

Seminar paper

Long run causality checks between Gross domestic product and Remittances: A case study for India-Time series analysis

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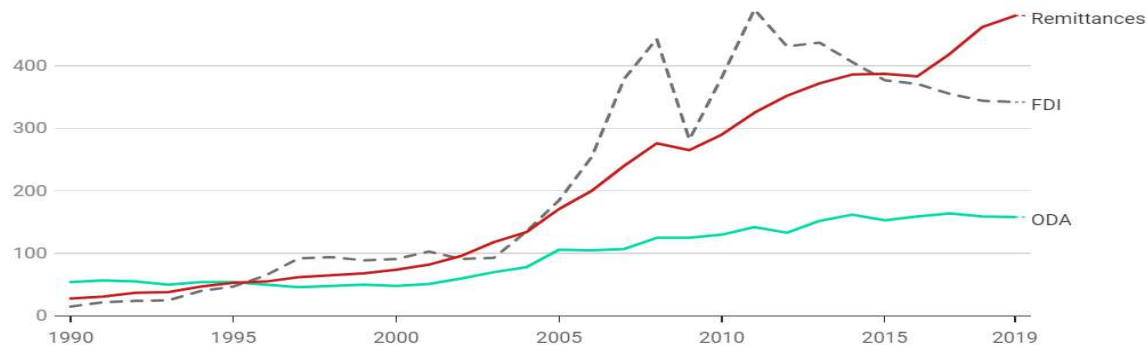
Abstract

International Capital flows have a significant role in the economic growth of a country. This is indeed more vital for the under-developed and developing countries like India. Such capital inflows are of various forms like Foreign direct investment, foreign aid, Development assistance, and remittances. India is the largest foreign remittances receiving country in the world as per the latest report of the World Bank. It has crossed the \$ 100 billion mark for the first time. The sharp rise in the amount transferred by migrants into the country can have a giant brunt on human welfare and economic development. Moreover, the World Bank states that the sheer size of these remittances is bound to have a significant impact on the economy of the country – both at the micro and the macro level. So, in this context, foreign remittances have a great influence on the economic growth of the country. So, this study tries to assess the cointegration between foreign remittances and the economic growth of India using the Johanson cointegration test. A time series of India for the period 1976-2022 will be considered for it. The variables taken up for the study are remittances per capita and GDP per capita.

Introduction

For several decades, there was a different opinion on the source of economic growth of developing countries. These opinions ranged from physical capital investment, surplus labor, human capital formation, foreign investment, and so on. For many developing countries remittances represent a major part of international capital flows due to size and impact on the economic growth of recipient countries. The flow of remittances has even surpassed the other traditional sources in developing countries.

Remittance flows to Low- and Middle-Income countries (excluding China) are now larger than FDI and Development Assistance



FDI = foreign direct investment. ODA = Official Development Assistance; Data for 2018 are estimates and data for 2019 are forecasts

Remittances are the dominant source of foreign exchange for India, with receipts more than three times the level of FDI in 2021 (WORLD BANK). In 2022, the remittances to India crossed the \$100 billion mark for the first time which is 25% higher than the FDI in India as per the World Bank.

The sharp rise in the amount transferred by migrants into the country can have a giant brunt on human welfare and economic development. Moreover, the World Bank states that the sheer size of these remittances is bound to have a significant impact on the economy of the country – both at the micro and the macro level.

Theories

The question of whether foreign remittances stimulate economic growth is still debatable both theoretically and empirically. One school of thought states that remittances have a positive impact on economic growth. The other school of thought is doubtful of the statement and argues that remittances reduce the productivity of the recipients and hence adversely affect the overall economic growth.

To analyze this debate further, the first question that arises is about the utilization of foreign remittances. Foreign remittances are believed to increase the income of the recipient and enhance their ability to resist external shocks as well as boost their investment in health, education, and other assets. It also affects the demand side of the recipients as it enhances the consumption expenditure and demand for imported goods.

Remittances are more sustainable and less volatile capital inflow than the FDI, official development assistant. Hence, it becomes important to analyze the impact of it on the economic growth of the country.

Before analyzing the study, let us discuss what exactly is meant by remittances and what may be the motive behind sending the remittances.

Remittances: -In September 2021, the World Bank's definition of foreign remittances corresponds to personal transfers and compensation of employees. Personal transfers consist of all current transfers in cash or in kind made or received by resident households to or from non-resident households. Compensation of employees refers to the income of border, seasonal, and other short-term workers who are employed in an economy where they are not residents and of residents employed by non-resident entities.

The motive behind foreign Remittances: -

The motivation behind the foreign remittances is explained as follows:-

- **Family Support:** Many individuals send money back to their families in their home countries to help cover living expenses, education, healthcare, and other basic needs.
- **Investment:** Some remittances are intended to invest in businesses, real estate, or other ventures in the home country, aiming to generate income or create opportunities.
- **Savings:** People may send money home as a way to save for the future, either for themselves or for their families, considering economic stability and security.

- **Debt Repayment:** Remittances might be used to repay loans or debts in the home country, providing financial relief and improving credit standing.

It's important to note that motives for sending remittances can vary widely based on individual circumstances, economic conditions, cultural factors, and personal goals.

Impact of remittances

The impact can be divided into two broad categories:

- Micro level
- Macro level

❖ At micro level

At the micro level, foreign remittances can have several significant impacts:

- **Improved Standard of Living:** Remittances provide recipient households with additional income, which can lead to an improved standard of living by covering basic needs such as food, housing, education, and healthcare.
- **Debt Reduction:** Remittances can help recipient households reduce or manage debts, improving their financial stability and reducing the burden of interest payments.
- **Increased Savings:** Remittances can enable households to save and build financial assets, providing a safety net for future needs or emergencies.
- **Social Mobility:** By receiving remittances, individuals and families might have the opportunity to move up the social ladder, improving their social and economic status.
- **Empowerment of Women:** Remittances can empower women by giving them greater control over household finances and decision-making, potentially challenging traditional gender norms.
- **Emotional Well-being:** Beyond the financial benefits, remittances can also enhance emotional well-being by reinforcing family ties and alleviating concerns about loved ones' welfare.

❖ At macro level

- **Economic Growth:** Remittances can contribute to a country's economic growth by injecting foreign currency into the economy, which can help stabilize foreign exchange reserves and support domestic consumption.
- **Balance of Payments:** Remittances can help improve a country's balance of payments by increasing foreign exchange earnings, which can be used to pay for imports, service foreign debt, and support other external obligations.
- **Reduced Poverty:** The inflow of remittances can alleviate poverty at the national level by providing additional income to recipient households and reducing overall poverty rates.
- **Investment and Development:** Remittances can be channeled into productive investments, such as infrastructure projects, education, and healthcare, contributing to long-term development.
- **Human Capital Development:** Remittances can support human capital development by funding education and skill-building initiatives, resulting in a more skilled and productive workforce.
- **Foreign Exchange Stability:** Remittances can help stabilize a country's foreign exchange reserves, making it more resilient to external economic shocks.

It's important to acknowledge that while remittances can bring about positive impacts, they are not a guaranteed solution to all challenges. The sustainability of these benefits can depend on factors such as the consistency of remittance flows, economic conditions, and the effective management of the received funds

LITERATURE REVIEW

Despite the increasing importance of literature, the existing empirical literature on the association between remittances and economic growth has been limited and far too less. In fact, there has been contrasting result on the relationship between two variables. Most of the existing

literature shows the short-run relationship between the variables not the long-run causality between variables.

Singh,T., and Mehra,A.(2014) studies the impact of international remittances on Indian economy by using the time series data for the period 1975-2011. This study states that remittances have a positive and significant short-run impact on real GDP per capita and real fixed capital formation per capita using Granger causality test while the long run impact on real GDP per capita is shown using Johanson cointegration technique in India.

khatir,A.,andGuvenek,B.(2021) shows the effect of FDI and remittances on the economic growth of selected SAARC countries. This study states that remittances have a significant impact on the economic growth of SAARC nations. In addition to it, it also reveals that remittances and economic growth influence each other in a bidirectional way through the Granger causality test.

Sutradhar,S.(2020) investigate the impact of worker's remittances on economic growth of 4 south Asian emerging countries(India, Bangladesh, Pakistan, Sri Lanka) using panel data from 1977-2016. It finds the negative effect of remittances on economic growth in Bangladesh, Pakistan and Sri Lanka while have positive impact on economic growth in India.

Rao.et al(2009) observe that remittances have no long run growth effect but have medium term transitory growth effect using Solow model. In addition to it, total factor productivity is used to analyse the impact of remittances on growth.

Shafiq. et al(2012) employ the cointegration technique to investigate the impact of remittances and growth in poverty alleviation in Pakistan by using time series data for the period 1978-2010. the study finds that remittances have significant impact on poverty reduction in Pakistan.

Mallick(2008) observe that though remittances have positive influence on private consumption but it have a neutral influence on growth rate of output causing adverse impact on private investment by using the data of India for the period 1966-67 to 200-2004.

Nayyar(1994) studies the impact of remittances on saving, investment, balance of trade ,balance of payment of India. The study finds that the remittances don't have a significant impact on

saving and investment but surely have significant influence on balance of trade and balance of payment of India as it reduces the current account deficit.

Objective of the study

There are a vast number of studies on the determinants of remittances, however, there is still a research gap related to the relationship between GDP and foreign remittances. It is very vital to investigate the impact of remittances on the GDP of India as India is the largest foreign remittance-receiving country in the world.

The contribution to the existing research studies is given as under: -

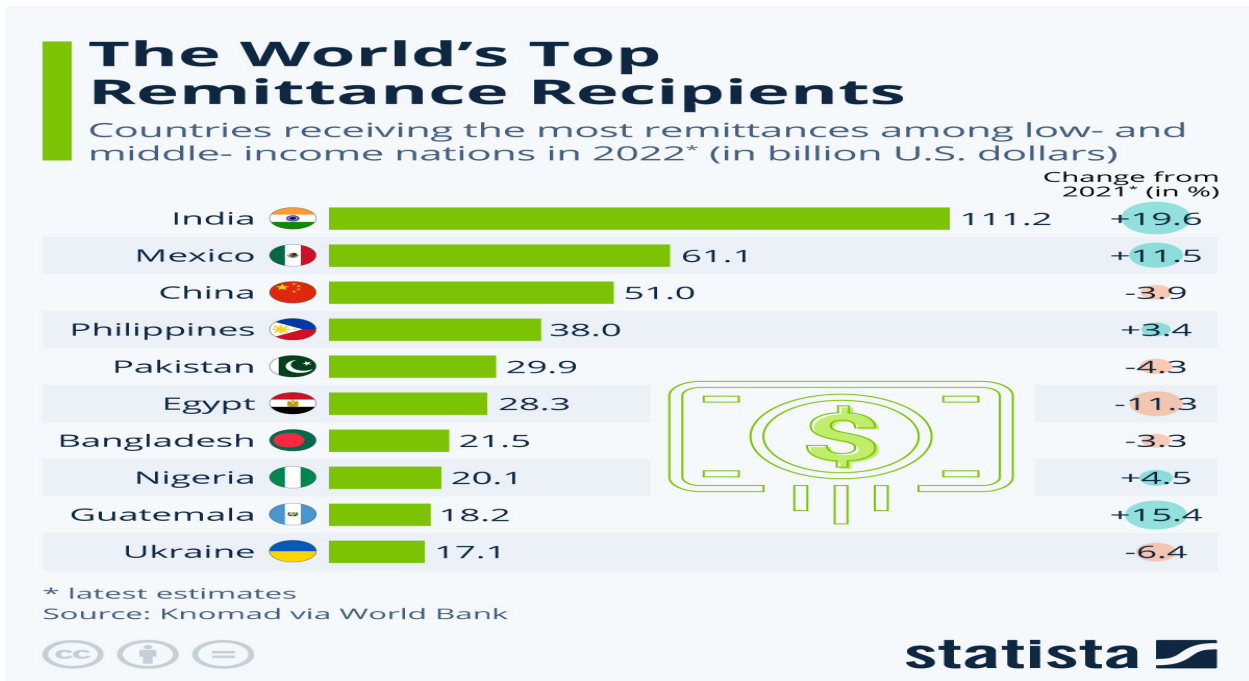
- Addition to time series.
- Concentrated on India as it is the largest foreign remittances receiving country globally.
- Less literature on estimating the cointegration between GDP and foreign remittances of India.

The objectives of this study are as follows:

- To study the long-run causality between GDP and remittances.
- To study the stability of long-run relationships.

Time series analysis: India

India is the largest foreign remittance receiving country in the world as per World Bank in 2022. In 2022, India posted more than 24% growth in its inward remittances to reach \$111 billion, accounting for 3.3 % of the GDP.



The above graph shows the foreign inward remittances of different countries in 2022 and their percentage growth rate vis-à-vis 2021. It depicts that India is the largest foreign remittances-receiving country in the world, receiving \$111 billion in 2022.

Data source

This study highly gives priority to the data availability, so only those years and variables are taken that have sufficient observation and minimal missing values for analyzing the relationship.

The dataset consists of time series data from 1976-2022. The variables taken up for the analyses are remittances(net) per capita and GDP per capita. The data on remittances received and paid is available in current US dollar figures while GDP is available in current US dollar. The data on remittances was first converted into net form and then divided by population to reckon (estimate) remittances per capita. Next, the given variables are converted to remittances per capita at constant (2011) US dollar and GDP per capita at constant US dollar using GDP deflator. Since, there are a lot of variances in the data in absolute terms so the two series of

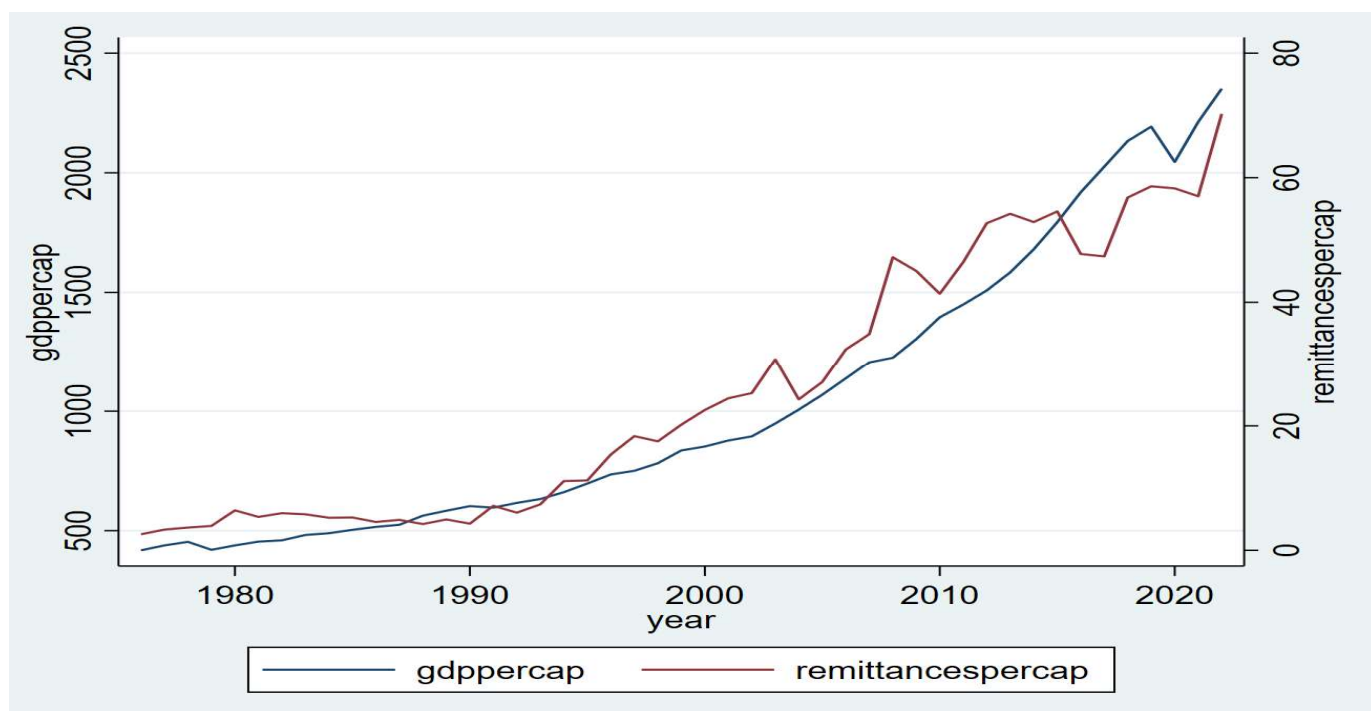
remittances per capita(constant at 2011) and GDP per capita(constant at 2011) are converted into logarithmic form.

Besides that, the dummy variable (Economic Policy 1991) is also added as a control variable.

So, the final variables that we considered are: -

- Log GDP per capita = $\ln(\text{gdppercap})$
- Log remittances per capita = $\ln(\text{remittancesperc})$

The data is primarily drawn from the World Development Indicator(WORLD BANK).¹



Source: world development indicator, world bank

¹Dummy variable(1991 economic reforms) has been purged out to see the pure impact of remittances on GDP of India.

The above graph shows the trend of the two series starting from 1976 till 2022. Both the GDP per capita(gdppercap) and remittances per capita(remittancespercap) have been showing an increasing trend throughout the period. Indeed, there is a lot of volatility in both variables, especially in remittances per capita(remittancespercap). This volatility may be occurring due to various components like irregularities and cyclic. Post 1991 economic policy, there is an upward trend both in remittances per capita(remittancespercap) and GDP per capita(gdppercap). We can see the decline in remittances per capita(remittancespercap) at various periods. This might be due to several factors: for instance, short-run shocks in the country, opening up the economy, rising competition, and so on. There is a decline in GDP per capita(gdppercap) in 2018 which may be due to the economic slowdown in India in this period. The volatility in remittances per cap may be due to several factors like changes in oil prices in the Gulf oil-producing region, the 2008 global crisis, and COVID-19.

Indian Immigrants by Country of Destination, 2020

Country of Destination	Number of Indian Migrants
TOTAL	17,869,000
United Arab Emirates	3,471,000
United States	2,724,000
Saudi Arabia	2,502,000
Pakistan	1,597,000
Oman	1,376,000
Kuwait	1,152,000
United Kingdom	835,000
Canada	720,000
Qatar	702,000
Australia	579,000

Source: United Nations, Department of Economic and Social Affairs (DESA), Population Division, "International Migrant Stock 2020: Destination and Origin, Table 1: International Migrant Stock at Mid-Year by Sex and by Region, Country or Area of Destination and Origin," accessed February 4, 2022, available online.

A lot of migrants sending remittances to India work in Gulf oil-producing regions so it can also be the factor behind the decline in remittances per capita(remittancespercap) in 2008.

Methodology

The above graph explicitly indicates that there is a trend in both series and therefore, the means and variance of the time series are changing over time indicating that both series in their original form may not be stationary. To trace the statistical result, we formally test the stationary properties of these two series using the augmented dickey-fuller(ADF) unit-root test.

The optimum lag length is decided using the AIC method.

- Using AIC, the optimum lag selection for log GDP per capita 1 at level is one(1)

Unit root test for Lngdp per capita 1

dfuller Lngdppercap1,trend lag(1)

Augmented Dickey-Fuller test for unit root Number of obs = 45

Test Statistic	Interpolated Dickey-Fuller			
	1% Critical Value	5% Critical Value	10% Critical Value	
Z(t)	-1.469	-4.196	-3.520	-3.192

MacKinnon approximate p-value for Z(t) = **0.8396**

- Using AIC, optimum lag selection for log GDP per capita 1 at the first difference is zero(0)

dfuller d.Lngdppercap1,trend lag(0)

Dickey-Fuller test for unit root Number of obs = 45

Test Statistic	Interpolated Dickey-Fuller			
	1% Critical Value	5% Critical Value	10% Critical Value	
Z(t)	-6.642	-4.196	-3.520	-3.192

MacKinnon approximate p-value for Z(t) = 0.0000

Using this test, the time series for Lngdppercap1 was found to be stationary at the first difference.

Unit root test for remittances per capita1

- Using AIC, the optimum lag selection for log remittances per capita1(remittancespercap1) at level is one(1).

dfuller Lnremittancespercap1,trend lag(1)

Augmented Dickey-Fuller test for unit root Number of obs = 45

Test Statistic	Interpolated Dickey-Fuller			
	1% Critical Value	5% Critical Value	10% Critical Value	
Z(t)	-1.946	-4.196	-3.520	-3.192

MacKinnon approximate p-value for Z(t) = 0.6307

- Using AIC, the optimum lag selection for log remittances per capita1(remittancespercap1) at the first difference is one(1).

The above table indicates that there exists a long-run equilibrium relationship between the log GDP per capita1(Lngdppercap1) and log remittances per capita1(Lnremittancesperc1). To check the long-run relationship between the time series we need to check the eigenvalue and trace statistics. In the above table, trace statistics is greater than the critical value at rank 0 which rejects the null hypothesis thereby indicating there is a long-run equilibrium relationship between the variables. The variables tend to move together in the long run. This also shows that there exists at most one cointegration equation which makes the linear combination of log GDP per capita1 and log remittances per capita1 to be stationary.

Vector error correction model(VECM)

Since, there exists a long-run relationship between the series, the next step is to check the stability of the long-run equilibrium relationship between the variables, that is, short-run dynamics and long-run cointegration equation. For it, VECM test is used. It tells the speed of adjustment in the variable if there are any shocks and deviations in the variables in the short run. Besides it, it also pinpoints whether the shock is permanent or not.

VECM gives two tables which are as follow: -

	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
D_Lngdppercap1						
_ce1						
L1.	.0388841	.0765025	0.51	0.611	-.111058	.1888262
Lngdppercap1						
LD.	.7488685	.2711811	2.76	0.006	.2173634	1.280374
Lnremittancesperc1						
LD.	-.3005296	.102791	-2.92	0.003	-.5019963	-.0990629
_cons	.0118607	.0194849	0.61	0.543	-.0263289	.0500504
D_Lnremittancesperc1						
_ce1						
L1.	.4669905	.1813339	2.58	0.010	.1115826	.8223985
Lngdppercap1						
LD.	2.144538	.6427809	3.34	0.001	.8847102	3.404365
Lnremittancesperc1						
LD.	-.7876429	.2436458	-3.23	0.001	-1.26518	-.310106

The above table shows the short-run dynamics, that is, the speed of adjustment in case of deviation in the system. In VECM, a negative sign shows the tendency to move towards the equilibrium point. In the above case, the sign of the values in the oval shape are positive which states that if any deviation/ shocks occur in the system then the variables (log GDP per capita 1 and log remittances per capita 1) will not be able to restore back to the equilibrium level in long run and hence the shocks are permanent.

Johansen normalization restriction imposed

beta	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
_ce1						
Lngdppercap1	1	.	.	.	.	.
Lnremittancespercap1	-1.035723	.1277736	-8.11	0.000	-1.286155	-.7852913
_cons	.0307864	.	.	.	.	.

Equation:-

$$D(\text{Lngdppercap1}) = a_0 + a_1 * D(\text{Lnremittancespercap1})$$

$$D(\text{Lngdppercap1}) = .0307864 + 1.035723 * D(\text{Lnremittancespercap1})$$

The above table shows the long-run cointegration equation. Since, it is the vector error correction model so sign is interpreted in the opposite direction. The result shows that at lag 1 if there is a 1% increase in log remittances per capita1 (Lnremittancespercap1) there is a 1.035723% increase in log GDP per capita1(Lngdppercap1) in the long run. These values are highly significant at a 1% level of significance.

KEY TAKEAWAYS

- There is a long-run relationship between log GDP per capita and log remittances per capita.
- The long-run relationship is not stable.
- Short-run deviations, if any are permanent.

Conclusion

Economist differs in their viewpoint related to the contribution of international capital flows to economic growth. One school of thought believes that international capital flows have a positive influence on economic growth while another school of thought doubts the impact of international capital flows on economic growth. Remittances are among the vital international capital flows to developing countries. This study tried to contribute to the existing studies by analyzing the long-run impact of remittances on the economic growth of India which is the largest recipient of foreign remittances as per the World Bank Report,2022. The coefficient for remittances is highly significant and shows the positive long-run relationship between GDP and remittances of India in the sample over the study period. It was found that a 1% increase in remittances ($\text{Lnremmitancespercap1}$) increases the GDP(Lngdppercap1) by 1.035723% for India in the sample over the study period. It further investigates the short-run dynamics which shows that the shocks are permanent in the long run.

The results indicate a conclusion that a large chunk of Remittances is channeled to productive use and the aim of remitting to the home country is mostly profit-driven rather than altruistic. There are many other empirical studies that show the positive impact of remittances on economic growth (Singh,T and Mehra,A, 2014). The significant figures of remittances indicate that remittance is not used to meet household non-productive consumption which in turn directly

contributes to the economic growth. This shows that not only the flow is pivotal but at the same time ensuring proper use of it is equally important. The efficient utilization of remittance flows demands the active role of the state and policymakers to ensure that this flow is channeled toward the productive sector. Besides that, the result shows that the government needs to monitor the shocks in an economy as it can impact economic growth.

References: -

Singh, T., and Mehra, A. (2014). Remittances and economic growth in India: A time series analysis. *Pacific business review international* volume 6

khatir, A., and Guvenek, B. (2021). The effect of FDI and remittances on the economic growth of selected SAARC countries. *Journal of economics and administrative approach* volume 3

sutradhar, S. (2020). The impact of remittances on economic growth in Bangladesh, India, Pakistan and Srilanka. *International Journal of economic policy studies*

Nayyar, D. (1994). Migration, remittances and capital flows: The Indian experience Delhi. Oxford university press

Mallick. (2008). Do remittances impact the economy? Some empirical evidences from a developing economy. Working paper

Shafiq, et al. (2012). The role of foreign remittances and economic growth in poverty alleviation: time series evidences from Pakistan. *World applied science Journal*

Rao, et al. (2010). A panel data analysis of growth effect of remittances. Working paper

Chami.et al.(2003).Are immigrants remittances flows a source of capital Development. Working paper

Poonam,and Gupta.(2005).Macroeconomics determinants of Remittances.IMF Working paper

Tahir.et al.(2015).foreign remittances,foreign direct investment,foreign imports and economic growth in Pakistan: A time series analysis. *Arab economics and business Journal*.