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Sarmad Ellahi

Muhammad Omer

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Do Workers' Remittances Promote Economic Growth in Pakistan?

Sarmad Ellahi[1] & Muhammad Omer[2]

Abstract

This study investigates the role of workers' remittances in promoting economic growth in Pakistan by using data from 1976-2017. We used GMM estimation to obtain the efficient estimates in the presence of endogeniety and simultaneity biases. Our estimates show that the increase in remittances inflows positively affects the economic growth of Pakistan. This impact is primarily through consumption channel, while investment channel is not found significant. However, in the long run, consumption growth may stimulate investment.

JEL Classification: E24, O40
Key Words: Workers' Remittances, GMM, Economic Growth

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Contact for correspondence:
Sarmad Ellahi
Assistant Director,
Economic Policy Review Department
State Bank of Pakistan
I.I. Chundrigar Road Karachi 74000.
Email:
Sarmad.Ellahi@sbp.org.pk

[1] Assistant Director, Economic Policy Review Department, State Bank of Pakistan, Karachi (Sarmad.Ellahi@sbp.org.pk)
[2] Joint Director, Economic Policy Review Department, State Bank of Pakistan, Karachi (Muhammad.Omer@sbp.org.pk)

Non-technical Summary

Workers' remittances are one of the major sources of foreign exchange earnings for Pakistan. Despite easing resource constraints and balance of payment pressures, the impact of remittances on economic growth is found indeterminate.

In the economic literature, two lines of arguments are usually given: one, remittances, being a means for ensuring smooth consumption, may discourage labor supply and adversely affect overall economic growth. Two, remittances contribute to economic growth because these not only smooth consumption of households but also promote investment in the country by reducing financial constraints, lowering cost of capital, and allowing physical and human capital accumulation.

This study contributes to the debate on remittances-economic growth nexus by examining the experience of Pakistan. The research question of the study is: do remittances inflows promote economic growth in Pakistan? Earlier literature on this subject in case of Pakistan reports a positive relationship between remittances and growth, but does not provide a reliable estimate.

We have used the technique of Generalized Method of Moments (GMM), which gives reliable estimates in the presence of econometric problems such endogeniety and simultaneity. Our estimates show that remittances have positive effect on economic growth. More precisely, one percent increase in the remittances to GDP ratio leads to a 0.15 percent increase in the GDP per capita. This increase in the per capita GDP could be due to the increase in the consumption of the low-income recipients, as our study could not identify the impact of the remittance on investment. A number of studies using survey data reported that the remittances inflows support households to accumulate physical assets, and in corollary, affect long-term investments in the economy. It is possible that a large part of remittances that are used to acquire physical assets lands in the informal economy. Therefore, investment impact of the remittances cannot be ruled out entirely, though our study could not substantiate this effect using aggregate macro data.

Keeping in view the positive impact of remittances on growth, as evident from reliable estimates in this study, it is important that incentive structure and money transfer mechanism should be further improved for attracting more remittances from Pakistani diaspora aboard.

1. Introduction

Workers' remittances inflows are a key source of foreign exchange for Pakistan. These inflows have financed Pakistan's trade and primary income deficit significantly over the last 50 years. Historically, Pakistan started receiving these inflows, in notable size, during early 1970s, when the incumbent prime minister actively pursued immigration of Pakistani labor force to countries of Gulf Cooperation Council (GCC). At that time, Gulf economies were experiencing oil price boom and labor shortages. Since then, Pakistan has received US $258.3 billion in remittances.[1] Only exports, with US $ 480.1 billion, exceeded remittances in FX inflows in this period. Even, inflow in Foreign Direct Investment (FDI) from 1977 to 2019 was only US$ 47.4 billion, too small as compared to workers' remittances.

Despite their significant volume and potential, the role of remittances in promoting economic growth of Pakistan remains to be established firmly. The economic literature is not very conclusive on this subject: there are two different lines of arguments. One strand of literature view remittances as source for consumption smoothing. Traditionally, migrants send remittances to their families to buy consumption necessities such as food, clothing, medicine, and shelter. These inflows, therefore, have lifted a large number of people out of poverty by supporting their higher level of consumption. Literature on the poverty-alleviating impact of remittances has widely recognized this effect. At the same time, the higher remittances inflows may even lower labor force participation in domestic economy and decrease work efforts. Thus, the remittances inflow and growth nexus may become negative if these inflows are compensatory in nature.

Other strand of literature argue that workers' remittances promote investment activity besides supporting the consumption of the recipients. The remittances are likely to act in a similar way as the private capital inflows, which have a proven record of enhancing factor productivity and economic growth. Globally, however, the evidence of favoring investment-promoting role of workers' remittances is sparse; as such, effect of remittances is not always guaranteed. For example, in a typical manifestation of 'Dutch disease', inflow of remittances may lead to appreciation in the real exchange rate in the recipient economy. This appreciation results in contraction of exports by the manufacturing sector and hence may lead to the decline in the domestic investments.

Moreover, if the recipient is unskilled in capital allocation and makes investment decision on behalf of remitter, then remittances may result in inefficient domestic investment. Furthermore, asymmetric information between the remitter and the recipient and improper monitoring of latter may encourage moral hazard among recipients. The recipient may prefer to enjoy the enhanced consumption by reducing labour supply in the market. In this situation, remittances inflows may increase the consumption of households, instead of promoting investment.

Interestingly, some evidence in Pakistan suggests that inflows of remittances are positively related with investment activities. For example, **Figure 1A** (in Appendix) shows that there was a positive correlation between the monthly remittances inflows and equity prices (KSE 100 Index) during January 1999 and December 2018. Similarly, the correlation between the yearly remittance inflows and the aggregate net asset values of the mutual funds in Pakistan between 2003 and 2018 was also found positive (**Figure**

[1] Between July 1972 and December 2019.

1B in Appendix). **Figure 1C** (in Appendix) shows that there was also a positive correlation between yearly remittances inflows and the Gross Fixed Capital Formation (GFCF) in the same period.

Moreover, empirical literature investigating the asset accumulation behavior of the remittances recipient household in Pakistan, reported that the recipients uses these inflows to acquire consumer durables, housing and financial assets. Their finding suggests that remittances do play a pivotal role in the assets accumulation by households in Pakistan. This proof suggests that remittances inflows in Pakistan may be supporting the investment activities and hence are contributing to the economic growth. However, this requires a comprehensive assessment given its role in supporting the economies of the developing countries. This research is an attempt to contribute to the literature by investigating the impact of the remittances inflows on economic growth in Pakistan.

The significance of such a study can be appraised by the facts that Pakistan is the seventh largest recipient of the global remittances flows, remittances contribute significantly to the overall FX inflow, and that they support the economy by keeping the macroeconomic imbalance in check.[2] This study attempts to answer the research question: do remittances inflows promote economic growth in Pakistan? The earlier research on this question fails to provide consistent results on the impact of the remittances inflows on economic growth in Pakistan mainly due to endogeniety bias in their estimates. Our study addresses this issue. We used instrumental variable approach, both single equation and system of equations to control for the endogeniety and simultaneity biases. For this study, yearly data from 1976 to 2017 have been used.

Our results suggest that the increase in remittances (in terms of GDP) leads to the increase in the per capita income in the economy. This increase in the per capita GDP could be due to the increase in the consumption of the low-income recipients as well as the investment in the economy. However, this study could not find the impact of remittances on investment activity, although increased consumption demand itself is likely to fuel the investment activity in the economy in the long run.

The rest of the paper is structured as follows. Section 2 discusses the theoretical underpinning, Section 3 reviews the recent literature, Section 4 motivates the model used in this research, Section 5 discusses data, and Section 6 delves into the methodology adopted for the estimation. Section 7 presents analysis of the results and finally, Section 8 concludes the study.

2. Theoretical Underpinning

In a comprehensive review of economic linkages, Gapen et al. (2009) identified the three key investment augmenting channels; (i) capital accumulation, (ii) labor force participation and (iii) total factor productivity through which workers' remittances contribute to the economic growth.

i) Capital accumulation: remittances may affect the investment activity directly by stimulating the rate of capital accumulation. This channel is activated either by reducing financing constraints, by lowering the cost of capital, by enhancing the macroeconomic stability, or through all of them acting simultaneously. In the first case (alleviating financing constraint), if a recipient economy has a poor domestic financial structure, remittance inflows may allow households to increase the rate of accumulation of physical and human capital, which may help in easing the financing constraint in the economy. In the second case (lowering cost of capital), workers' remittances inflows improve the

[2] Migration and Development Brief No. 31, World Bank.

creditworthiness of domestic investors thereby lowing the cost of capital in the domestic economy. As a result, the future remittances inflows not only act as collateral for additional borrowing that may lead to the new investments, but also can be used to service the accumulated debt. In the third case (enhancing the macroeconomic stability), sustained remittances inflows make the domestic economy less volatile thus reducing the sovereign risk premium, on which firms weigh heavily while making their investment decisions. Therefore, remittances inflows enhances investment activity through direct investments by foreign firms in the domestic economy.

However, capital accumulation through inflowing remittances is not always guaranteed. For example, remittances inflows may increase the consumption of households, instead of promoting investment, if these inflows are compensatory in nature. Moreover, impact of remittances may be weakened if the domestic economy is highly integrated with world financial markets. Foreign financial inflows may leave less room for the recipient household to make efficient investment decisions. In these situations, remittances inflows may not be promoting investment, though they can still stimulate overall growth through consumption.

ii) Labour force participation: is another important channel through which remittances can influence the economic growth. Undistorted labour supply that helps labour market to maintain its natural equilibrium is very important for economic growth. However, asymmetric information between the agents and the lack of monitoring may boost moral hazard in recipients. As a result, recipients may be encouraged to enjoy consumption by reducing labour supply in the market, which may hinder the investment growth.

iii) Total Factor Productivity: remittances may also affect growth in the total factor productivity by a number of ways. For example, it is empirically proven that inflow of remittances tend to appreciate the real exchange rate of the recipient economy. This appreciation results in contraction of export by the manufacturing sector and hence may lead to the decline in the domestic output and the factor productivity. Moreover, if the recipient is unskilled in capital allocation and makes investment decision on behalf of remitter, then remittances may result in decreased efficiency of domestic investment. In either case, remittances may not be supportive of investment.

Additionally, there is political economy channel through which remittances may effect the economic growth. For instance, remittances receiving bigger depositors can pressurize government to undertake financial sector reforms. These reforms could be either for increasing the productive lending in the economy or for enhancing safety so that the financial institutions invest in safer assets. The outcome may depend on the government's response to the pressure. If the policies are designed to support the productive lending from the depositors' money, enhanced economic growth may be achieved through the new investment. On the contrary, investment in the safer assets are less likely to supplement the entrepreneurship and hence economic growth may not be impacted by remittances inflows.

Moreover, large remittance inflows may dent the domestic good governance, as the recipients may become less interested in monitoring the domestic government's performance. It has widespread implication for quality of policy environment, which may affect the capital accumulation, TFP growth and growth in labor inputs negatively.

3. Review of recent literature

A number of studies have explored the impact of workers' remittances on economic growth; however, their results remained inconsistent. A few of them [such as Driffield and Jones, 2013; Acosta et al., 2008; Meyer and Shera, 2017; Giuliano and Ruiz-Arranz, 2009; Ramirez and Sharma, 2008; and Imai et al., 2014] found a significant and positive effect of remittances on economic growth. Others [for example, Chami et al., 2005; Gapen et al., 2009; and Karagoz, 2009] have found no or negative impact.

Driffield and Jones (2013) have investigated the relative impact of workers' remittances, FDI and official development assistance on economic growth in developing countries. They conclude that both remittances and FDI have positive effect on growth provided that the recipient country has better institutional environment, law and order situation and stronger mechanism to protect the investors. Acosta et al. (2008), by using large cross-country panel data, finds that remittances in Latin American and Caribbean countries have reduced inequality and poverty significantly through increase in income. Meyer and Shera (2017), by using six countries' panel data, explored the remittances-growth nexus. Their finding shows that remittances significantly contributed towards growth.

Similarly, Giuliano and Ruiz-Arranz (2009) analyzed whether the depth of domestic financial sector affects the remittances GDP growth relationship in the recipients 100 developing countries. Their findings reveal that the workers' remittances have enhanced economic growth in the countries where financial sector was less developed, suggesting that remittances work as alternate to the financial sector which is responsible for financing the investments. Findings of Ramirez and Sharma (2008), who examined the similar question but using annual data of 23 Latin American countries from 1990 to 2005, corroborate the earlier results of Giuliano and Ruiz-Arranz that remittances can work as a substitute to the financial sector, especially in the countries where level of income is low. Similarly, Imai et al. (2014) have investigated the effect of remittances on growth of GDP per capita using panel data from 24 Asia-Pacific economies. They concluded that the remittances inflows were not only beneficial for growth but also largely contributed to poverty reduction. However, their study also suggests that any volatility in the remittances and FDI inflows is a source of shocks to economic growth.

A study by Chami, et al. (2005), on the other hand, reveals that the impact of remittances differs from that of capital flows. Their empirical estimation shows that remittances are compensatory in nature and intended to compensate the recipient for the bad economic outcome that the individual or households may face. Therefore, these are negatively related with per capita GDP growth. Whereas, capital flows such as FDI are profit driven and have positive relation with economic growth. Addressing the limitations of Chami et al. (2005), Gapen et al. (2009) also worked on the similar question with updated instruments and techniques; however, they arrived at a similar conclusion.

The notable country-specific studies also show a similar trend. For example, Kumar (2013), while studying the relationship between remittances and economic growth in Guyana, reports that the remittances are significantly and positively related to economic growth in the short and long run. On the contrary, findings of Ahmed (2010) and Karagoz (2009) reveal that remittances have no or negative affect on GDP growth in Bangladesh and Turkey, respectively. Interestingly, similar study by Alvin (2007) at national and regional level of Philippines remained inconclusive, as the author reports that remittances do influence economic growth positively and significantly at national level, but this result may not remain consistent at regional level.

Country-specific studies on Pakistan are not in abundance, though the subject has received more attention recently. Interestingly, the literature covering Pakistan is more consistent in reporting that remittances have a positive effect on the economic growth in the long run. For example, Qayyum et al. (2008) have examined the impact of remittances on poverty and economic growth over the period extending from 1976 to 2006; and found a significant and positive effect. Besides, as the impact broadens over time, remittances can lead to sustainable growth and welfare improvement of poor households in the long run. Similarly, Kumar (2011) concludes that remittances and economic growth are positively related in the long-run; however, in the short run, remittances are insignificant contributor towards economic growth. Contrary to Kumar (2011), finding of Jibran et al. (2016) reveals that the remittances have significant and positive effect on growth in Pakistan not only in the long run but also in the short-run. Despite the consensus, the quantum impact of remittances inflows on the per capita income remained to be agreed upon.

Table 1: Literature on Impact of Remittances on Economic Growth of Pakistan

			Estimates of Remittances and GDP Growth	
Study	**Period**	**Method**	**Short-Run**	**Long-Run**
Jibran et al. (2016)	1976-2013	ARDL[a]	0.039*	0.074*
Qayyum et al.(2008)	1973-2007	ARDL	-0.92*	0.465*
Kumar (2011)	1980-2009	ARDL	-0.05*	0.083*
Ahmad et al. (2013)	1978-2011	OLS[b]	Nil	0.25*
Hussain and Anjum (2014)	1973-2011	GMM[c]	Nil	0.28*
Iqbal and Sattar (2010)	1972-2003	OLS	Nil	0.45*

*Significant, [a] ARDL: Autoregressive Distributed Lag, [b]OLS: Ordinary Least Squares, [c] GMM: Generalized Method of Moments

For example, Jibran et al. (2016) and Kumar (2011) reported almost 0.08 percent impact on the growth caused by the one percent increase in the remittances inflows, while Qayyum et al. (2008) reported 0.46 percent impact (**Table 1)**. The wide gap between the two estimates suggests that more research is required on this topic. This study, therefore, is a step forward and contributes to this debate by using an extended data set and latest available techniques and instruments.

4. Model development

For estimation, we adopted the model specified by Gapen et al. (2009) with minor modification, as our study is country-specific. The economic model used to measure the impact of remittances on real GDP growth is specified below:

$$(\text{GDP per capita})_t = \beta_{0t} + \beta_{1t} * (\text{Remittances to GDP})_t + \alpha_t * (\text{Controls})_t + \varepsilon_t \quad (1)$$

We have used Generalized Method of Moments (GMM) regression modeling technique, which is efficient in dealing with the endogeniety and simultaneity biases. Generally, estimation of the remittances inflows and the economic growth relationship suffers from two-way causality. Often low economic growth in the domestic country promotes migration of the productive labour force towards the higher income countries. These emigrants send their earnings back home to support their family, which increases the remittances inflow in the domestic economy. The remittances, thus received, may enhance the economic growth through investment and consumption.

Moreover, it is possible that another variable, such as governance, may effect both remittances inflow and the economic growth of the domestic economy. Precisely, poor domestic governance could encourage higher migration that may lead to higher remittances inflows in the domestic economy. At the same time, higher outflow of the productive labour may stifle the economic growth of the domestic economy, as far as the remittances they send is used for consumption smoothening.

Besides the feedback effect, the presence of autocorrelation due to the imposition of time aggregation on variables may also lead to the biased estimate. Therefore, controlling endogeniety remains a key concern. To circumvent the problem, often instrumental variable is used. An instrumental variable correlates strongly with the original variable but remains uncorrelated with the errors. Moreover, choice of the appropriate estimation procedure also plays important part in obtaining consistent and the most efficient estimates. GMM technique provides consistent estimates in the presence of one or more endogenous regressors while its system estimates mitigate the endogeniety and auto-correlation problem more comprehensively.

5. Data

Following Gapen et al. (2009), we have used real GDP per capita and remittance to GDP ratio as indicators of the economic growth and remittances inflows in Pakistan, respectively. Per capita GDP is mostly used as a measure of economic growth in remittances-growth literature probably to incorporate income effect of the individuals in a rising population. Moreover, similar to Gapen et al. (2009), we have used a number of control variables, such as FDI to GDP ratio, money supply (M2) to GDP ratio, fiscal deficit to GDP ratio, inflation, population growth, and Investment to GDP ratio.

Finding a suitable instrument for remittances, which is both practically and theoretically independent of the error term, is challenging. Following Gapen et al. (2009), we have also used world remittances inflows to GDP ratio (excluding Pakistan) as an instrument for the remittances inflow in Pakistan. According to these authors, this instrument is likely to register any increase in remittances flow globally due to reductions in global transactions costs and other systematic changes effecting its microeconomic determinants. At the same time, it cannot capture the effects of idiosyncratic changes in the determinants of remittances.

For other variables, we have used lags as their instruments. Besides, we have used trade openness (ratio of sum of imports and exports to GDP) and telecom, which indicates number of telephones including fixed and mobile connections. Improvement in the telecommunication is expected to enhance the remittances inflows; however, its contribution to the GDP remains almost negligible. This study uses data from 1976 to 2017 in logarithmic form, as some of the variables are available since the starting date. All these data have been acquired either from State Bank of Pakistan or from Haver Analytics. Most of the variables are in US dollar. In case of real variables, base year 2010 US dollar have been used.

6. Methodology

The GMM estimation is one of the most extensively used methods in literature dealing with the structural issues. It uses assumptions about specific moments of the random variables, which are called moment conditions. GMM does not require full information of the distribution of the data unlike

maximum likelihood estimation (MLE). This approach makes GMM more robust, in some cases. In the model in which there are more moment conditions than model parameters, GMM estimation provides more efficient estimates.

Let us assume that the equation (2) is to be estimated, as given by the matrix notation

$$y = X\beta + u, \tag{2}$$

where $E(uu) = \Omega$. The regressor matrix X is of order nxK, where n is the number of observations. Moreover, assuming that K_1 regressors are endogenous under X_1 part of the partitioned X matrix and (K- K_1) are the remaining regressors under X_2 part that are assumed exogenous. The full set of instrumental variables Z, which is nxL, are assumed exogenous, i.e., $E(Z_i u_i) = 0$. Similar to X, matrix Z is also partitioned into (Z_1, Z_2), where the L_1 instruments under Z_1 are excluded instruments, and the remaining ($L - L_1$) instruments $Z_2 = X_2$ are the included instruments.

A GMM estimator can be obtained as,

$$\beta_{GMM} = (X'ZWZ'X)^{-1}X'ZWZ'y \tag{3}$$

with distribution of the variance covariance matrix given by,

$$V(\beta_{GMM} = \frac{1}{n}(Q'_{XZ}WQ_{XZ})^{-1}(Q'_{XZ}WSWQ_{XZ})(Q'_{XZ}WQ_{XZ})^{-1}$$

and W is the optimal weighing matrix and S is the covariance matrix of the moment condition, that is $S = \frac{1}{n}E(Z'uu'Z)$.

This study also reports results from Two-Stage Least Squares (2SLS) and Limited Information Maximum Likelihood (LIML) for the robustness check of the GMM estimates. Both 2SLS and LIML are K-class estimators and are used to obtain parameter estimates of the structural equations, though they differ significantly from GMM in estimation philosophy.

Two-Stage Least Squares is used when the error terms are correlated with the independent variables. Similar to GMM, this procedure also uses instrumental variables to estimate the values of the predictor(s) in the first stage, and then estimate a linear regression model of the dependent variable in the second stage using those values computed at the first stage. Since, the estimates are based on the instrumental variables that has no correlation with the errors; the results of the 2SLS are likely to be optimal.

Similar to the 2SLS, LIML method is actually a linear combination of the OLS and 2SLS estimate with the weights calculated in such a way that they roughly minimizes the 2SLS bias. The LIML estimator is efficient among the single equation estimators when the error terms are normally distributed. LIML procedure uses a priori information only of the relevant equation(s) whose parameters are to be estimated. Moreover, this procedure does not imposing restrictions on the parameters, a priori.

7. Empirical results and discussion

Table 2 shows the two stage reduced form estimates using GMM, LIML and 2SLS. However, this study

draws inferences from the GMM estimates only, as it is a widely accepted procedure for addressing the potential problem of endogeniety and simultaneity biases. Estimates from LIML and 2SLS are reported for robustness check of these results. Besides alternate estimates from different procedures, we also reported a number of diagnostic checks that show the robustness of the estimates as shown in **Table 2**.

The upper panel of **Table 2** shows the estimates of Equation 1. These estimates are consistent among GMM, LIML and 2SLS estimators. The estimates suggest that remittances have positive effect on economic growth. A one percent increase in the remittances to GDP ratio leads to a 0.15 percent increase in the GDP per capita. Our result, therefore, stands in sharp contrast to Gapen et al. (2009) and others arguing that remittances have no significant impact on economic growth. In other words, remittances inflows in Pakistan are not only supporting the consumption of the recipients but also contributing to the investment activity, albeit marginally. We will discuss later the findings of the impact of the remittances on the investment activity in more detail. Nevertheless, our estimates are consistent with the earlier studies, which have reported that the remittances are contributing positively to the economic growth in Pakistan.

Table 2: IV Estimates of Relationship between Per Capita Income and Remittances

	GMM	LIML	2SLS
Remittances to GDP	0.1511	0.1513	0.1483
	(0.000)	(0.000)	(0.000)
FDI to GDP	0.0919	0.0877	0.0873
	(0.000)	(0.000)	(0.000)
Inflation	-0.0115	-0.0167	-0.0167
	(0.672)	(0.549)	(0.547)
Fiscal Deficit to GDP	0.1088	0.0926	0.0920
	(0.004)	(0.027)	(0.028)
Population Growth	-0.9760	-1.0194	-1.0158
	(0.000)	(0.000)	(0.000)
Money Supply (M2) to GDP	0.1887	0.2444	0.2484
	(0.310)	(0.215)	(0.204)
Investment to GDP	-0.1637	-0.1286	-0.1335
	(0.318)	(0.445)	(0.423)
Intercept	7.0414	6.8093	6.8103
	(0.000)	(0.000)	(0.000)
Under identification tests			
Kleibergen-Paap rk LM statistic [Chi-sq(3)]	20.3180	20.318	20.318
	(0.000)	(0.000)	(0.000)
Weak identification test			
Kleibergen-Paap Wald rk F statistic	27.4830	27.483	27.483
Stock-Yogo weak ID test critical values:			
5% (10% for LIML) maximal IV relative bias	13.910	6.460	13.910
Over identification test of all instruments			
Hansen J statistic [Chi-sq (2)]	1.8440	1.8350	1.8350
	(0.398)	(0.400)	(0.400)

On the impact of control variables, the FDI appears to have significant effect on the per capita income; though it is very low. Almost one percent increase in FDI leads to 0.1 percentage point increase in the per capita income. The literature generally reports a higher impact of FDI. For example, Khan and Khan (2011) while analyzing the impact of FDI on GDP growth of Pakistan using data from 1981 to 2008 reported that one percent increase in the FDI leads to 0.31 percent increase in the economic growth,.

Lower FDI coefficient of our study may be due to the extended sample size, which covers the latest period of low FDI inflow in Pakistan.

Similarly, fiscal deficit also has positive and significant impact on the per capita income. One percent increase in the fiscal deficit leads to almost 0.11 percent increase in the per capita income. Besides, our result shows that population growth has negative relationship with the per capita income. One percent increase in the population leads to almost similar reduction in the real per capita income. Our result shows that money supply, inflation and investments have no impact on the per capita income. Insignificant impact of the money supply and inflation on the real per capita income is expected; however, insignificant impact of investment on the per capita income could be due to inclusion of FDI, which is probably also capturing the variation in the investment. Dropping investment does not change our results. Thus, we have retained this variable following the Gapen et al. (2009) specification adopted here.

For diagnostics check, we used LM test for the under-identification of the equation. Under the null hypothesis, the equation is under-identified, that is the excluded instruments are correlated with the endogenous regressors. Kleibergen-Paap (Rank) LM test for under-identification is essentially a rank test, of a matrix of reduced-form coefficients. The null hypothesis is rejected at five percent level of significance, indicating that the correlation matrix is full column rank and the model is identified. For weak identification test, we used robust Kleibergen-Paap Wald (Rank) F-statistic. When the excluded instruments are weakly correlated with the endogenous regressors, the performance of estimators may suffer. The calculated test statistics are greater than the Stock and Yogo (2005) critical values, indicating that equation is not weakly identified.

For testing over-identifying restrictions, we have used the Sargan-Hansen/J-test. The joint null hypothesis is that the instruments are valid and uncorrelated with the error term. In this case, our test statistics failed to reject the null hypothesis, indicating that instruments used for the estimation are valid. For the efficient GMM estimator, the reported test statistic is Hansen's J statistic; however, for the 2SLS estimator, the test statistic is Sargan's statistic, typically calculated from a regression of the IV residuals on the full set of instruments. Under the assumption of conditional homoscedasticity, Hansen's J statistic becomes Sargan's statistic. The results of these diagnostic tests and the consistent estimates from alternate estimation procedure suggests that our results are robust and can be reliably used for policy making purposes.

Importantly, investment plays important role, which channelizes the inflowing remittances for the growth of the economy. To capture this role, we introduced the interaction term incorporating investment and remittances into the specification. However, with the inclusion of the interaction term, the estimates become too distorted to draw meaningful economic inferences (the result can be provided on request).

To get some clue on the role of investment, we then estimated the system of equations with remittances, per capita income, money supply and investment as key endogenous variables defining the equations of the system. For the sake of brevity, **Table 1A** in the Appendix shows the estimates of per capita income and investment equations (estimates of the other equations can be provided on request).

Most of the coefficients defining the ‘per capita income’ equation (first column) become insignificant with the inclusion of the investment variable in the system. When investment is dropped from the system, the coefficients of the ‘per capita income’ equation (second column) become significant and meaningful. Specifically, this system estimate shows that one per cent increase in the remittance leads

to 0.19 percent increase in the income per capita – very close to the earlier estimates of Table 1. Moreover, the system estimate of the investment equation (third column when the system includes investment) shows that remittances have insignificant impact on investment, though FDI has positive and significant impact on the investment.

Though this study could not substantiate the impact of remittances on the investment behaviour, there are studies reporting that remittances inflows helped the recipients to accumulate assets in Pakistan. For instance, Junaid et al. (2018) examined the asset accumulation pattern of remittances recipients and reported that the households treat inflows as transitory and precautionary income. The recipients use these inflows to acquire consumer durables, housing and financial assets. On a similar note, Fatima and Qayyum (2015), focusing on the association between workers' remittances and migrants' household assets accumulation, concluded that remittances do play a pivotal role in the assets accumulation of household in Pakistan. Besides these recent studies, finding of Nishat and Bilgrami (1993) shows that the remittances inflows are positively related to individual's self-interest, such as accumulation of property, and their future planning for business motives.

Deviation of findings of our study from that of above studies showing investment promoting effect of the remittances could be due to nature of the information sets being used in both cases. The above reported studies have mostly used microdata, extracted from primary source of the household surveys. On the other hand, this study has used macro data, acquired from the secondary sources. It is quite possible that a large part of the remittances being used to acquire assets that promotes investment activity in the informal sector of the economy. The aggregate macro data being used here mostly covers the formal sector of the economy and may not be capturing this important economic relationship appropriately.

8. Conclusion

This study has investigated the role of workers' remittances in promoting economic growth in Pakistan using data from 1976-2017. It has used GMM estimation procedure as remittances inflows and the economic growth relationship suffers not only from two-way causality but also from influence of other indirect variables.

Our estimates show that an increase in remittances (in terms of GDP) leads to the increase in the per capita income in the economy. This increase in the per capita GDP could be primarily due to the increase in the consumption of the low-income recipients. At the same time, this consumption demand may be supporting some investment activity. There are studies that have reported asset accumulation pattern of the remittance recipient households in Pakistan. This asset accumulation behaviour may be augmenting the investment activity in the economy in the long run. However, this study could not manage to identify the impact of the remittance on investment activity. Therefore, a more detailed analysis of the impact of the remittances on the investment growth is required. This could be an agenda of future research.

Based on the finding of our study, we recommend that both the government and the central banks should focus more on the policy actions designed to attract more remittances from its diaspora. This enhanced inflow is likely to boost the economic growth in the domestic economy with meagre cost and no exchange rate or interest rate risks.

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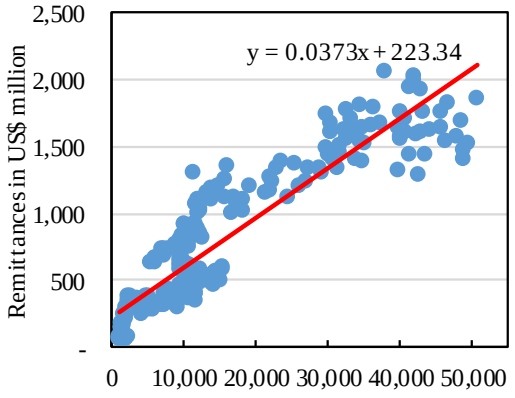
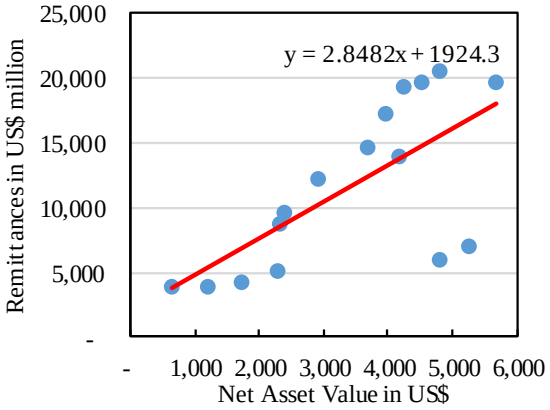
Appendix

Figure 1.a: Correlation between MonthlyWorkers' Remittances and Pakistan Stock Exhchange Index



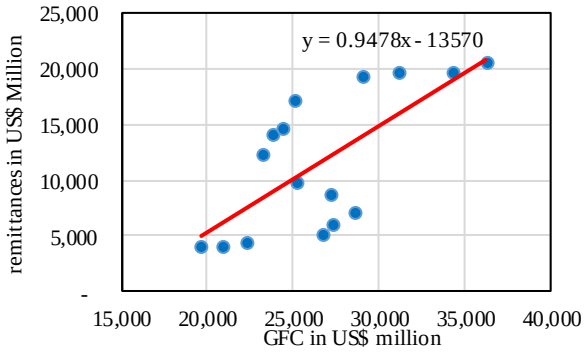
Source: State Bank of Pakistan and Pakistan Stock

Figure 1.b: Correlation between Yearly Workers' Remittances and Mutual Funds (2003-2018)



Source: Mutual Fund Association of Pakistan

Figure 1.C: Correlation between Yearly Workers' Remittances and Gross Fixed Capital Formation (2003-2018)



Source: State Bank of Pakistan and World Bank

Table A1: System GMM Estimates of Impact on Remittances on Income and Investment

	Per Capita Income		Investment to GDP	
	With Investment	**Without investment**	**With Investment**	**Without investment**
Remittances to GDP	0.1295	0.1873*	-0.0029	
	(0.195)	(0.000)	(0.952)	
FDI to GDP	0.0622	0.0031	0.1318*	
	(0.799)	(0.964)	(0.001)	
Money Supply to GDP	1.6776	1.8334*	0.4202*	
	(0.192)	(0.000)	(0.043)	
Population Growth	-1.0276	-1.2963*		
	(0.372)	(0.000)		
Fiscal Deficit to GDP	0.4389	0.3082*		
	(0.229)	(0.005)		
Investment to GDP	-0.7998			
	(0.575)			
Per Capita Income			-0.2962	
			(0.181)	
Telecom (-1)			0.0116	
			(0.691)	
Intercept	2.8076	0.2892	4.5282*	
	(0.673)	(0.880)	(0.002)	