationship between financial development, remittances, and economic growth in Ghana real GDP growth. Their findings support their hypothesis that there exists a strong relation between remittances and economic growth. In [8], authors worked to find the effect of remittances on economic growth and a discovered a significant positive long run relationship between remittances and economic growth of India, Bangladesh, Nepal, and Sri Lanka. In [9], authors estimated the effects of workers' remittances on economic growth, private investment, inflation, external debt, and change in terms of trade. The real GDP growth was found to be positively related to workers' remittances. In [10], authors examined those remittances are important sources of foreign income for developing countries that have increased dramatically in size over recent decades. In [11], authors claimed that remittance flow to developing countries indicate their potential to significantly put impact on economy. In studies [3], it is mentioned that worker remittances have increased the investment opportunities in the migrant home country. Remittances considered holding the strong influence on the growth of an economy [12]**.** In [13], authors argued that remittances have a positive effect on economic growth in developing countries.

In [14], authors discovered that the foreign remittance is main source of foreign exchange earnings for Pakistan since 1970. During the last 40 years, Pakistan received handsome number of remittances, however, ups and down were also seen in the inflow of remittances. Remittances affects economic growth positively with reducing current account deficit, improving the BOP position, and decreasing in the external borrowing. In [15], author mentioned that Pakistan like other developing countries in the world is known for its high migration and workers' remittance. It is argued that this high migration is the result of poor economic conditions of the country because the economy is facing so many problems like unemployment, illiteracy, poverty, inflation, and terrorism etc.

The people of Pakistan are migrating to foreign countries in search of job and to change their living standards. Remittances, economics, and currency exchange are interconnected topics that have significant implications for both sending and receiving countries. The relationship between economic growth and stock trading is also dynamic and influenced by many factors. Stock market performance can provide valuable insights into the state of the economy and can impact consumer behaviour and corporate financing [16-17]. Companies that invest in research and development to create new products and applications using technology can stimulate economic growth through innovation. For example, IT companies play a significant role in facilitating and enhancing the remittance process by developing and offering digital platforms, mobile applications, and fintech solutions that make it easier, faster, and more cost-effective for individuals to send and receive remittances, ultimately benefiting both senders and recipients. As an example, ANT+ technology plays a role in fostering innovation, industry development, and economic activity in sectors where it is applied [18].

WDI dataset provides a comprehensive and consistent set of data on various economic, social, and environmental indicators for countries around the world. It is essential for performing a wide range of analyses [19]. As discussed in the above literature, WDI data is remittances can play a crucial role in bolstering the economy of receiving countries by providing a stable source of income for households and contributing to poverty reduction, economic stability, and potential long-term development.

3. Methodology

We evaluate the relationship between Gross Domestic Product and Foreign Remittances in Pakistan. We considered GDP as a dependent variable and foreign remittances, CPI, Gross Fixed Capital, and export as independent variables. In [3,7-8], authors also used these variables in their analysis. The functional form of this modal with natural logarithm is as follows:

$Y=f(E, CPI, k, R)$

$Yt=a_0 + a_1Et + a_2CPIt + a_3Kt + a_4Rt + \mathcal{E}t$

Where, Yt represents Gross Domestic Product, E is export, CPI presents inflation rate, K is Gross Fixed Capital and R represents the foreign remittances. The term t is for time period, i.e., 1980 to 2019. a_0 is intercept, a_1 is the elasticity of export, a_2 is the elasticity of inflation rate, a_3 is the slope of Gross Fixed Capital, a_4 is foreign remittances elasticity, and $\mathcal{E}$ represents error term.

To find the relationship between GDP and foreign remittances, we have taken annual data from WDI and applied unit root test to check the stationary of the variables. For this purpose, we applied ADF test. OLS technique is applied when all variables at level but if some variables are at level and some variables are at first difference then ARDL bounds test cointegration test is most suitable and can be applied but if all the variables stationary at first difference, then Johansen cointegration technique can be suitable. We also applied langrage multiplier test for serial correlation heteroscedasticity, and Ramsey reset in our model

4. Results

The variables involved in this study are GDP (constant 2010 US$) that means all the final goods and services produced in the country with the help of resources in one year. Exports (Constant 2010 US$) that are goods which are sent to the foreign countries. Gross Capital Formation (k) that is net accumulation of capital goods. CPI is increase in the price of goods also called inflation. Foreign Remittances (REMIT) mean all amount which is sent to the country by countrymen.

4.1. Sources of Data

This study is based on secondary data which was taken from World Development Indicators (WDI).

Table 1 Descriptive Statistics Results

Parameters	#Observation	Mean	Median	Max	Min	Std.value
LGDP	40	25.46097	25.46247	26.27129	24.48758	0.510453
LEXPORT	40	23.21786	23.18223	24.03901	21.94861	0.622386
LREM	40	22.06953	21.67278	23.82538	20.71925	0.986665
LCPI	40	1.980033	2.049992	3.009937	0.927954	0.502378
LK	40	23.75945	23.74378	24.46745	22.93552	0.380725

Table 2 Correlation among Variables

Variables	LGDP	LEXPORT	LREM	LCPI	LK
LGDP	1				
LEXPORT	0.970797	1.000000			
LREM	0.766853	0.687953	1.000000		
LCPI	-0.074911	0.021687	-0.060454	1.000000	
LK	0.980974	0.955222	0.726601	-0.037248	1.000000

Table 1. narrates the results of descriptive stats of 40 observations of each variable. All the values of table help to understand the nature of the data, their ranges, and relevance.

Table 2. contains correlation among variables. The results show that the correlation of all the independent variable is stronger with the dependent variable except CPI.

5. Empirical Result and Discussion

Table 3 Result of Units root Test (ADF Test)

Indicators	**I(0)**		**I(1)**		**Status**
	T-stat	Prob.	T stat	Prob.	
LGDP	-3.014756	0.0422			I(0)
Lcpi	-2.688306	0.0851	-6.114672	0.0000	I(1)
Lk	-1.712296	0.4165	-3.913439	0.0049	I(1)
Lexport	-1.772189	0.3883	-6.333952	0.0000	I(1)
lrem	0.474984	0.9836	-4.855740	0.0003	I(1)

In table 3. There are results of ADF units roots test result. It shows that all variables are stationary at first difference but GDP stationary at level, so we use ARDL bound test which is most suitable in this case

Table 4 Results of ARDL Bounds F-Test co-integration

ARDL model 1	**Lag length**	**f-stats**	**Critical Value 1%**		**Critical 5 %**	
			I(0)	I (1)	I(0)	I (1)
GDP, Export, CPI, K, Rem	(3,1,4,2,2)	18.62	3.29	4.37	2.5	3.49

ARDL bounds F-test cointegration approach result are shown in table 4. Lag length of variables are shown in first column. These are 3, 1, 4, 2, 2 for GDP, export, CPI, GCF and remittances, respectively. F-stat value (18.62) is greater than the critical values at 1% and 5%. This value shows the cointegration relationship between GDP, export, inflation, gross fixed capital, and foreign remittances.

Table 5 Result of short and long Run ARDL cointegration

variables	**Short run elasticities**		**Long run elasticities**	
	Coefficient	P value	Coefficient	P value
GDP(-3)	0.440521	0.0111**		
EXPORT	0.017474	0.3918	0.499619	0.0017
EXPORT(-1)	0.035998	0.0623	----	---
CPI	-0.006640	0.2418	-0.346818	0.0035
CPI(-4)	-0.008487	0.2026	-----	------
K	0.176875	0.0005	-0.006000	0.9852
K(-2)	-0.058604	0.2002	-----	------
Rem	-0.006429	0.5091	0.163377	0.0025
Rem(-2)	0.045527	0.0001	-----	------

constant	1.274294	0.0000	11.90636	0.0274
RSS	0.001138			
R^2	0.9996			
X^2_{LM}	2.187098	0.0544		
X^2_{HET}	1.746081	0.1620		
X^2_{REST}	1.318813	0.2588		
Jarque-Bera	0.253196	0.876693		

After confirmation of cointegration by bounds F-stat test, there is found a short and long run cointegration. Results in table 5. conclude that export has positive and significant impact on growth and inflation rate has negative result on GDP, so, its impact is insignificant. Gross Fixed Capital has positive effect on GDP and puts a significant impact on GDP. While, the foreign remittances also hold positive and significant impact on GDP

The long run result shows that export, capital, and foreign remittances are those factors which increase the GDP, but inflation has insignificant impact on GDP. The coefficient of export is 0.01 which mean that 1 percent increase in export cause a 0.01% increase in GDP. The coefficient of capital is 0.17 which mean that 1 percent increase in capital causes a 0.17% increase in GDP. The coefficient of foreign remittances is 0.04, which mean that 1 percent increase in foreign remittances causes a 0.04% increase in GDP.

The value of R-square is 0.99 its mean that this modal confirms (99%) that dependent variables is affected by these independent variables. The residual sum of square is 0.001 that shows the fitness of the model. The p-value of LM is greater than 0.05 that means there is no serial correlation, the p-value of heteroscedasticity test is also greater than 0.05, which means there is no heteroscedasticity.

6. Conclusion

Our study shows the impact of remittances on GDP growth of Pakistan from 1980 to 2019. ARDL test have been applied to determine the long run and short run effects of foreign remittances on Gross growth. The results show that the impact of remittances on GDP is positive and significant for Pakistan. In this study, all the variables (exports, foreign remittances, Gross Fixed Capital) are having positive impacts on GDP growth. Coefficients of these variables are statistically significant.

Recommendations

The flow of the remittances through the banking channels should be used for productive purpose. The government should prepare policies that increase remittances by reducing the transaction cost and transfer remittances through proper channel. Remittances can be fruitful for the country if they are used for the purpose of business and not for luxuries. Increase in the quantity of human capital can get through the better education, and improved health facilities. They increase the productivity and efficiency of the economy. This study only focusses on relationship between workers' remittance and economic growth and our future plan is to investigate the relationship of workers' remittances with other macroeconomic indicators like poverty reduction, reduction in inequalities and entrepreneurship in Pakistan.

Compliance with ethical standards

Disclosure of conflict of interest

The authors declare no conflict of interest.

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