

## **FOREIGN REMITTANCE AND SOURCE OF ECONOMIC GROWTH: Evidence from Pakistan**

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### **Abstract**

The present study aims to analyze the impact of foreign remittance on source of economic growth, namely the physical capital, human capital and the total factor productivity (TFP). There is a substantial literature related to the impact of foreign remittance on economic growth of Pakistan, but there has been dearth of related literature to the impact of foreign remittance on sources of economic growth. The study covers the time span of 1972 to 2013 and employed three estimation techniques, namely, the OLS, FMOLS, and the GMM, to execute empirical testing. Results of the study indicate that, foreign remittance significantly contribute in building physical and human capital of the country, along with improving the TFP.

*Key Words:* Foreign Remittances, GMM, TFP, Physical Capital, Human Capital.

*JEL Classification:* F24, O47.

### **I. Introduction**

The process of globalization has taken place in many aspects throughout many centuries around the world. In a comprehensive way, the phenomenon of globalization is a result of an increasing impact of different forces on human activities. These activities may revolve around economic, cultural, civil, political, biological and technological aspects [Goldin and Kenneth (2006)]. While exploring the relationship between globalization and development, migration of factors of production among countries have been the key focus for researchers. Indeed the global phenomenon of international migration, have been widely recognized but the influence of migration on home countries is always a matter of constant and intense debate. On a pessimistic view migration is held responsible for increasing economic inequalities at international and regional levels [Frank (1966), De Mas (1978), Penninx, (1982)]. Moreover, it is considered an element which tends to bring a decrease in limited resources of trained and qualified labor in less developing countries leading to phenomenon called ‘brain drain’ [Baldwin (1970)]. On an optimistic side, neo-classical migration theorists distinguish migration

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as a method of optimally allocating factors of production which is beneficial for both the home and host countries. In this way the redistribution of factor input (labor in this case), from poor countries to rich industrial economies acts as a mandatory condition for boosting the economic growth. Similarly, the proponents of migration perceive it as a risk sharing act of households and families in order to reduce their risk and widen their income in the form of external remittances [Stark and Levhari (1982)].

Since foreign remittance is significant outcome of external migration, it also qualifies for playing an essential role in accelerating economic growth of poor countries. These external receipts are accounted as one of the leading sources of capital flows to developing economies through formal channels.<sup>1</sup> According to the World Bank (2014), the formally documented inflow of foreign remittance to developing economies has reached to US\$ 435 billion, which shows a 3.4 per cent increase in the previous year's estimates of these receipts. Moreover, estimates of the World Bank (2014) shows that this inflow of remittance have exceeded the other external inflows of Official Development Assistance (ODA) and the Foreign Direct Investment (FDI) in many developing countries. Due to huge magnitude of external remittance flow, they are anticipated to exert substantial macroeconomic impact on economies of the recipient countries.

Regionally, this flow of remittance to South Asia increased more vigorously in 2014 as compared to previous years. The reason for this tremendous increase in foreign receipts was because of revival of employment opportunities in Gulf Cooperation Countries (GCC), for migrants from the South Asian countries [Salahuddin and Jeff (2015)]. In regions of the South Asia and South East Asia; India, Philippines, Bangladesh and Pakistan are the main recipients of these foreign remittances and have experienced a fair growth in its receipts for the preceding three decades [Chowdhury (2011)]. Pakistan has been a major recipient of foreign remittance due to its rising external migration rate, since 1970s. The decade of 1980s was considered to be the golden time in terms of foreign remittance and half of the total foreign remittance (to South Asia) was recorded for Pakistan [Irfan (2011)]. The foreign remittance receipts have shown a declining trend during the decade of 1990s, due to the start of Gulf war, imposition of sanctions and squeezing foreign accounts after atomic explosion. This reduction in external remittance is accounted for high poverty level in 1990s for Pakistan [Siddiqui and Kamal (2002)]. According to Amjad, et al. (2014), the volume of formally recorded receipts of foreign remittance jumped from US\$ 1.5 billion (in 1997-98) to US\$ 14 billion (in 2011-12). The period 2000-02 to 2011-12 registered significant variation and mounting trends in external remittance inflows due to a number of reasons, like measures taken against money laundering by the government of Pakistan, onset of hesitation in Pakistani diaspora after 9/11 attacks and the establishment of Pakistan Remittance Initiative (PRI), by the Government of Pakistan in collaboration with State Bank of Pakistan, to boost the external remittance through formal channels [Amjad, et al. (2014)].

<sup>1</sup> There may be many more transfer of remittance through informal channels of *Hundi* and *Hawala* [World Bank (2009)].

Due to remarkable surge in foreign remittance flow to developing countries, including Pakistan, the policy makers and researchers have focused on exploring their welfare and growth effects on the recipient countries. The receipt of foreign remittance played an important role in forming foreign exchange income, alleviating people out of poverty by easing financial constraints which resulted in easy access to basic education and health facilities for recipients of these receipts. Moreover, if these external receipts are entirely devoted to consumption purpose, even then they contribute in accelerating economic growth through multiplier effects on total demand and national output [Nishat and Bilgrami (1991), Paradhan, et al. (2008)]. Being major recipient of foreign remittance, most literature in remittance growth nexus is based on exploring poverty reduction effects or direct growth effects of these external flows in Pakistan. Both the micro and macro level researches have explored this relationship and found foreign remittances a resilient and significant determinant of economic growth. Inflow of foreign remittance has always contributed in foreign exchange reserves of the country and helped in improving the balance of payments to reduce dependency on external borrowings [Burney (1987), Iqbal and Sattar (2005)].

Importance of foreign remittance in enhancing economic growth can be explained through its effects on sources of economic growth, namely, physical capital, human capital and TFP. The effect of foreign remittance on sources of economic growth is supported, both theoretically and empirically. This important dimension is not well explored in case of Pakistan. The study by Hassan, et al. (2013) is the only work, which explore relationship between remittance and human capital development for Pakistan. They found a negative association between these two variables. The current study attempts to analyze the impact of foreign remittance on three sources of economic growth, namely, physical capital, human capital and total factor productivity (TFP) in Pakistan.

The present study contributes in the relevant body of literature through two main aspects. Firstly, there is an acute shortage of literature on investigating the implications for foreign remittance for three key sources of economic growth; namely, physical capital, human capital and TFP in the country. Limited studies aiming at exploring the effects of foreign remittance on a single source of economic growth are found in Pakistan. By investigation only a single source of economic growth for analyzing the effects of foreign remittance does not provide a better opportunity to estimate foreign remittance and economic growth nexus thoroughly. Thus, the present study attempts to overcome the limitation of existing stock of relevant literature on foreign remittance and economic growth by empirically gauging the role of foreign remittance in shaping the behavior of three key sources of economic growth. Secondly, the significance of the present study is apparent from the fact that it applies three estimation techniques for finding consistent parameter which estimates the models used in the study. This exercise enables to get relatively more concrete evidence with regard to effects of foreign remittance on source of economic growth. The rest of the paper is structured as

follows: Section II presents the literature review and Section III illustrates the methodology and variable descriptions. Section IV is devoted to empirical results and discussions; and finally, Section V concludes the study with policy implications.

## II. Literature Review

A vast body of literature is available which provides different dimensions and sources about foreign remittance impact on economic growth and development. On positive contribution to economic growth foreign remittance affects economic growth through different sources of economic growth. Since in presence of these external receipts, people are more incline to spend on education of their children which helps them in building human capital for recipient economies. This positive relation is supported by many theoretical studies like Brown (2006), de Hass (2007). Similarly, foreign remittance exerts a positives impact on capital accumulation, as recipients have far higher saving level and easy access to financial resources. The role of foreign receipts of remittance in influencing physical capital extends from influencing the size and efficiency of domestic investment to speed up development of financial resources. These effects of remittance on sources of growth are well documented by Barajas, et al. (2008), Guiliano and Ruiz (2009) and Rao and Hassan (2011).

The empirical literature on foreign remittance, however disagree when it comes to contribution of remittance in economic growth. Many migration optimists observed that foreign remittance have a positive impact on economic growth through a number of sources like physical and human capital investment, multiplier effects on total demand and output, and creating more occupational prospects, etc. Adams and Page (2005), Acosta, et al. (2007) and the World Bank (2008) claims that international remittance flows exert a positive effect on balance of payments in many developing countries, as well as they boost the economic growth, by not only enhancing savings and investment in human and physical capital but also through consumption. Ratha (2005) explains that remittance is relatively more firm and less volatile source of international transfers for developing economies. Additionally, this stability of remittance is also effective when these flows are used for investment purpose. Migrants are more inclined to invest in their home country, as compared to foreign investors even during the time of sluggish economic activities, an effect parallel to the home-bias in investment<sup>2</sup> [World Bank (2001)]. Furthermore due to their compensative nature, these receipts work counter cyclically as suggested by Barajas, et al. (2008); thus it seems to act like a strong stabilizer for output volatility in developing economies. The authors concluded a strong and significant negative effect of foreign remittance on the volatility of real GDP growth for a sample of 70 countries.

<sup>2</sup> An effect referring to the propensity of investors to make financial investment in their home country rather than in foreign markets. For more details, see Coval and Moskowitz (1999).

The role of foreign remittance in accelerating physical and human capital has also been focused extensively in the literature. Adams and Cuenca (2010) concluded that households receiving internal or international remittance spend large amount on two investment goods, i.e., education and housing, as compared to what they would have spent for procurement of these goods, without these receipts. The other studies which finds that external remittance transfers a positive driver for productive investment are Drinkwater, et al. (2003), Woodruff and Zenteno (2007), Karagoz (2009) and Balde (2011), among others. Foreign remittance can help in boosting human capital, when invested in education and health. Cordova (2004) and, Edwards and Ureta (2003) shows that higher rate of remittance received by recipient households contribute towards improvement of various indicators of welfare (such as, fall in illiteracy, greater school attainment, etc). McKenzey and Rapoport (2006) declared that migration may have an additional positive impact on education by increasing the returns to schooling and thereby, improving incentives to acquire education. On the same lines, investigating relationship between foreign remittance and human capital accumulation, Calero et al. (2008) have shown that foreign remittance tends to increase school enrollment, especially for girls in rural the areas. Moreover, foreign remittance helps to reduce child-labor to some extent. At the macro-level, Zunhio, et al. (2012) concluded a positive relationship between foreign remittance receipts and increasing education attendance for primary and secondary levels, in a sample of 69 low and middle income countries.

The role of international remittance in influencing TFP growth extends from speeding up the development of financial resources and promoting innovation and technological diffusion in receiving countries. As foreign remittance form a significant source of foreign exchange for developing economies and one of the usage of foreign remittance is to make import disbursements of capital goods and investment by the government [Ahmad, et al. (2009)]. The role of external remittance in augmenting the TFP through the channel of technological diffusion is reported by Salim (1992) for Bangladesh. Another empirical study by Udah (2011) also verifies this impact of foreign remittance on TFP through the channel of technological diffusion. These effects of remittance on productivity are well explained by Barajas, et al. (2008), Giuliano and Arranz (2009) and, Rao and Hassan (2011). On the contrary, according to the pessimistic belief, foreign remittance have either undesirable growth effects or zero impact on economic growth. The main argument against remittance contribution to development is that these are mainly used to finance consumption and housing expenditures. A study by Chami, et al. (2003) of 113 countries showed a negative relationship between growth rate of remittance and the per capita GDP. They suggested that remittance transfers are not only compensatory in nature but also generate motivations that lead to moral hazard problems (i.e., reduction in labor market participation), which in turn hamper economic growth. However, it is disputed that estimates in the study, by Chami, et al. (2003), are biased because of inappropriate use of instruments for solving the

problem of endogeneity [Catrinescu, et al. (2006)].<sup>3</sup> On the same lines, Barajas, et al. (2008) have concluded that foreign remittance inflows tends to improve the living standards of people by pulling them out of poverty but normally it don't turn them into producers. Their results have also shown a negative relationship between remittance and economic growth.

In case of Pakistan, a number of studies have been carried out at micro as well as at macro level with focus on poverty reduction or direct growth impact of external remittance. By comparing the household consumption with and without foreign remittance, Jamal (2004) suggested that external remittance play an important role in reducing poverty. Similarly, Mughal and Diawara (2009) have also concluded that foreign remittance reduce poverty as well as inequality, both at macro and micro levels. Ahmed, et al. (2011) reported that foreign remittance in the short- and long-run come out to be significantly and positively co-integrated to economic growth of Pakistan. Qayyum, et al. (2008) also found that foreign remittance affect economic growth, positively and significantly. Findings of the study have also shown that remittance have a strong and statistically significant impact on poverty reduction and growth while analyzing the effect of remittance on one of the sources of economic growth. Hassan, et al. (2013) found an adverse impact of foreign remittances on human capital formation and suggested that negative impact of foreign remittance is due to absence of parental care in case if the father is living abroad. As far as Pakistan is concerned, literature available on the aforementioned relationship has focused on the economic growth effects or welfare effects of foreign remittance. There is a dearth of macro-economic research conducted on the impact of foreign remittance on different sources of economic growth. This paper fills the gap and contributes to the literature by analyzing the macroeconomic effects of foreign remittances on physical capital, human capital and TFP growth.

### III. Analytical Framework

To achieve objectives of the current study, growth accounting technique has been adopted as a baseline specification. Growth accounting provides a breakdown of observed economic growth into components associated with changes in factor inputs and a residual that reflects technological progress and the other elements. Generally, growth accounting exercise is viewed as a preliminary step for analysis of fundamental sources of economic growth. The production function is written as:

$$Y_t = A_t f(K_t, H_t) \quad (1)$$

<sup>3</sup> In order to deal with the problem of endogeneity, Chami, et al. (2003) have adopted the instrumental variable approach by using ratios of the recipient country's income to US income and recipient country's real interest rate to US real interest rate as instruments.

where  $Y_t$  is an output,  $K_t$  and  $H_t$  represent physical capital stock, and the human capital augmented labor, respectively; and  $A_t$  denotes the TFP. By differentiating the above production function with respect to time, the growth rate of output can be obtained, which is further decomposed into sources of economic growth, namely, improvement in productivity ( $\dot{A}/A$ ) and increase in factor inputs, physical capital ( $\dot{K}/K$ ) and human capital ( $\dot{H}/H$ ). Differentiation of Equation (1) with respect to time and some simplification results in:

$$\frac{\dot{Y}}{Y} = \frac{\dot{A}}{A} + \frac{Af_K K}{Y} \frac{\dot{K}}{K} + \frac{Af_H H}{Y} \frac{\dot{H}}{H} \tag{2}$$

In Equation (2),  $Af_K$  and  $Af_H$  are marginal products of capital and human capital augmented labor, respectively; which are equal to rental and wage rates. If markets are competitive and firms maximize their profits; then,  $Af_K K/Y$  and  $Af_H H/Y$  are shares of compensation to capital ( $\alpha_k$ ) and human capital ( $\alpha_h$ ) in total output, respectively. Therefore, the growth rate of output is decomposed into TFP growth and the weighted sum of the growth of capital and human capital as follows:

$$\frac{\dot{Y}}{Y} = \frac{\dot{A}}{A} + \alpha_h \frac{\dot{H}}{H} + \alpha_k \frac{\dot{K}}{K} \tag{3}$$

Having data on growth rate of output and input along with factors income shares, TFP growth can be measured as residual from the above equation,

$$\frac{\dot{A}}{A} = \frac{\dot{Y}}{Y} - \alpha_h \frac{\dot{H}}{H} - \alpha_k \frac{\dot{K}}{K} \tag{4}$$

As derived from the above growth accounting method, impact of remittances on three sources of economic growth has been analyzed empirically. Determinants of human capital have been taken from the studies of Adeyemi, et al. (2006), Sid-dique (2008), Bildirici, et al. (2005) and Hassan, et al. (2013); while the equation for determinants of physical capital have been adapted from Ghura and Goodwin (2000) and, Acosta and Loza (2005). Moreover, the equation on determinants of TFP has been formulated, utilizing the studies of Khan (2006) Ref.2005, Isaksson (2007), Loko and Diouf (2009). The three independent equations take the following econometric forms:

$$K_t = \beta_0 + \beta_1 Y_t + \beta_2 FR_t + \beta_3 GE_t + \beta_4 IR_t + \beta_5 FD_t + \beta_6 TO_t + \mu_{1t} \tag{5}$$

$$HC_t = \gamma_0 + \gamma_1 PCI_t + \gamma_2 FR_t + \gamma_3 Inf_t + \gamma_4 FDI_t + \gamma_5 EE_t + \mu_{2t} \tag{6}$$

$$TFP_t = \theta_0 + \theta_1 HC_t + \theta_2 FR_t + \theta_3 TO_t + \theta_4 FD_t + \theta_5 FDI_t + \theta_6 RER_t + \mu_{3t} \tag{7}$$

t = 1,2, 3.....42 stands for time period, i.e., 1972-2013.

here,  $K_t$  denotes physical capital taken as gross fixed capital formation as percentage of GDP,  $Y_t$  is real GDP measured in constant *Pk.* Rupee,  $FR_t$  is foreign remittance as percentage of GDP,  $GE_t$  is government expenditures as percentage of GDP,  $IR_t$  is nominal interest rate (annual per centage),  $FD_t$  is financial development measured as domestic credit to private sector as percentage of GDP,  $TO_t$  is trade openness measured as trade as percentage of GDP,  $HC_t$  is human capital index,  $PCI_t$  is real GDP per capita in constant *Pk.* Rupees,  $Inf_t$  is consumer price index taken for inflation,  $FDI_t$  is foreign direct investment (net capital inflows) as percentage of GDP,  $EE_t$  is public expenditures on education measured as per cent of GDP,  $TFP_t$  is total factor productivity, and  $RER_t$  is a real exchange rate.

The dependent variables of the study are physical capital, human capital and the TFP. Gross fixed capital formation is used as a proxy for physical capital, whereas for measuring human capital, index of human capital per person based on years of schooling and returns to education are used. Mostly, the data is retrieved from World Development Indicators by the World Bank. Data for human capital has been taken from the Penn World Tables (PWT) 8.0; whereas, the interest rate data is taken from the International Financial Statistics (IFS). TFP in the level form which has been calculated using the growth accounting method of Hall and Jones (1999). The share of physical capital and human capital for Pakistan has also been estimated using the Johansen co-integration technique. The share of physical capital is equal to 0.53 and that of human capital is 0.46 in the current study. The share of labor is 0.38.<sup>4</sup>

Equation (7) consist of various determinants of TFP including human capital, foreign remittance, trade openness, foreign direct investment and the real exchange rate. The role of human capital in stimulating TFP growth has been supported by many studies, like Nelson and Phelps (1966) explain that human capital can support TFP growth by expediting technology spillover. Moreover, Romer (1990), Aghion and Howitt (1998) and Benhabib and Spiegel (1994) have shown that level of human capital of a country can increase productivity growth through developing domestic technological innovations. Most of the studies have confirmed that inflow of foreign remittance can impact TFP by affecting the size of domestic productive sectors that create dynamic production externalities, as well as through effects on productivity of domestic investment by importing technology and equipment [Chami et al. (2003)]. At aggregate level foreign remittance is considered to provide a substantial source of foreign currency that can be utilized for supporting imports of different types of machinery and equipment. The direct import of high technology personified machinery and intermediate capital goods iare one channel of foreign remittance to affect TFP [Salim (1992)]. Explaining the channels of technological diffusion, Bollard, et al. (2011) and Niimi, et al. (2010), argue that remittance sent by migrants increase the ability of home country to import, invest and promote new technology, hence it improves the growth of TFP.

<sup>4</sup> Results of this regression for TFP calculation are available on request.

Trade openness is one of the major determinants to boost TFP, especially for developing countries. It impacts TFP through its effects on efficiency enhancement, developing domestic technological level by attracting more external capital and technology. According to Miller, et al. (2000), an outward oriented economy has higher TFP as higher openness promotes more specialization and effectiveness in production which improves managerial skills. However, the channel of trade openness is vital for technology transfer but the degree of its implication is dependent on absorptive ability of the recipient countries [Edwards (1998)]. Similar to trade openness, FDI is also regarded as being a crucial channel for transmission of advance technology and better knowledge from developed to developing economies. Alternatively, there are some studies corroborating negative or insignificant relation between FDI and TFP. As multinational firms employ most of the skilled labor from the host countries and hence divest the domestic firms of their services [Aitken and Harrison (1990)]. The basic concept of financial development impacting productivity is given Schumpeter (1912). The main insight is that financial markets improve productivity through effective capital restructuring in the process of creative destruction, moving capital from diminishing to productively flourishing industries. According to Khan (2006) financial sector may impact TFP through quality and quantity channel. The quantity channel mainly focuses on how the financial sector can impact the rate of capital accumulation; whereas, the quality channel explains the significance of financial facilities that can accelerate the rate of technological innovations.

Finally, the association between exchange rate and TFP can be illuminated by Matsuyama's (1992) two sector open economy growth model. According to this model exchange rate depreciation causes an increase in exports growth as exports become cheap for other countries. Therefore, this increase in export will bring many externalities such as learning by doing, better allocation of resources and human capital development which resultantly increases the TFP of a country. Yanikkaya (2003) also validates the relationship between exchange rate and TFP by arguing that imports become expensive due to depreciation which further leads to the cause of inflationary pressure in manufacturing sector which dependent on imported raw material. If depreciation continues for long time, it can produce negative impacts on productivity of that country [Harris (2001)]. However, according to Diallo (2010), real exchange rate appreciation can have either a positive or negative effect on TFP. Due to appreciation of exchange rate, the price of non-tradable goods rises and wages are essential part of them. Appreciation of exchange rate will cause a decrease in relative price of capital; hence business class will move their resources towards more capital intensive factors. Technical efficiency of firms will be enhanced due to availability of the imported capital which will boost the productivity resultantly.<sup>5</sup>

<sup>5</sup> According to the literature, institutions are a strong determinant of TFP but are not included in the model because of non-availability of time-series data. The international country risk guide data for various measures of institutions is available since 1984 which reduces the number of time-series observations in the study; therefore, the variable is excluded.

For analyzing the impact of foreign remittance on sources of economic growth, Equations 5, 6 and 7 are separately estimated utilizing the Generalized Methods of Moments (GMM) and cointegration technique of Fully Modified Ordinary Least Squares (FMOLS), together with the basic technique of Ordinary Least Squares (OLS). GMM is relatively advantageous in time series applications because serial correlation in the errors is most important departure from the point of common textbook assumptions. This raises the possibility of allowing GMM weighting matrix to account for serial correlation of unknown form, as well as for heteroskedasticity, as discussed by Hansen (1982), White (1984) and, Newey and West (1987). Secondly, the particular form of the model [given by Equations (5), (6) and (7)] is based on three equations, and each endogenous variable is a function of both the endogenous and exogenous regressors. This make the application of GMM estimation technique more appropriate as compared to vector auto-regression technique (VAR) because the later treats each variable as endogenous. Finally, the technique of GMM permits for a broader range of internal instruments to be used for controlling the possible endogeneity of the explanatory variables [Wooldridge (2001)]. Due to the small sample size of the study, it is therefore plausible to apply FMOLS, a co-integration technique developed by Phillips and Hansen (1990). Use of FMOLS is appropriate in the presence of unit root and endogenous regressors [Levin, et al. (2002)].

#### IV. Results and Discussion

In this study the Chow breakpoint test has been employed for stability analysis which is performed on the data. To investigate the presence of a structural breakpoint, one of the most frequently test in time series studies is the Chow test [Farhani (2012)]. The year 1988 was selected as a breakpoint for all the three models, when Structural Adjustment Program was being implemented with the assistance of International Monetary Fund (IMF), conditionality for economic aid programs [Husain (2002)]. Results

**TABLE 1**  
Results of the Chow Breakpoint Test: Time Series 1972-2013

Model	F-Stats.	Prob. F (8,25)	Log likelihood Ratio	Results
Physical Capital Equation (5).	1.637	0.208	1.685	Do not reject $H_0$ at 10% level of significance.
Human Capital Equation (6).	0.622	0.750	7.451	Do not reject $H_0$ at 10% level of significance.
TFP Equation (7).	1.482	0.213	13.243	Do not reject $H_0$ at 10% level of significance.

Note:  $H_0$  Parameters are structurally stable. Year of Break 1988.

Source: Authors' own estimation.

of this Chow breakpoint test are reported in Table 1; which shows no evidence of structural instability in each of the models at 10 per cent level of significance. The second diagnostic test performed on the data is the unit root test. Stationarity property of the data has been checked using the Augmented Dickey Fuller Test (ADF). Results of this test are reported in Table 2, indicating that all variables of the three models are stationary at first difference, i.e., integrated of order (1).

To begin with results, the first model of regression analysis include determinants of physical capital including focused variable of foreign remittance. Results of this model are presented in Table 3. Starting with GMM estimation and focusing on the variable of interest, foreign remittance show significant and positive impact on investment, illustrating that 1 per cent increase in foreign remittance inflows increase the physical capital by 0.08 per cent. Similarly, the estimates for foreign remittance under FMOLS and OLS also validate the positive relationship between the capital accumulation and foreign remittance. These results demonstrate that inflow of external remittance to developing countries promote productive investment by easing credit constraints, both at micro and macro level. Massey and Parrado (1998), Ilahi (1999), McCormick

**TABLE 2**  
Augmented Dickey Fuller (ADF) Unit Root Test: (1972-2013)

Variable	Level	First Difference	Order of Integration
$Y_t$	-1.878	-4.045	I (1)
$K_t$	-2.101	-4.881	I (1)
$HC_t$	-1.275	-5.595	I (1)
$FR_t$	-1.324	-8.521	I (1)
$Inf_t$	-1.677	-3.845	I (1)
$TO_t$	-0.915	-7.322	I (1)
$FDI_t$	-1.779	-4.267	I (1)
$GE_t$	-0.623	-7.481	I (1)
$IR_t$	-2.166	-5.730	I (1)
$FD_t$	-1.518	-4.910	I (1)
$PCI_t$	-0.919	-5.428	I (1)
$EE_t$	-1.812	-5.860	I (1)
$TFP_t$	-1.588	-4.948	I (1)
$RER_t$	-0.924	-4.214	I (1)

Note: 1% critical value: -3.60

Source: Authors' own estimation.

and Wahba (2001), Mesnard (2004) and Mim and Ali (2012) have also provided the evidence of a significant and positive relationship between physical investment and foreign remittance. Moreover, Adams (1998) in his study for Pakistan, discovers that recipient households are mostly expected to invest in irrigated farmlands as compared to non-recipient households, which enhances the overall investment, as well.

The variable of real GDP is positively and significantly affecting investment. The coefficient shows that with every 1 per cent increase in GDP, investment increases by 0.91 per cent. This outcome is in line with the accelerator theory of investment and supports the findings of Ghura and Goodwin (2000), Ouattara (2004), Frimpong and Marbuah (2010), Ajide and Lawanson (2012). In contrast to the coefficient of real GDP, the coefficient for interest rate is very low, though negative and statistically significant; thus it verifies the neoclassical theory of investment. The size of estimated coefficient for interest rate is 0.05 and, it is significant at 10 per cent. Focusing on the next determinant of physical capital, public sector is believed to play a large part in economic

**TABLE 3**  
Determinants of Physical Capital: Pakistan (1972-2013)

Regressors	GMM (a)	FMOLS (b)	OLS (c)
$Y_t$	0.917*** (2.652)	1.111*** (3.718)	1.026*** (3.376)
$FR_t$	0.081*** (5.906)	0.025*** (4.168)	0.055*** (3.323)
$GE_t$	-0.286** (-2.131)	-0.336*** (-3.139)	-0.608*** (-5.289)
$TO_t$	2.666*** (3.930)	0.461** (2.687)	0.085 (0.455)
$FD_t$	0.020*** (3.490)	(0.013)*** (5.406)	0.020*** (6.091)
$IR_t$	-0.052* (-1.954)	-0.022*** (-3.902)	-0.013* (-1.990)
$C$	12.931 (5.211)	12.132 (6.525)	6.869 (3.823)
$R^2$	0.951	0.983	0.972
Adjusted $R^2$	0.962	0.976	0.963
J-statistics (p-value)	0.273	-	-
Durban-Watson Stat.	-	-	1.950

Note: (1) Figures in the parenthesis are t values. (2) \*, \*\* and \*\*\* denote significance at 10%, 5% and 1% respectively. (3) Instrument List: LK (-1) LTO (-2) LHC LFR LINF LTO FDI.

Source: Authors' own estimation.

activity through public sector investment or government expenditures. However, it may boost investment by providing good infrastructure (crowd in) and can crowd out the private investment if consumption expenditures are drastically increased and financed by deficit. The result of Table 3 shows a negative and statistically significant coefficient for government expenditures in all the three estimations. It implies that investment declines by 0.33 per cent with every one per cent increase in government expenditures which may have detrimental the impact due to exploitation of resources in unproductive uses. Ghani and Din (2006) have reported that public expenditure affect private investment, negatively in Pakistan.

The coefficient of trade openness is positive and significant, depicting that with 1 per cent increase in trade openness, physical capital increases by 2.66 per cent. This proposes that trade openness play an essential role in augmenting physical capital through improving exports and diversifying import capability of developing economies. Further, reduction in trade barriers encourages transfer of ideas and fosters competition in input markets leading to higher physical capital stock in the country [Skipton (2007)]. Results in Table 3 shows that financial development also affects physical capital positively and significantly, though with a coefficient size of 0.02. Results may indicate that well-developed financial system provides improved capability to consider investment projects for sustainable economic growth [Hansson and Jonung (1997)]. This result is aligned with findings of Chaudhary (2007), which also confirm positive relationship between investment and financial development for Pakistan.

The next focused source of economic growth is human capital that gained considerable importance in growth theories, as an endogenous growth theory which highlights the importance of human capital formation and take it as a factor which illuminates the difference in economic growth performance of the developed and developing countries [Romer (1990), Lucas (1988) and Rebelo (1991)]. Results on determinants of human capital for Pakistan are reported in Table 4. The variable of foreign remittance forms a positive and significant relationship with human capital. It implies that receipts of external remittance contribute in education of recipient household's children by easing their credit constraints. This helps in building human capital which ultimately enhances economic growth of the country. The estimated coefficient shows that 1 per cent increase in foreign remittance will cause 0.04 per cent increase in human capital. Hanson and Woodruff (2003) confirm positive relationship between remittance and educational attainment. Among others, Edwards and Ureta (2003), Cordova (2005), McKenzie (2006) and Udah (2011) also validate this positive association between foreign remittance and human capital.

Results of Table 4 shows, that per capita income and educational expenditure are positively and significantly affecting human capital. The estimated coefficient of per capita income is 0.58 and is significant at 1 per cent level of column (a), Table 4. It implies that one per cent increase in per capita income will bring 0.58 per cent increase in human capital formation. Results for the variable of educational expenditures shows

that with one per cent increase in this variable, human capital will increase by 0.07 per cent. Positive relationship between per capita income and educational expenditures is also supported by Anand and Ravallion (1993), and Siddique (2008). Similarly, the positive impact of public expenditures on provision of education and health facilities on human capital development have been observed by Anand and Ravallion (1993), Prabhu (1999) and Jamal and Khan (2002). It has been argued that developing countries can enhance their human capital through spending more on education and health. Among others, Chin and Chou (2004), Adeyemi, et al. (2006) and Baldacci, et al. (2008) have concluded that public expenditures on social infrastructure have positive influence on human capital development. Contrary to this, inflation has a negative and significant impact on human capital. This result is consistent with theoretical work of Wang and Yip (1992), Gillman and Kejak (2001) and Chang (2002). They have developed monetary growth models with endogenous human capital which shows that inflation influence human capital either negatively or neutrally. Another strand of literature namely, De Gregorio (1992) and Temple (2000), explain this negative relationship between inflation and human capital as during the time of high inflation, individuals move towards the financial sector instead of going for education and this

TABLE 4

Determinants of Human Capital: Pakistan (1972-2013)

Regressors	GMM (a)	FMOLS (b)	OLS (c)
$PCI_t$	0.586*** (5.654)	0.497*** (5.115)	0.067*** (3.167)
$FR_t$	0.043*** (2.90)	0.017* (1.823)	0.003* (2.466)
$Inf_t$	-0.485*** (-3.465)	-0.413*** (-3.215)	-0.160*** (-5.084)
$FDI_t$	0.006 (0.529)	0.016 (1.394)	-0.001 (-0.407)
$EE_t$	0.075** (2.306)	0.074*** (3.157)	0.018*** (3.385)
$C$	1.715 (3.335)	1.404 (2.844)	0.333 (2.123)
$R^2$	0.987	0.983	0.980
Adjusted $R^2$	0.984	0.971	0.974
J-statistics (p-value)	0.287	-	-
Durban-Watson Stat.	-	-	1.931

Note: (1) Figures in the parenthesis are t values. (2) \*, \*\* and \*\*\* denote significance at 10%, 5% and 1% respectively. (3) Instrument List: LPCI (-1 to -2) LFR (-1 to -2) LINF (-1) FDI (-1).

Source: Authors' own estimation.

might undermine the productivity of schooling and cause reduction in human capital.<sup>6</sup> In addition to this, Khan and Rana (2014) also found that inflation affects human capital investment adversely in a panel study of 104 developed and developing countries. Finally, FDI is found to be insignificant determinant of human capital (Table 4). In case of developing countries, usually the FDI has very small or no effect on level of human capital due to poor social and economic infrastructure.

The third source of economic growth to be analyzed for possible impact of foreign remittances is TFP. Table 5 reports the results obtained by estimating Equation (7) regarding determinants of TFP. In results of column (a) with GMM estimation technique, foreign remittance is positive, but it is insignificant. This result is in line with Senbeta (2013), who found an insignificant effect of remittance on TFP. According to Abdih,

**TABLE 5**  
Determinants of Total Factor Productivity in Pakistan (1972-2013)

Regressors	GMM (a)	FMOLS (b)	OLS (c)
$HC_t$	1.461*** (9.280)	1.422*** (8.898)	1.404*** (8.373)
$FR_t$	0.023 (0.896)	0.048* (2.022)	0.044* (1.928)
$FD_t$	0.349** (2.283)	0.501*** (4.426)	0.444*** (4.083)
$TO_t$	0.832*** (8.423)	0.831*** (5.126)	0.785*** (4.996)
$RER_t$	0.297*** (3.185)	0.003*** (2.986)	0.003*** (3.091)
$FDI_t$	-0.026 (-0.952)	-0.020 (-1.117)	-0.012 (-0.653)
$C$	1.271 (4.204)	1.642 (3.246)	2.013 (3.825)
R <sup>2</sup>	0.898	0.943	0.948
Adjusted R <sup>2</sup>	0.879	0.934	0.939
J-statistics (Prob)	0.207	-	-
Durban-Watson Stat.	-	-	-

Note: (1) Figures in the parenthesis are t values. (2) \*, \*\* and \*\*\* denote significance at 10%, 5% and 1% respectively. (3) Instrument List: LHC(-1 to -2) LFR LFD(-1 to -3) LTO LRER.

Source: Authors' own estimation.

<sup>6</sup> Aiyagari, et al. (1998) give an interesting empirical explanation of this relation. They show that there is a robust positive relationship between employment share in the financial sector and inflation in high inflation countries like Brazil, Argentina and Israel.

et al. (2008), the insignificant impact of foreign remittance on TFP can be explained through the fact that effective utilization of foreign remittance is dependent on the presence of quality institutions, sound fiscal policies and government accountability which may not be the case for Pakistan. Therefore, the positive effects of this external capital flow will go unnoticed and would gain from such resources that may proceed to activities, other than those for which they are expected.

However, the estimated coefficient of foreign remittance with FMOLS and OLS techniques is positive and significant with coefficient values of 0.048 and 0.044, respectively. The role of foreign remittance in enhancing TFP through the channel of technological diffusion is also observed by Salim (1992), Ahmad et al. (2009) and, Siddiqui and Kemal (2006). As foreign remittance income forms a significant source of foreign exchange for developing countries, it has considerable growth impact, both at micro and macro level. At macro level one of the use of foreign remittance is to make import disbursements of capital goods and investment by the government [Salim (1992)]. A major share of external remittance inflow is consumed on investment in trade and industry and to sponsor imports of investment goods like machinery and equipment [Ahmad, et al. (2009)]. Similarly, Siddiqui and Kemal (2006) argue that any decline in flow of foreign remittance is expected to affect productivity growth and trade liberalization, negatively by restraining the inflow of imports. Another empirical study by Udah (2011) also confirms this impact of foreign remittance on TFP through the channel of technological diffusion. The next determinant of TFP reported in Table 5 is human capital, which is positively and significantly affecting TFP. The coefficient of human capital with GMM estimation is 1.46 and is significant at 1 per cent level of significance. Rath, et al. (2014), also confirmed this positive and significant impact of human capital on TFP for Pakistan with coefficient of 0.56. These findings show that educated and skilled labor force is more capable of utilizing new techniques of production and thus increases the overall efficiency of economy.

The estimated coefficient for trade openness under GMM is positive and highly significant and implies that one per cent increase in this variable will increase the TFP by 0.83 per cent. The results support the previous literature, like Miller, et al. (2000), Chand and Sen (2002), Khan (2006). Miller and Upadhyay (2000) showed that an outward oriented economy is characterized with higher TFP as higher openness promotes more specialization and effectiveness in production. Sachs and Warner (1995) also concluded positive impact of trade openness on TFP using a composite openness index. The results of FMOLS and the OLS techniques in columns (b) and (c) also show similar impact of trade openness on TFP.

The financial sector development can affect the TFP through many channels. It encourages people to save more and add up in capital accumulation, which further impact the TFP positively. Moreover, it encourages technological innovation due to easy availability of financial resources, and increases TFP [Khan (2006)]. Additionally, a well-established financial system can also help in increasing the marginal productivity

of capital through efficiency improvement effects [King and Levine (1993)]. The coefficient of financial development is significant and positive as presented in Table 5 (in all three columns). The size of estimated coefficient of financial development in column (a) is 0.34 and is significant at 1 per cent level. It illustrates that with one per cent increase in financial development, the TFP will increase by 0.34 per cent. The positive and significant impact of financial development on TFP was previously concluded by Alfaro, et al. (2009), Christopoulos, et al. (2004) and Khan (2006). Results in column (b) and (c) also depict a positive and significant impact of financial development on TFP. The variable of real exchange rate shows theoretically positive and significant relation with TFP. The coefficient of this variable shows that 1 per cent increase in this variable will cause 0.29 per cent increase in TFP. This result implies that exchange rate depreciation increases the TFP in case of Pakistan. This result is aligned with the theoretical work of Matsuyama (1992). Yanikkaya (2003) also validates this relationship between exchange rate and TFP for a cross country analysis of 100 developed and developing economies. The results in columns (b) and (c) in Table 5 also confirm this relationship between exchange rate and TFP for Pakistan.

## V. Conclusion

The present study has contributed to the literature on macroeconomic impact of foreign remittance by focusing on the impact of this external capital inflow on sources of economic growth of Pakistan for the time period of 1972 to 2013. Based on the growth accounting framework, three sources of economic growth namely, physical capital, human capital and total factor productivity (TFP) have been focused for the possible impact of foreign remittance. The study employs the GMM estimation technique on three independent equations for determinants of physical capital, human capital and TFP. Robustness of results have been checked using FMOLS and OLS of the estimation techniques.

Empirical results confirm the positive impact of foreign remittance on physical capital, human capital and TFP. Findings of the analysis are consistent in all the aforementioned techniques. The difference arises only in case of TFP model, where foreign remittance has no impact on productivity under GMM method, whereas the affect on TFP is positively and significantly under the FMOLS and the OLS. These findings are in line with reports of IMF and the World Bank which state that international remittance have potential to contribute to economic growth of developing economies by aggregating investment, building human capital and complementing TFP through different mechanisms.

Based on the analysis, the study recommends that it is rational for government to motivate recipient households to invest in education by improving education policies and providing better infrastructure. Similarly, for a considerable impact of foreign remittance on physical investment, a firm and stable financial sector would produce

more benefits and facilitate the requirements of recipients of foreign remittance for productive investment. Finally, to improve the impact of foreign remittance on TFP growth it is imperative to improve the functioning of public institutions, enforcement of rules and regulations, accountability of public organizations and political stability. By implementing such policies brain gain effects may dominate the brain drain effects.

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