

THE IMPACTS OF REMITTANCES ON ECONOMIC GROWTH OF PAKISTAN THROUGH TRANSMISSION CHANNEL OF INVESTMENT

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Received: 15 March, 2024

Revised: 15 April, 2024

Accepted: 30 April, 2024

Published: 10 May, 2024

ABSTRACT

The main purpose of this study was to assess the impacts of remittances through transmission channel of investment on economic growth of the Pakistan. For this purpose, the time series data obtained from World development indicator was analyzed through ARDL bound test. The findings demonstrate that remittances have positive and significant impacts on economic growth of Pakistan especially through transmission channel of investment. Based on the findings, it is recommended that government of Pakistan should take concrete and effective measures to ensure the transmission of remittances through formal channel and use the received funds in high returned investment projects to stimulate economic growth in Pakistan. This study is an original work developed from PhD thesis and is first ever study to be conducted in case of Pakistan by considering an investment as a transmission channel through which remittances can affect economic growth.

JEL Classification B 22, B 27F 24, F 29, F 43.

Keywords: Remittances, Investment, economic growth, ARDL, Pakistan.

INTRODUCTION

Remittances from expatriates abroad, now surpassing foreign direct investment and nearing export earnings, are acknowledged as a crucial financial resource for economic growth in low and middle-income countries, such as Pakistan (S. Ahmad & Khan, 2021, Dilshad, 2013, Ellahi & Omer, 2020, Hassan & Holmes, 2016, Javid et al., 2012, KNOMAD, 2022). Remittances have provided significant benefits by bolstering foreign reserves, counteracting trade deficit impacts, stabilizing consumption and investment, reducing poverty, fostering human and physical capital development, diminishing dependence on foreign loans and ultimately promoting economic growth and development in receiving countries (Acosta et al., 2009, Ali & Ismail, 2024, IOM, 2022, Iqbal & Sattar, 2010, Mol, 2023, Rashid & Samad, 2022, Sutradhar, 2020).

Apart from their potential benefits, remittances may pose certain challenges for recipient countries. These challenges include the emigration of skilled workers (brain drain), inflationary pressures, the risk of Dutch disease due to exchange rate appreciation, potential moral hazards within emigrant's families and a shift towards less productive non- tradable sectors. These

challenges could result in higher foreign debt, decreased foreign reserves and increased volatility in GDP growth rates (Chami et al., 2005, Mijiyawa & Oloufade, 2022).

When managed effectively, remittances have the potential to increase domestic savings, ease foreign exchange constraints, tackle Balance of Payment issues, and allocate funds towards development-oriented budgets. Redirecting these resources through formal channels such as banks and registered money transfer companies is essential to maximize their potential impacts and discourage the use of illegal informal methods like "hawala and hundi" as around half of remittances are still remitted through these unofficial channels (Ozaki, 2012).

Studies on the economic impacts of remittances have produced diverse results. While remittances are found to aid in poverty alleviation and sometimes assist household investments and savings, their overall influence remains ambiguous. In specific instances, international remittances have contributed to macroeconomic growth by increasing national disposable income (Catrinescu et al., 2009) & (Fayissa & Nsiah, 2010). Although remittances are generally

viewed positively affecting the economies, some studies indicate they may have adverse effects on long-term national economic growth. Remittances have been associated with inflation and can disadvantage tradable sectors through Dutch disease effects¹. Moreover, depending heavily on remittances might decrease incentives for implementing sound macroeconomic policies and structural reforms, which could potentially hinder efforts to promote growth and reduce poverty (Chami et al., 2005).

Remittances can influence economic growth through different channels, including the quality of institutions, effective macroeconomic policies, human capital development, financial development, financial openness and levels of savings and investment (Barajas et al., 2009, Catrinescu et al., 2009). However, Catrinescu et al. (2009) consider that institutional quality and transparency are very vital for the impacts of remittances on economic growth to be significant and positive.

Nevertheless, the remittances inflows have exponentially increased in some countries like India, Mexico, China, Philippines, Pakistan, Egypt, Bangladesh, Vietnam, Guatemala and Ukraine but the economic growth in some countries have increased while it has been volatile in other countries such as Philippines, Pakistan and Egypt. Thus, the researchers are vexatious and anxious to ascertain the causes behind these heterogeneous impacts of remittances on economic growth of various countries.

Ratha & Mohapatra (2007) are of the view that the worker's remittance are pro poor as recipient household's income is proportionally increased due to remittances. The received finance has substantial impacts on poverty reduction and welfare enhancing of the families of workers in home country through macroeconomic multiplier effects. These flows are free from the governance issues as they are faced in official development assistance, external debt and foreign direct investment inflows. The reduction in poverty thanks to remittances inflows in Uganda is by 11 point percent, in Bangladesh by 6 point percent and in Ghana by 5 point percent. Research shows that drop out ratio from school for the children of remittance recipient households is lower in Sri Lanka and El Salvador. Besides, the birth weight and other health indicators of the children of remittance recipient families are relatively better in Sri Lanka, Nicaragua, Mexico and Guatemala. However, Barajas et al. (2009) are of the view that remittances have no any significant and direct impacts on economic growth.

Pakistan that is 5th most populous and only atomic power in Muslim World has been declared as 5th largest remittance recipient country in the World. Recently, remittances have shown exponential growth by almost 20% since 2019 as shown in Figure 1. But Pakistan's GDP growth rate has not been stabilized despite huge inflows in the form of remittances and foreign aid as shown in Figure 2. The average GDP growth rate has remained five percent but it has been oscillating and fluctuating too much; which is a matter of great concern for researchers and policy makers. Thus, it warrants concrete empirical research to find the reasons behind dwindling GDP growth rate of Pakistan. Since, the findings of previous studies conducted in different contexts have given mixed results and the impacts of remittances on economic growth through capital formation and other channels have not yet been explored empirically. So, the main objective of this study is to ascertain the impacts of remittances on economic growth through transmission channel of Investment ; proxy by gross capital formation. Thus, this study becomes very significant in such a way that it is the first ever study that has been conducted in the context of Pakistan to investigate the impacts of remittances on economic growth directly as well as through transmission channel of investment: proxy by gross capital formation. Moreover, the unit root properties of data are checked through more appropriate test of KPSS and data is analyzed through ARDL bound test developed by (Pesaran et al., 2001). The findings show that remittances have more positive, strong and significant impact on economic growth of Pakistan if they are utilized for capital formation.

Rest of the study is followed by section 2 that consists on literature review containing empirical review, section 3 encompasses the methodology, data sources and econometric models along with their relevant diagnostic and robustness checks. While the results and policy recommendations and conclusion are presented in section 4 and section 5 respectively.

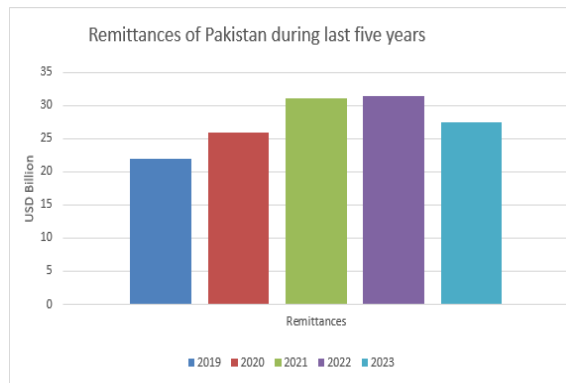


FIGURE 1
 Remittances of Pakistan during last five years

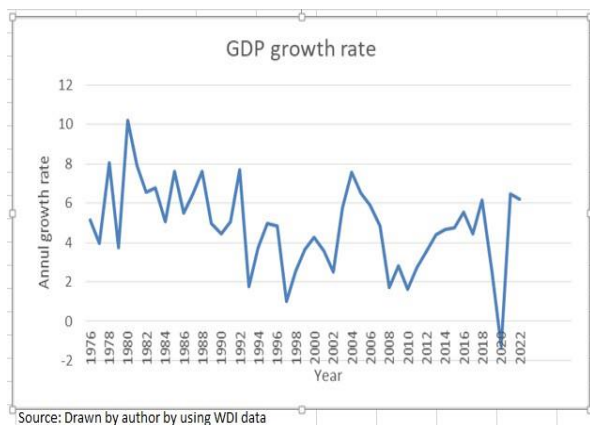


Figure 2:
 GDP growth rate of Pakistan from 1976-2022

Literature Review

Empirical Review

Since our study is conducted in the country specific context of fifth top remittances recipient country Pakistan by using time series data, so we have included only those studies which have been carried out by using time series data and econometric techniques in various countries. The literature illustrates the significant role that workers' remittances play in fostering economic growth and development in developing and emerging countries by providing crucial support to their external accounts. Hassan & Holmes (2016) revealed that workers' remittances not only help in balancing the current account in nations with persistent imbalances but also stimulate private sector national savings, which can potentially be channeled into investments of productive and socially beneficial projects. This infusion of funds can ultimately lead to the economic growth and

development of these countries. Their findings contradicted with existing literature showing concerns about the "Dutch Disease" phenomenon associated with substantial inflows of remittances. Furthermore, they argued that the availability of substantial workers' remittances increases the likelihood of high co-integration between a country's exports and imports.

However, Shaikh et al. (2016) found that there is no any significant impact of personal remittances on economic growth of Pakistan. Whereas, foreign direct investment and gross capital formation and foreign aid substantially contribute in economic growth of Pakistan. They applied Johnson co-integration and VECM to analyze the data ranging from 1980 to 2014 since all the series were stationary at first difference.

Similarly, Barajas et al. (2009) are of the view that remittances don't have any impact on economic growth. They argued that remittances positive and negative effects off set each other and eventually have no any significant impact on economic growth of any group of countries.

Additionally, S. Ahmad & Khan (2021) concluded that foreign direct investment and foreign remittances significantly and positively contribute to Pakistan's economic growth in the long run. Their analysis, conducted using the ARDL model with time series data spanning from 1990 to 2018, revealed that all series were stationary at first difference, indicating they are integrated of order one I(1). The model demonstrated no issues related to auto-correlation or heteroscedasticity and various tests confirmed that the error terms were normally distributed.

Furthermore, Ellahi & Omer (2020) argued that remittances represent a form of interest-free foreign exchange finance that plays a pivotal role in the economic growth of both Muslim and non-Muslim nations. Their research using generalized method of moments (GMM) analysis on time series data from 1976 to 2017, aimed to mitigate issues related to endogeneity and simultaneity bias. They discovered that remittances positively contribute to Pakistan's economic growth by boosting both consumption and investment within the country. Additionally, foreign direct investment and fiscal deficits exerted positive and significant impacts on economic growth, while population growth rates negatively affect the economic growth. Inflation also had a negative impact, although statistically insignificant.

Moreover, N. Ahmad et al. (2013) conducted their study focusing on Pakistan, employing an OLS multiple regression model with time series data spanning from 1978 to 2011. Their findings indicated that remittances and foreign direct investment had positive impacts on economic growth, while inflation and exchange rates had significantly negative effects. Similarly, Javid et al. (2012) established a positive and significant relationship between remittances, economic growth, and poverty reduction in Pakistan. They utilized the ARDL model and analyzed time series data from 1973 to 2010. Their research also revealed that human development index and investment positively and significantly influenced economic growth and poverty reduction, although the impact of trade openness was negative. Besides, Dilshad (2013) also conducted research in Pakistan to explore the effects of remittances and other variables on economic growth. They employed an OLS regression model with time series data ranging from 1991 to 2012. Their findings highlighted a strong positive impact of remittances and employed labor force on economic growth. However, the impact of gross capital formation on economic growth was found to be negative and significant. They recommended that the government should formulate policies to encourage emigrants to send money through formal channels.

In contrast, Khurshid et al. (2023) applied a Markov regime switching model to quarterly data from 2000 to 2020. Their research revealed that personal remittances, FDI and external debt had positive and significant effects on Pakistan's economic growth. Additionally, economic growth was more pronounced during periods of dictatorship and election periods. The authors conducted various tests to ensure the robustness, validity, reliability, unit root, and linearity of their model before and after estimation.

It is worth noting that remittances can exacerbate inequality and potentially increase poverty in society. Shahbaz et al. (2014) examined the impacts of remittances and income inequality on Pakistan's economic growth, using the ARDL model and time series data from 1976 to 2006. They found that remittances had positive linkages with economic growth but also contributed to income inequality in Pakistan. Therefore, policymakers were urged to explore innovative income redistribution methods, as traditional approaches were not yielding desired results.

Similarly, Hassan & Shakur (2017), Karagöz (2009), Tolcha & Rao (2016) also found negative impacts of remittances on economic growth in long run in various context by employing various time periods data and various methodologies.

Besides, Roy (2023) has recently found the negative impacts of external debt and remittances while positive impacts of oil price on economic growth of India by applying various econometric techniques such as ADF, PP and KPSS for unit root and ARDL, DARDL for long run and short run and Toda-Yamamoto causality for causation on time series data ranging from 1990 to 2020. They also applied the reliability, validity and robustness tests after estimation and established that the data and error term are free from abnormality, auto and serial correlation, heteroscedasticity and model misspecification. The remittances if used in investment become pro-cyclical like other investment expenditure especially in poor developing countries. The remittances in India and Bangladesh are more counter cyclical while they are pro-cyclical in Jordan and Morocco (Sayan, 2006). The remittances in Turkey and Philippines were more volatile and pro-cyclical during 1990s than in 1980s (Ratha & Mohapatra, 2007). The worker's remittances have been more stable in Sub Sahara Africa as compare to official development aid and foreign direct investment Gupta et al. (2007). In same way, Singh (2014) conducted the research in Nepal. He found that 79 percent of remittances in Nepal is spent on the consumption of goods and services including imported products, 3 percent is allocated to capital formation and rest is used to finance external debt and spent on education. He also noted that there is strong correlation between remittances and trade deficit which is evident of existence of Dutch disease in case of Nepal; as in 2013, the remittances to Nepal were RS. 360 billion and trade deficit was increased to RS. 390 billion.

However, Kireyev (2006) carried out the working paper at IMF for Tajikistan where he established the positive and beneficial effects of remittances inflows that worker's remittances can have on economy. He was of the view that remittances would have helped to mitigate the effects of huge trade deficit on exchange rate in the form of depreciation. Moreover, the cheap labor and other inputs in Tajikistan as compare to her trading partners might have meaningfully offset the adverse effects of remittance inflows on competitiveness in international market through real

exchange rate appreciation. Literature also highlights that presence of huge workers remittances is not only helpful in the stimulation of domestic consumption and investment but also in financing reverse flows in the form of external debt services, capital flight and buildup of foreign exchange reserves. Das et al. (2021) conducted the research in Jamaica, a huge recipient of remittances in the Caribbean region by estimating net export equation through auto regressive distributive lag model and incorporating time series data from 1976 to 2017. They found that USD 0.24 of each dollar of remittances is allocated to finance the reverse flow while remaining USD 0.76 of every dollar of remittances is fascinated in domestic consumption and investment.

Moreover, Lartey (2017) carried out the research about effects of remittances on current account dynamics under various monetary policy and exchange rate regime. He noted that current account dynamics created by remittances depend on the nature of remittance and choice of the policy regime. Altruistic remittance culminate current account surplus if Tyler type² rule is followed in monetary policy. While, current account deficit would happen if fixed exchange rate system is adopted.

However, the self-interest remittance enhance capital accumulation and production of tradable sectors if Tyler type of monetary policy is applied which endeavors to manage exchange rate volatility. This policy results in decrease of inflation of non-tradable products, depreciation of real exchange rate and current account surplus. While in case of applying standard Tyler rule that targets inflation of non-tradable products, current account deficit is observed as hike in the consumption of non-tradable products that could culminate growth of that sector and fall of tradable product's sector. The current account dynamics are changed when the objective of the monetary policy is to decrease the consumption of non- tradable products, stabilize inflation of non-tradable and achieve current account surplus through real depreciation. However there is an alternative point of view that it may hinder the economic activities by discouraging the labor force participation rate and decreasing the exportable competitiveness of the country in international market through appreciation of real exchange rate due to so called "Dutch Disease" in literature (Chami et al., 2005).

These discussed studies show that the impacts of remittances on economic growth are mixed. Moreover, these studies have ascertained the direct impacts of

remittances on economic growth. However, the remittances effects on economic growth depend on various conditions such as their usage and utilization, financial development and financial deepening, institutional quality and appropriateness of monetary and fiscal policy. But, these aspects have been ignored especially the utilization of remittances in high return investment projects. Thus, this study intends to fill this gap by including investment; proxy by gross capital formation as a transmission channel through which remittances may affect the economic growth of Pakistan. The results demonstrate that impacts of remittances on economic growth become more strong and significant if investment variable is included in the model.

Research Methodology

Data type and Source

The annual time series data from 1976 to 2022 for relevant variables in the model is obtained from World Development Indicators data base of the World Bank.

Tentative Models

For investigating the effects of workers' remittances and other (control) variables on GDP; the following Equation 1 and Equation 2, are estimated, first by including the investment variable in the analysis and then excluding investment as a mediating variable by following S. Ahmad & Khan, (2021), Islam, (2022) and Ellahi & Omer, (2020) who established the effects of remittances on economic growth. Other variables such as gross capital formation, imports external debt servicing and foreign reserves are included by following Dilshad, (2013), Shaikh et al., (2016), Topxhiu & Krasniqi, (2017) and Sutradhar, (2020).

$$GDPG_t = \alpha + \beta_1 WR_t + \beta_2 EDS_t + \beta_3 IMP_t + \beta_4 RES_t + u_t$$

Eq(1)

$$GDPG_t = \alpha + \beta_1 WR_t + \beta_2 GCF_t + \beta_3 EDS_t + \beta_4 IMP_t + \beta_5 RES_t + v_t$$

Eq------(2)

In Equation 1 and Equation 2, gross capital formation (GCF) and foreign reserves (RES) are expected to have positive coefficients while imports (IMP) and external debt servicing (TDS) are expected to have negative one. However, workers remittances (WR) are expected to have ambiguous linkages with GDP growth rate. Remittances will affects the GDP growth rate positively if remittances are spent on high return

oriented investment projects (No Dutch disease effects), while they may affect the GDP growth rate negatively if spent on luxurious, non tradable and show off products such as real estate, jewellery and luxurious cars (Dutch disease effect etc).

Methods

Equation 1 and Equation 2, are estimated by applying Auto Regressive Distributive Lag Model (ARDL) bound test developed by Pesaran et al. (2001) in order to ascertain long run co integration. If there exists a long run relationship between the variables, ECT and short run coefficients will also be generated in the model to find the speed of adjustment (convergence) once the economy is deviated from equilibrium position due to any shock. If ECT term is negative and statistically significant, the model is said to be stable and convergence will be materialized; otherwise divergence would be observed.

The main reason to use the ARDL model is because some of the variables are stationary at level while others are stationary at first difference. However, there is no any series that becomes stationary at second difference. Moreover, it is necessary to determine the lag length of the variable included in the model on the basis of various information criterion: such Akaiki information criterion (AIC), Shwarzin Information

criterion (SIC) etc. For this purpose, the study will use Aikaiki information criterion (AIC) as it is believed to be more accurate, precise and authentic. Besides, the results of ARDL model are still unbiased and t-statistics are valid even though some of the variables have endogeneity problem (Harris & Sollis, (2003) and (Kumar, 2010). Since, it is found through KPSS unit root test that the variables included in analysis have mixed order of integration so the choice of using ARDL model is more appropriate and authentic.

Unit root test

However, before applying the ARDL bound test it is necessary to check the unit root of the series trough KPSS test to ensure that none of the variable is Integrated of order two because we cannot use the ARDL model if any of the series is I(2). It can be applied if the series are stationary at level I(0), stationary at first difference I(1) or mix of the two I(0) or I(1) but none of the series should be integrated of order two means stationary at second difference I(2).

ARDL specification

The ARDL model specification for long run and short run ECT term of Equation 1 is as Equation 3.3.

$$\begin{aligned} \Delta GDP = & \beta_0 + \sum_{i=1}^q \beta_{1i} \Delta GDP_{t-i} + \sum_{i=1}^p \beta_{2i} \Delta WR_{t-i} + \sum_{i=1}^p \beta_{3i} \Delta IMP_{t-i} \\ & + \sum_{i=1}^p \beta_{4i} \Delta TDS_{t-i} + \sum_{i=1}^p \beta_{5i} \Delta GCF_{t-i} + \sum_{i=1}^p \beta_{6i} \Delta RES_{t-i} + \gamma_0 GDP_{t-1} + \gamma_1 WR_{t-1} + \gamma_2 IMP_{t-1} \\ & + \gamma_3 TDS_{t-1} + \gamma_4 GCF_{t-1} + \gamma_5 RES_{t-1} + \mu_t \quad \text{--- eq(3.3)} \end{aligned}$$

ARDL model specification for short run along with ECT term for Equation 2 is as Equation 3.4.

$$\begin{aligned} \Delta GDPG_t = & \beta_0 + \sum_{i=1}^q \beta_{1i} \Delta GDPG_{t-i} + \sum_{i=1}^p \beta_{2i} \Delta WR_{t-i} + \sum_{i=1}^p \beta_{3i} \Delta IMP_{t-i} \\ & + \sum_{i=1}^p \beta_{4i} \Delta TDS_{t-i} + \sum_{i=1}^p \beta_{5i} \Delta RES_{t-i} + \sum_{i=1}^p \beta_{6i} \Delta GCF_{t-i} + \pi_0 ECT_{t-1} + v_t \quad \text{--- eq(3.4)} \end{aligned}$$

Hypothesis

Null Hypothesis: There is no long run and short run co-integration among the variables.

Alternative Hypothesis: There is long run and short run co-integration among the Variables.

Decision rule

First of all, in order to check the long run relationship F statistic will be computed and applied in comparing it with critical lower and upper bound values developed by Pesaran et.al (2001). If calculated F-statistic is greater than upper bound value, the null hypothesis of no long run relationship will be rejected: meaning that there is long run relationship between the variables. Where as, if the F-statistics is less than lower bound value, the null hypothesis of no long run relationship can not be rejected. However, if the F statistics lies between the upper and lower bound values, the result will be inconclusive. Once the long run relationship is determined on the basis of F test, then the short run coefficients of variables and ECT, term are generated to check the short run relationship between the variable and speed of convergence (divergence) to the equilibrium; once the economy deviates from its equilibrium position due to any shock in the system. If the coefficient of ECT is negative and significant, the model is said to be stable and converging to its equilibrium position, otherwise, it will be unstable and divergent.

4. Results Discussion

4.1 Unit root test with KPSS test

The outcomes of the KPSS unit root test are presented in Table 1. As per the test results, the GDP growth rate, gross capital formation, external debt servicing and foreign reserves exhibit stationary at first differences, indicating they are integrated of order one I(1). On the other hand, remittances and imports are stationary at the level, suggesting they are integrated of order zero I(0). Given the mixed order of integration among the variables, it is appropriate to employ the ARDL bound test to explore both long-run co-integration and short-run relationships among these variables.

**Table 1:
 KPSS Unit Root Test**

Variable	level	1st difference	conclusion
GDPG	0.4488* significant	d(GDPG) insignificant	I(1)

REM	0.1871 insignificant		I(0)
GCF	0.5876** significant	0.0828 insignificant	I(1)
TDSG	0.3858* significant	0.1318 insignificant	I(1)
IMP	0.2416 insignificant		I(0)
RESED	0.3493* significant	0.1965 insignificant	I(1)

*, ** & *** show the significance level at 10%, 5% and 5% respective

4.2 ARDL bound test, long run, short run coefficients and ECT term

Table 2 presents the ARDL results regarding the impact of remittances on Pakistan’s economic growth. Our main objective was to assess the influence of remittances on economic growth, considering investment as a moderating or mediating variable.

To achieve this, we initially conducted the regression without including the investment variable (GCF) and then repeated the analysis by incorporating it into the model. The introduction of the investment variable resulted in an increase in the coefficient value of remittances and its significance level. This suggests that investment serves as the mediating/moderating (transmission channel) variable through which remittances may affect economic growth.

According to the findings, both remittances and investment make positive and significant contributions to Pakistan’s economic growth in the long run, aligning with theoretical expectations. These results are consistent with the studies by Hassan & Holmes (2016), S. Ahmad & Khan (2021), Islam (2022) and Ellahi & Omer (2020). The results indicate that Pakistan does not suffer from negative effects of remittances in the form of so-called Dutch disease. Specifically, a one-point percentage increase in the workers’ remittances to GDP ratio leads to a 0.575 point percentage increase in the GDP growth rate, keeping other factors constant. Similarly, a one-point percentage increase in the gross capital formation to GDP ratio results in a 0.459 point

percentage increase in the GDP growth rate in the long run.

Moreover, the GDP growth rate is also positively and significantly affected by the gross capital formation to GDP ratio in the short run. If the gross capital formation to GDP ratio increases by one point percentage, the GDP growth rate will also rise by 1.11 point percentage, keeping other factors constant. These results are in line with theoretical expectations but contradict with the findings of Dilshad (2013) and Ellahi & Omer (2020), who reported negative impacts of gross capital formation on Pakistan's economic growth.

The F-statistics of both regressions surpass the upper bound levels at the 1% significance level, indicating long-run co-integration between economic growth and remittances, as well as other control variables. Remittances and gross capital formation have positive and significant impacts on economic growth in both regressions, while foreign reserves and external debt servicing have insignificant effects, possibly due to the relatively lower magnitude of foreign reserves in Pakistan. However, the impacts of imports are negative and insignificant in the long run.

The negative and highly significant error correction term in both regressions suggests stability and convergence in the system during the long run period after deviations from the equilibrium level. The Durbin Watson test value in both regressions is hovering around two which means that there is no any problem of auto correlation in the model.

In the short run, the inclusion of the investment variable also renders the impacts of external debt

servicing and GDP growth rate significant. The previous value of external debt servicing negatively and significantly affects the GDP growth rate in the short run, aligning with theoretical expectations.

As the government begins to secure funds for external debt servicing to foreign lenders, it tends to reduce investment in development expenditures, resulting in lower economic activities, output, employment, and hence a lower GDP growth rate. The significant coefficient of the own value of the contemporaneous term implies that the GDP growth rate is positively influenced by its own previous value, indicating that higher production in previous years enables more investment in the current period, leading to higher GDP growth rates.

The negative and highly significant coefficient of the ECT indicates that 75% of the restoration of equilibrium after deviation occurs within a six-month time period, demonstrating stability and convergence in the system.

The inclusion of the investment variable (GCF) in the model also leads to an increase in the values of R square and adjusted R square, indicating that approximately 67.4% of the dependent variable GDP growth rate is explained by independent variables. This signifies a good fit of the model.

Table 2:
ARDL long run, short run and ECT coefficients

*, ** and *** indicate significance level at 1%, 5% and 10% respectively.

Post estimation diagnostic, validity and reliability

distribution. Similarly, the probability value of the F-

Long-Run Results Variable	Coefficient	Probability	ECT and SR results Variable	coefficient	probability
REM	0.575764*	0	D(GDPG(-1))	0.276954***	0.0966
RESED	0.021297	0.4036	D(REM)	0.286602	0.3974
IMP	-0.174668	0.1458	D(IMP)	-0.02075	0.8852
GCF	0.459032*	0.0382	D(TDSG)	-0.377144	0.2686
TDSG	0.353599	0.1308	D(TDSG(-1))	-0.738998*	0.0242
			D(GCF)	1.110553*	0.002
F-statistic	5.807501		D(GCF(-1))	0.769672*	0.0195
k	5		ECT	-1.523028*	0
R-squared	0.674745		DW	2.083882	
Adjusted R-squared	0.61321				
Excluding GCF					
REM	0.479878*	0.0076	D(REM)	-0.302618	0.2874
RESED	0.027342	0.5788	D(IMP)	0.097278	0.5096
IMP	-0.196252	0.2481	ECT	-0.858563*	0
TDSG	0.391853	0.1116	DW	2.22964	
F-statistics	6.001046				
K	4				
R-square	0.490923				
Adj. R square	0.467245				

tests

Table 3: presents the outcomes of various post-estimation diagnostics and validity tests for both models: one without the inclusion of the investment variable (GCF) and the other with the inclusion of the investment variable (GCF). The introduction of the investment variable leads to higher probabilities for the Jarque-Bera statistic for normal distribution, the F-statistic of BG LM serial correlation test, and the BPG heteroscedasticity test.

The probability value of the JB normality test is substantially higher than the 5% level of significance, preventing us from rejecting the null hypothesis that error terms follow a normal

statistic of BG LM serial correlation is also significantly higher than the 5% level of significance. Consequently, we cannot reject the null hypothesis that there is no serial correlation among the error terms. Likewise, the probability value of the F-statistic of BPG heteroscedasticity is considerably higher than the 5% level of significance, indicating that the residuals of the model do not suffer from heteroscedasticity problem. Additionally, the probability value of the F-statistic for the Ramsey model specification test exceeds the 5% level of significance. Consequently, we cannot reject the null hypothesis that the model is correctly specified.

Table 3:
 Post estimation Diagnostic and Validity Test
 Excluding the Investment

Test	JB statistic	Probability	F-Statistic	Probability
Normality JB	3.591056	0.16604	NA	NA
Serial correlation BG LM	NA		1.523944	0.2316
Heteroscedasticity BPG	NA		1.375317	0.2438
Model specification Ramsey	NA		0.289035	0.5941
Including the Investment				
Normality JB	3.186587	0.203255		
Serial correlation BG LM			0.626596	0.5415
Heteroscedasticity BPG			0.698073	0.7505
Model specification Ramsey			2.231243	0.1457

Model stability test

Figure 4.5 and Figure 4.6 show the CUSUE and CUSUME square without and with investment models respectively. They show that both the models are stable at the 5% level of significance as the blue line lies between the red line boundaries. Therefore, it can be concluded that there are no any structural breaks.

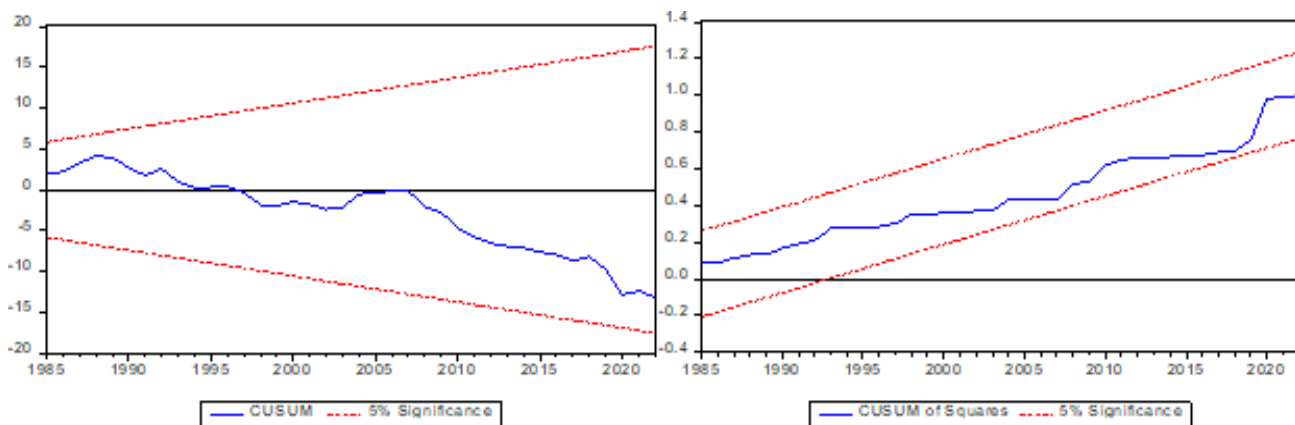


Figure 4.5: CUSUM and CUSUM Square without Investment

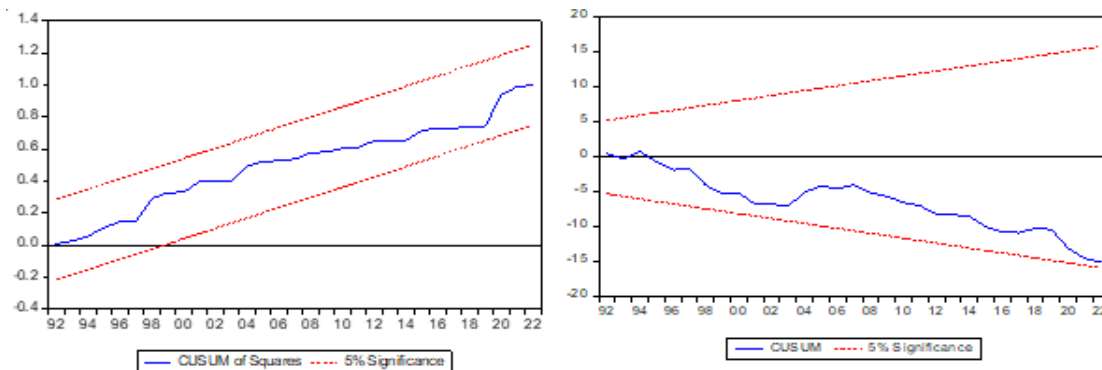


Figure 4.6: CUSUM and CUSUME square with Investment

The main purpose of this study was to delve the impacts of remittances on economic growth through transmission channel of investment. On the basis of findings, it is recommended that government of Pakistan should take serious efforts to ensure the transfer of remittances through formal channel by giving the attractive incentive package for overseas

Policy recommendation and conclusion

Pakistanis and initiating the crack down against the culprits involved in the illegal business of money transfers through *hawal* and *hundi* business. Besides, the received funds of remittances should be more spent on high returned investment projects by ensuring the conducive environment for investment, resolving energy crisis and improving the law and order situation. Besides, the government should approve the pending emigration policy and implement it in true spirits.

This study concludes that workers' remittances and investment positively contributes to the GDP growth rate of Pakistan. The remittances affect the GDP growth rate through transmission channel of investment, proxy by gross capital formation. Positive impact of remittances signals that Pakistan is not suffering from the negative implications of remittances in the form of so called Dutch disease.

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