Remittance and domestic labor productivity: evidence from remittance recipient countries

Al Mamun, Md. and Sohag, Kazi and Uddin, Gazi Salah and Shahbaz, Muhammad

East West University, Bangladesh, The National University of Malaysia, Linköping University, Sweden, COMSATS Institute of Information Technology, Lahore, Pakistan.

11 January 2015

Remittance and domestic labor productivity: evidence from remittance recipient countries

Md. Al Mamun
East West University, Bangladesh.
E-Mail: mamunacademic@gmail.com, alm@ewubd.edu

Kazi Sohag
The National University of Malaysia
E-Mail: sohagkaziewu@gmail.com

Muhammad Shahbaz
COMSATS Institute of Information Technology,
Lahore, Pakistan.
Email: shahbazmohd@live.com

Gazi Salah Uddin
Linköping University, Sweden
E-mail: gazi.salah.uddin@liu.se

Abstract
For countries with significant labor force like China, India, Bangladesh, Pakistan etc. any long-run growth strategy should focus on augmenting the domestic labor productivity. The advent of globalization and factor mobility has given a recipe to reap up gains from labor abundance for most of the labor abundant countries by strategically converting abundant labor into capital. However, remittance inflow may become counterproductive strategy for growth, if it is viewed within the work-leisure framework. Using heterogeneous non-stationary panel data with cross-sectional bias this empirical study explores the best fitted estimator to explain remittance and labor productivity dynamics for 21 top remittance recipient countries of the world. Our results suggest that though remittance has a positive impact on domestic labor productivity; however, there is new evidence that such impact diminishes after certain level.
Keywords*:* Labor productivity, Foreign Remittance
JEL Classification: C5, F2, F24, F41, F43, J40, O10.

I. Introduction

Since Levitt (1983) coined the term 'globalization of the market', it was not Coke or Pepsi but also human kind of skilled, semi-skilled and unskilled irrespectively which found new opportunities in new markets. Migrant workers especially form countries like Africa, Asia, Eastern Europe, Latin and Central America, and Central Asia started to move to America, Europe and Middle East for better life and opportunities. Today the size of global remittance is $414 billion with a growth rate of 6.3% and KSA and USA alone reimburse around $75 billion to rest of the world as remittances payment (World Bank, 2013). According to World Bank (2013), developing countries received about 75% of global remittances and supplied 80% of the global migrant workers in 2013. Though, Stark (1991) exposed that there exists no general theory of remittances, however, Lucas and Stark (1985), Poirine (1997) and others have nicely explained the economic reasons for such an enormous increase in the global flow of remittances. Lucas and Stark (1985) termed the motivations to remit as 'tempered altruism' and 'enlightened self-interest' phenomenon and stated'….*certainly the most obvious motive for remitting is pure altruism-the care of a migrant for those left behind. Indeed, this appears to be the single notion underlying much of the remittance literature*'. Besides, Lucas and Stark (1985) also suggest that migrants may have investment that needed to be taken care of while they are away, so they will ask their family members to work as an agent, and the remittance represents both a compensation for the agents and a principal for investment need. However, Poirine (1997) considered remittances within a family loan agreement structure phenomenon, a phenomenon where the family finances the migration of some of its family member. Remittances, therefore, is the installment to repay such loan.

No matter why remittances inflows, there is a wider economic and social impact of remittances on both the recipient and sending countries. Although a number of empirics over the last two decades have shed light on the impact of remittances, a very few of them have explored the possibility that remittances and domestic labor productivity may be integrated. Therefore, given the increasing size of global remittances flow, a study on remittances and labor productivity merits investigation for a number of reasons: *First*, literatures over the last two decades have shed light on the impact of remittances inflow by focusing on some particular areas of interest. These include remittances and financial development (Shahbaz et al. 2007, Nyamongo and Misati, 2011; Aggarwal et al. 2010), remittances and sustainable economic development like welfare effect (Gupta, 2009; Siddiqui and Kemal 2006; Adams and Page 2005; Adam, 1993); economic growth effect (Taylor and Wyatt, 1996; Esman et al. 2012); increasing consumption

effect (Quartey and Blankson 2004); human capital formation (Edwards and Ureta, 2003; Hanson and Woodruff, 2003); remittances and education and schooling (Calero et al. 2008; Richard et al. 2010); remittances and Dutch disease (Acosta et al. 2009; Bourdet and Falck, 2006; Lartey et al. 2008; Vargas-Silva, 2009 etc.), remittances and real exchange behavior (Amuedo-Dorantes and Pozo, 2004; Chami et al. 2003) etc. Studies on remittances and financial development conclude that remittances channeled through the formal financial channel affect the its growth by standardizing the local banking sector up to the international standard following global practices (Nyamongo and Misati 2011; Aggarwal et al. 2010, Shahbaz et al. 2007).

Studies on remittances and socio-economic development like Gupta, (2009), Siddiqui and Kemal (2006), Insights (2006) and Adams and Page (2005) argued that remittances has both a welfare effect (via directly alleviating poverty of the recipient family) since the 'really deprived' households are more likely to engage in international migration, and they end up with relatively 'better-off' position with remittances (Stark and Taylor, 1989; Adam 1993). Adam and Page (2005) in a comprehensive study using 71 developing countries data concluded that both international migration and remittances significantly reduce the level, depth, and severity of poverty in the developing countries. Quartey and Blankson (2004) reported that remittances are countercyclical, and very effective in maintaining a smooth households' consumption, continuous welfare especially for the most disadvantageous group of people. Gupta, (2009) working with Sub-Saharan African data also documented a direct poverty-mitigating effect of remittances. Giuliano and Ruiz-Arranz (2009), and Jongwanich (2007) unveiled that the impact of remittances is prominent in developing countries with a higher level of higher poverty and lower level of financial development. Besides, Edwards and Ureta (2003), Hanson and Woodruff, (2003) find evidence for 'forward' linkages between remittances and human capital formation in Latin America such as human capital development (Calero et al. 2008; Richard et al. 2010). Esman et al. (2012) documented a significant positive growth economic effect of remittance in 36 African countries.

The above empirics suggest that there is a study gap in the literature. Virtually all the studies ignore the possible impact of remittances on domestic labor productivity at macro level. Though Bayangos and Jansen (2011) using the experience of Philippines showed a significant positive effect of remittances on the domestic labor market and its competitiveness; however, the study does not account the effect of remittances on the labor productivity. Besides, McCormick and Wahba (2000) in their theoretical model though present a complete utility maximizing decision

process to migration; however, the study failed to account the fact that an optimum decision must compensate the lost production at home due to potential high under-employment, an appreciation of the real exchange rate causing so-called Dutch disease effect (Acosta et al. 2009; Bourdet and Falck, 2006; Lartey et al. 2008; Vargas-Silva, 2009). Furthermore, McCormick and Wahba (2000)'s decision process is applicable only at micro level, and it does not consider the impact of remittances on domestic labor productivity for the recipient countries at macro level.

Second, most countries receiving remittances are low and middle income countries. The use of remittances as documented by Mamun and Nath (2010) may lead to reduce the requirements for further earning of the migrant's family members. In fact, remittances is a non-wage income and a substitute for wage income. So, using a labor-leisure framework, it can be shown that with an increase in remittances receipt households substitute labor with leisure. This may lead to low domestic labor participation and employment (Rodriguez and Tiongson, 2001; Amuedo-Dorantes and Pozo, 2006; Airola, 2008; Bussolo and Medvedev, 2007) leading to high under-employment and low labor productivity especially in labor intensive countries. Besides, there is a strong economic argument that the remittances may have a negative impact on economic growth especially when remittances inflow appreciates local currency against foreign currencies and thus reduces the international competitiveness of the domestic products (Amuedo-Dorantes and Pozo, 2004; Chami et al. 2003). The appreciations of local currency can also lead to increased consumption of foreign goods by local consumers creating an environment where local industrial production will be replaced by the foreign products. So, remittances can reduce local productivity including the productivity of the labor force. So the apparent gain from remittances may itself become counterproductive for most of the countries.

Third, Barua et al. (2007) argued that, remittances can also generate employment domestically through the reinvestment of remittances-induced national savings, capital accumulation, and investment. So, there is direct, trickle down, and indirect benefits of remittances for many of the developing countries. Barai, (2012) also points that the development impacts of remittances on economy and society are affected by the manner remittances are put to use. Alternatively, remittances can optimize the existing sub-optimum labor-capital ratio; therefore, given the level or stock of technical knowledge, remittances can augment total domestic productivity including the productivity of domestic labor. This argument is consistent with Solow's (1957) classical growth estimation. It is important to note that most of the remittances recipient countries share some common characteristic i.e. abundance of labor forces (i.e. India, China, Pakistan, Bangladesh, Indonesia, etc.), as well as shortage of capital, therefore, any long-run growth

strategy for these countries must be based on augmenting the long-run productivity of these labor forces. Migration generally reduces the size of the labor force in the domestic market while remittances increase the capital stock of these economies. Therefore, it has the potential to convert strategically the abundant labor force into capital and optimize the suboptimal capital-labor ratio for most of these countries. This can significantly improve the productivity of domestic labor force. Moreover, most of the countries receiving remittances compete internationally against one another to take the lion share of the global size of remittances. Thus, it is natural that these competitions will lead to a type of cross-sectional dependence among them in terms of the size of remittances flow. Despite these appealing and contradictory conceptual arguments above, there is hardly any study undertaken to explore the long-run impact of remittances on domestic labor productivity in top remittances earning countries with abundant labor force.

II. Conceptual Framework

How remittances influence domestic labor productivity can be explained by the Cobb-Doglus production function, Y = $F(K, AL)$. Where Y= Output, K = capital stock (fixed capital formation plus remittance are regarded the proxy of capital) and L = Labor. Following Romer (2006), it is assumed that labor of these sample countries as effective labor (AL) since most of these economies are open economies and modern technologies are readily available to improve the knowledge stock of the domestic labors. Thus the output from per unit of the effective labor is given as:

$$\frac{Y}{AL} = F(\frac{K}{AL}, \frac{AL}{AL}) = F(\frac{K}{AL}, 1) \ldots\ldots\ldots\ldots (1)$$

Here $\frac{\mathrm{Y}}{\mathrm{AL}}$ = Output per unit of effective labor, and $\frac{\mathrm{K}}{\mathrm{AL}}$ = capital per unit of effective labor

Let's denote $y = \frac{Y}{AL}, k = \frac{K}{AL}, and$, hence it can be rewritten as $y = f(k)$. Moreover, output per unit of labor $\frac{Y}{AL}$ depends on amount of capital a labor consumes $\frac{K}{AL}$. Now let's see how remittance enters into this output function:

$$\dot{K}(t) = sY(t) - \delta K_{t-1} + \mathcal{R}_t \ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Where, $\mathcal{R}_t$ = Remittance inflow at time t. Moreover, the labor supply function in the presence of migration is defined as:

$$\dot{L}(t) = L_t + nL(t) - L_{mt} \ldots\ldots\ldots\ldots\ldots (3)$$

Where, $\dot{L}(t)$ = Labor supply, n is the labor growth rate, L_{mt} = numbers of labor migrate overseas at time t. Assuming the idea of frictionless international financial markets where the transaction cost is negligible or zero, remittances inflow function can be written as:

$$R_{et} = f(\gamma * \bar{w}(L_{mt}) * ER_t) \ldots\ldots\ldots\ldots\ldots (4)$$

Where, R_{et} = remittance inflow at time t, γ = marginal propensity to transfer of money earned by the migrant workers from foreign economy into their local economy, $\bar{w}$ = average wage rate; L_{mt} = number of migrants labor in foreign economy at time t of a particular country; ER_t = real exchange rate time t. Furthermore, following the framework of Barai (2012), the remittances consumption function can be derived as:

$$R_{ct} = C + R_{Bt} + R_{ht} \ldots. (5)$$

Where, C = consumption for goods and services out of remittances earning, R_{Bt} = use of remittance as investment into productive sector, R_{ht} = use of remittances in investment for human capital development. Therefore, incorporating a portion of remittances in the local stock capital, the following capital-labor ration can be derived:

$$k = \frac{sY(t) - \delta K_{t-1} + R_{Bt}}{L_t + nL(t) - L_{mt}} \ldots\ldots\ldots\ldots\ldots\ldots (6)$$

To make this simple, we are not considering the inflow of labor in these markets and outflow of remittances from these countries. As can be seen from the equation 6, migration of labor has two effects: firstly, remittances inflow (R_{Bt}) is on the numerator of the equation 6 with positive sign indicates that it augments the capital stock of the country; secondly, migration of labor (L_{mt}) lowers the labor force in the domestic economy as L_{mt} lies at denominator with negative sign. The combination of these two effects would surely optimize the capital labor ratio to improve the overall economic productivity including the productivity of domestic labor. This is because according to standard endogenous Solow growth model, Y/AL depends on the k/AL ratio. Higher the ratio k/AL ratio, higher will be the MP_L up to stable point. Since, k/AL ratio is expected to be at below stable level for most of the sample countries with abundance of labor

force in our study, any increase in k is expected to work positively to increase the marginal productivity. Therefore, we can simplify the relationships as:

$$\begin{bmatrix} R_B \xrightarrow{\text{influcence}} \frac{K}{L} \\ R_h \xrightarrow{\text{influence}} A \\ C \xrightarrow{\text{increases}} AD \end{bmatrix}$$

Here, R_B refers the investment into productive sector, which will increase $\frac{K}{L}\uparrow$. Secondly, R_h indicates the investment into education, training etc. which will increase effectiveness of labor i.e. $A\uparrow$. Lastly, $C \xrightarrow{\text{influence}} AD$ indicating that, remittances inflow affects the aggregate demand positively. Though, in short run such increase in the aggregate demand may have a negative impact on overall economy, because remittances recipients may offer higher price for obtaining goods and services thereby increasing inflation according the classical school of thought, hence the utility of the other poor segment of the economy would fall (which is a question about social justice!); However, according the Keynesian school of thought, this sort of impact would be positive for the overall economy. Finally, though remittance increases local consumption and it can possibly lead to appreciation of local currency as well. Such an appreciation of local currency would lead to reduction of local productivity in tradable sector. Therefore, the inclusion of real exchange rate in our analysis is important to fully figure out the possible impact of remittance on the domestic labor productivity.

III. Data and Methodology

Most empirical studies including Weiss (1993) and Jeanneney and Ping (2011) defined labor productivity as the output per worker. While others defined labor productivity as the ratio between GDP expressed in 2000 constant prices and employed population. However, in this study domestic labor productivity is defined as the real GDP contribution per economically active population i.e. real GDP chain per workers (RPW)[1]. But in defining economically active population the study remains remain traditional i.e. traditional household workers especially women has not been considered as economically active labor force. The study considers RPW as the dependent variable, personal remittances received from abroad (normalized by GDP) i.e. REM is the primary endogenous variable. Other endogenous includes domestic fixed capital

[1] http://pwt.econ.upenn.edu/Documentation/append61.pdf

formation (FC), real exchange rate (RER) against most dominant international currency i.e. US dollar. The study used data from a variety of sources including World Bank, and ILO (international labor organization). The dataset ranges from 1980-2012 include 21 top most remittance recipient countries with the availability of substantial labor force.

III.I Cross-sectional dependency and unit-root test

In recent year, various panel unit root test methodologies have grown. For example, the first-generation panel unit root tests methodologies (Maddala and Wu, 1999; Levin et al. 2002; Im et al. 2003) based on the assumption of the cross-sectional independence across units; the second-generation unit root tests methodologies (Bai and Ng, 2004; Smith et al. 2004; Moon and Perron, 2004; Choi, 2006; Pesaran, 2007) with the assumption of cross-sectional dependence across units, and finally, panel unit root test methodologies those accounts for structural breaks in the panel. Therefore, this study initially employs cross section dependence (CD) test developed by Pesaran (2004) test to investigate contemporaneous correlation across countries and to appreciate the types of unit root test to be applied and the types of cointegrating methodology to be persuaded.

Indeed cross-section dependence in macro panel data has received a great attention recently. Moreover, the presence of CD is the pre-requisite of the application of common correlated effect mean group (CCEMG) and augmented mean group (AMG) approaches. The null hypothesis of Pesaran (2004) CD test is cross-sectional independence against the alternative hypothesis of cross-sectional dependence among the respective countries. The test is done using the following equation:

$$CD = \left[\frac{TN(N-1)}{2}\right]^{1/2} \bar{\hat{P}} \quad \ldots\ldots\ldots\ldots (7)$$

Where, $\bar{\hat{\rho}} = \left(\frac{2}{N(N-1)}\right) \sum_{i=1}^{N-1} \sum_{j=i+1}^{N} \hat{\rho}_{ij}$, here $\hat{\rho}_{ij}$ indicates the pair-wise, cross sectional correlation coefficient of the residuals comes from the ADF regression. N and T indicate cross section and time dimension respectively. After calculating the CD statistics the next step is to estimate following cross-sectional augmented Dickey-Fuller regression:

$$\Delta y_{it} = \alpha_i + K_i t + \beta_i y_{it-1} + \gamma_i \bar{y}_{t-1} + \phi_i \Delta \bar{y}_t + \varepsilon_{it} \quad \ldots\ldots\ldots\ldots (8)$$

Here, $t = 1, \ldots, T \; and \; i = 1, \ldots, N$, and $\bar{y}_t$ indicates the cross-sectional mean of y_{it} which is derived from $\bar{y}_t = N^{-1} \sum_{i=1}^{N} y_{it}$. The objective of considering the cross-sectional mean is to manage for contemporaneous correlation among y_{it}. The null hypothesis of the above regression is $H_0: \beta_i = 0$ for all i and alternative hypothesis is $H_a: \beta_i < 0$ for some i. The test statistic given by Pesaran (2007) is as follows:

$$CIPS(N,T) = N^{-1} \sum_{i=1}^{N} t_i(N,T) \ldots\ldots\ldots (9)$$

Where $t_i(N,T)$ indicates the t statistic of β_i .

III.II Panel methods

This study intends to apply several panel methods. Initially, these estimates includes pooled OLS (POLS), fixed effect (FE), instrumental variable, fixed effect (IV-FE) and differenced fixed effect (DE-FE) approaches. Moreover, both the CD test and CIPS test are applied to see whether these models can solve the problem of CD and residual non-stationarity. Based on the outcome of the CD test, additional panel approaches will be applied. Since the level of remittances inflow by one country is expected to have an impact on the level of remittances received by another country, the presence of CD is a strong possibility. Thus the study the possible list of methods to be used includes the mean group (MG) estimator, common correlated effects mean group (CCEMG) estimator, and augmented mean group (AMG) estimator developed by Pesaran and Smith (1995), Pesaran (2006), Eberhardt and Teal (2010) respectively. The rational behinds using those methodologies lies their abilities to deal with the cross-sectional dependent error processes as cross-correlation occurs very frequently due to spatial spill-over, omitted common factor and interactions within socioeconomic network (Pesaran and Tosetti, 2011). The standard approach to measure the panel data with the presence of cross-sectional dependence is the system of seemingly unrelated regression equations (SURE), which is estimated under generalized least square (GLS) technique. However, SURE is applicable for small cross-section (N < 10) and large time dimension (T) (Pesaran, 2006). Another major shortcoming of SURE model is that it doesn't consider the time variant in the model. Although, Ahn et al. (2001) proposed generalized method of moments (GMM) to address this problem but still this estimation assumes the error term be identical and independently distributed, which might be other around in practice. Whereas, mean group (MG) estimator based on the common correlated

effect (named as CCEMG) is asymptotically unbiased as N→∞ for both T fixed and T→∞. CCEMG is also very efficient in the presence of unobserved common effects (Pesaran, 2006). Likewise, pooled version of CCE (referred as CCEP) provides the unbiased estimator.

$$RPW_{jt} = a_j + d_j t + \beta_{j1} REM_{jt} + \beta_{j2} FCF_{jt} + \beta_{j3} ER_{jt} + \varepsilon_{jt} \ldots\ldots\ldots\ldots (10)$$

Where, j stands for cross sectional dimension j=1……J and time period t=1……T and a_j represents country specific effects and $d_j t$ denotes heterogeneous country specific deterministic trends. Note thata_j is related with the coefficient of respective independent variables like $\beta_{j1} = \frac{\alpha_{j1}}{1-\alpha_{j1}}$,$\beta_{j2} = \frac{\alpha_{j2}}{1-\alpha_{j1}}$ and$\beta_{j3} = \frac{\alpha_{j3}}{1-\alpha_{j1}}$. In the equation 1, this study doesn't impose any homogenous restriction in the flow of remittances, fixed capital formation etc. the sample countries. The parameter vector of slope coefficient $\beta_j = (\beta_{j1},\beta_{j2},\beta_{j3})'$ is also considered as heterogeneous across the countries. It is also considered that the short run dynamic and their adjustments towards long run take place through error term u_{jt}, which is following:

$$u_{jt=}\acute{\iota}_j f_t + \varepsilon_{jt}$$

Here f_t represents the vector of unobserved common shocks. f_t can be either stationary or non-stationary, which does not influence the validity of the estimation (Kapetanios, 2011). In addition, the cross-sectional specific errors ε_{jt} are permissible to be serially correlated over time and weakly dependent across the countries (Cavalcanti et al. 2011). However, in the case of regressors and unobserved common factor have to be identically distributed. Regards to the coefficient of CCEMG model, Pesaran (2006) pointed out that $\beta_j = \beta + \omega_j$ which means there is a common parameter β across the countries while $\omega_j \sim IID(0, V_\omega)$. As cross section dependency (CD) occurs due to few reasons like, oil price shock, global financial crisis, local spillover, hence this study applies CCEMG to eliminate CD asymptotically. In addition, this study also applies CCEP for robustness check where it assumes that coefficients are the same for across the countries. However, CCEMG allows heterogeneous slope coefficients across group members which are captured simply by taking the average of each country's coefficient. The estimator of CCEMG is shown by following equation:

$$\hat{\beta}_{CCEMG} = J^{-1} \sum_{i=1}^{J} \hat{\beta}_j$$

As an alternative to the CCEMG, Eberhardt and Teal (2010) developed augmented mean group (AMG), which also capture the unobserved common effect in the model. Moreover, AMG model also measure the group-specific estimator and take a simple average across the panel. The specialty of AMG is that it follows first difference ordinary least squares for pooled data and is augmented with year dummies.

IV. Result and discussions

Initially, the study uses descriptive statistics to have a clear and generalized view of the data set. For the entire panel, the average level of real GDP chain per workers is $16169 while the average exchange rate remittances receipt as a percentage of GDP is 2.92%. Moreover, the average level of gross fixed capital formation as a percentage of GDP is 22.50%. Among the variables labor productivity has the greatest variability and remittances (normalized by GDP) has the lowest variability.

Table-1 here

At this stage, the test for possible cross-sectional dependence of the errors is a must. This is because the unit-root tests that assume cross-sectional independence can have low power if estimated on data that have cross-sectional dependence (Sadorsky, 2013). Furthermore, the test for the unit root properties of the variables are also important to make sure that the variables do not show mixed order of integration order. As mentioned earlier in the methodology section that cross-section dependence in macro panel data has received a great attention, hence we start by looking at the CD test developed by Pesaran (2004) test to investigate contemporaneous correlation across countries. CD test of Pesaran (2004) tends to a normal distribution as the numbers of countries tend to infinity. Moreover, the test is based on the average of the pair-wise correlations of the OLS residuals from the individual regressions in the panel. Furthermore, the presence of CD is pre-requisite of CCEMG approach. However, the null hypothesis of CD test is that cross-sectional independence against the alternative hypothesis of the presence of CD among the respective countries. The result of the CD test (Table-2) clearly shows that each series in the panel exhibits cross-sectional dependence. Therefore, Pesaran's (2007) CIPS (Z(t-bar)) test for unit roots was calculated. This is a unit root test that allows for cross-sectional dependence. These tests were estimated with a constant term at level and first difference. The CIPS test indicates that each series contains a unit root.

Table-2 here

After conducting the CD test, now we move to estimate the static pooled models. The estimated coefficient on the exchange rate covers a very flexible range between -7.530 to 3.350 (Table-3). The estimated coefficients are statistically significant at 1% level in each specification. The estimated coefficients on the fixed capital formation are statistically significant in each specification and maintain a very tight range of 0.006 to 0.023. Collectively these results indicate that the fixed capital formation has a positive impact on the domestic labor productivity for these heterogeneous countries, while exchange rate imparts a statistically significant negative effect in two out of four specifications. Regarding the effect of remittances on domestic labor productivity is not conclusive in these estimates. Since the fixed effect estimate is favored among these alternatives, we can argue that remittances have statistically significant positive impact while remittances square have a statistically significant negative impact on domestic labor productivity on these countries. Applying CD test on the regression residuals provides strong evidence of cross sectional dependence in all four estimates. Moreover, the CIPS test indicates that the problem of non-stationary residuals still exists in the POLS and IV-FE estimates. Though, the problem of residual non-stationarity is solved in FE and FE-FD estimates, but the fact that the residuals are cross sectional dependent is enough in itself to indicate poor model fitting and to motivate us for the search of a better model in augmenting the impact of remittances on domestic labor productivity.

Table-3 here

Empirical result for the estimates with the abilities to solve the problem of CD in residuals is presented in Table-4. The reported result suggests that, among MG, CCEMG and AMG estimates, the problem of CD in residuals is solved only in AMG estimates. This indicates that the result of MG and CCEMG are no better than the result of POLS, FE, IV-FE and FD-FE estimates. Moreover, the solution to the problem of residual non-stationarity checked by CIPS test is only achieved in AMG estimates. Since we are focusing on finding the residual based best fitted model to augment the relationship between remittances and domestic labor productivity, the CD and CIPS test result strongly argue for the superiority of AMG over the MG and CCEMG estimates. Thus we will only focus on the result of AMG model in explaining the long run relationship between remittances and domestic labor productivity. Empirical results presented in Table-4 suggest that collectively for these countries although exchange rate is a positive function of domestic labor productivity, but such result is not statistically significant.

Thus the general economic policy of depreciating local currency to counter the negative effect of remittances on exchange rate to maintain a corrected balance of trade is no longer needed. The estimated coefficient on fixed capital formation is statistically significant at 1% level. The estimated coefficient suggests that a 1% increase in the fixed capital formation will lead to approximately a 0.8% increase in domestic labor productivity for the overall sample countries. The economic reasoning for such result is quite appealing. Fixed capital formation does lead to an optimum combination of labor and capital which in turn increases the productivity of labor as argued in classical Cobb-Douglas production function. This phenomenon is quite natural since most countries in the panel are labor abundant and capital scarce. Since the global size of remittances is increasing significantly over the years, this study explores a unique research question relating to the nature of the relationship between remittances and domestic labor productivity; whether the relationship is monotonic or non-monotonic in the long run? Alternatively, whether the increasing trend of remittances receipt could play negatively for these countries in the long run? The introduction of remittances square as an additional variable enables us to answer such question. The estimated coefficient on remittances is highly positive and statistically significant at 1% level while the estimated coefficient on remittances square is negative and statistically significant at 5% level. The result indicates that an increase of remittances inflow by 1% will result in an increase of 0.174% in domestic labor productivity. However, the marginal effect of remittances will diminish since the parameter of remittances square is negative and statistically significant. Alternatively, other things remaining the same, remittances maintains an inverted U-shape relationship with domestic labor production. This is a robust finding!

Table-4 here

It is interesting to note that the impact of real exchange rate on domestic labor productivity is positive but statistically insignificant. The finding is inconsistent to the earlier results. For example, Jeanneney and Ping (2011) argue that there is a positive effect of real depreciation upon the labor productivity in China. Feder (1983) and Guillaumont (1994) also argued that same relationship between labor productivity and real exchange rate. This is based on the notion that depreciation of real exchange rate may improve the competitiveness of local enterprises in the international market. So, it raises exports and also creates an environment of import substitution with the growth of the industrial sector inviting additional foreign direct investments. Both industrial growth and FDI are viewed as a favorable factor of efficiency and technical progress and hence the labor productivity.

At this state, it is worth investigating whether the general findings displayed in table 04 holds equally for all the 21 countries of the panel? The merit of this question lies in the fact that the panel contains countries like Belgium, Germany, France, and Korea, which are high income countries while it also contains countries like Algeria, Bangladesh, India, Kenya, Pakistan, and Sudan etc which are low income or middle income countries. Except the fact that these countries are world's topmost remittance recipient countries and most of these countries are highly populated, there are various other macro-economic characteristics those clearly make them heterogeneous. Thus the general result presented in table 04 may not hold equally.

Result of country specific test presented in Table 5.A, 5.B and 5.C clearly show how the countries in the panel differ from the general findings presented in table 04. Table 5.A shows that the coefficient of remittance is statistically positive and significant, while the coefficient of remittance square remittances is statistically negative and significant. Thus it can be said that there is an inverted U-shaped relationship between remittance and labor productivity for Belgium, France, Indonesia, Mexico, Sri Lanka, and Vietnam. The result implies that initially remittance contributes positively in augmenting labor productivity, while, after some threshold level, any additional flow of remittances will contribute negatively to domestic labor productivity. The elasticity estimates are less than one across all countries and are significantly different from zero. The largest remittance elasticity of 0.786 and 0.753 belongs to France and Indonesia respectively while the smallest elasticity belongs to Vietnam.

Table-5.A here

In contrast, the relationship between remittances and labor productivity is U-shaped in Egypt, Nigeria, Philippines, and Ukraine with the coefficient of remittances is statistically negative and significant, while the coefficient of remittances square term is statistically positive and significant (Table-5.B). The implication of this finding is that the initially remittances negatively affect labor productivity while further augmentation of remittances spur labor productivity. The elasticity estimates of remittances are less than one across all countries and are negative and significantly different from zero. The largest negative elasticity of -0.085 belongs to Egypt and Ukraine while the while the smallest negative elasticity belongs to Nigeria. The finding of Mamun and Nath (2010) is very significant here. This is because most of the private remittances inflows into these countries are used in consumption rather than capital accumulation, which has the potential to improve the effective productivity of the labors. Thus, family members of

migrant workers consider remittances as the substitute for their own income and increase their leisure activities which reduce labor participation rate, labor productivity and economic growth domestically.

Table-5.B here

Lastly, the impact of remittances is inconclusive in Algeria, Bangladesh, China, Germany, India, Kenya, Korea, Pakistan, Spain, Sudan, and Tunisia (Table-5.C). However, these countries continue to receive lion share of global remittances. Therefore, further investigation needs to be undertaken to come up with specific reasons for such inconclusive findings.

Table-5.C here

V. Concluding Remarks

This paper presents heterogeneous type of modeling for augmenting the long run impact of remittances on domestic labor productivity for topmost remittances recipient economies. The estimated output is enriched by removing any cross-sectional dependence as well as by removing the non-stationarity problem in the error of the estimates. This modeling approach allow us to come up with the most robust and consistent parameters for policy planners of these countries. Several results stand out. The study finds that the real exchange rate does not have any impact on domestic labor productivity for the overall countries in the panel. Moreover, the study also finds a statistically significant positive role of fixed capital formation and remittances on domestic labor productivity. So the fear that remittances may reduce the domestic labor productivity cannot be empirically supported. The main driving force for this result may lies in the fact that remittances does not increase leisure rather it does affect the existing suboptimal combination of labor and capital or these countries. However, remittances square term has a statistically significant negative parameter. Thus, a certain threshold level remittances is welcome in these countries. From the country specification test, the study also shows that that remittances do not have a significant impact on labor productivity. This study speculates several underlying causes for such findings like lack of institutional quality, good governance, the investment portfolio of the relevant economies as well as in micro level issues such as the consumption priority of family members etc. Therefore, intensive research should be conducted to figure out why there is inconclusive finding for these countries especially then most of these countries are in dire need of capital, and they have labor intensive production process.

IV. Policy Implications

This paper has several policy implications of paramount importance. First, for overall panel countries since the current level of exchange rate do not impart any negative impact on domestic labor productivity; the existing exchange rate management policy should be continued. This will enable these countries to outweigh any possible negative impact of remittances on tradable sectors in their respective economy. Second, the abundance of labor force necessitate that these countries should continue to give formation of domestic capital a priority. Our empirical result recommend that improving national savings ratio and eliminating the anomalies in financial sector in channeling these saving into capital for the augmenting output should be given due importance. Third, remittances have significant impact on domestic labor productivity. Therefore, efforts should be undertaken to improve the efficiency of the formal channels of remittance inflow so that the inflow of remittances can be increased continuously. Furthermore, as the financial crisis in most developed countries has turned into much painful long-term recessions in countries like UK, USA etc, there is a real chance that the growth of migration may be receded. Giving this reality, government of these countries should explore more markets for keeping the growth of migration. Effective political diplomacy, improving the skill levels, knowledge base etc. of those who want to migrate must be given due priorities to this end. However, it should be remembered that remittances is not a perpetual tonic for augmenting labor productivity as the squared term of remittances have negative impact on domestic labor productivity. Therefore, building domestic productive base and employment generating locally can lead to more stable, shock resilient growth in domestic labor productivity.

Finally, our result shows that for major remittances recipient countries like Bangladesh, China, India, Pakistan etc. the growth in remittances an inconclusive impact on labor productivity of these countries. Being, labor abundant countries, since any growth agenda for these countries should be based on augmenting the productivity of labor, the governments of these countries should undertake further reform both in the labor market and financial market so as to improve remittance-labor productivity channels.

Reference

Acosta, Pablo. A., Lartey, Emmanuel. K. K., & Mandelman, Federico. S., 2009. Remittances and the Dutch disease. Journal of International Economics 79, 102-116.

Adams, R. Jr., 1993. The economic and demographic determinants of international migration in rural Egypt. Journal of Development Studies 30, 146-167.

Adam Jr. & J Page, 2005. Do International Migration and Remittances Reduce Poverty in Developing Countries? World Development 33(10), 1645-1669.

Ahn, S. C., Y. H. Lee, and P. Schmidt, 2001. GMM estimation of linear panel data models with time-varying individual effects. Journal of econometrics 101(2), 219-255.

Aggarwal, R., Demirguc, Kunt, A., & Martinez Peria, M. S., 2010. Do remittances promote financial development? Journal of Development Economics 96(2), 255-264. doi:10.1016/j.jdeveco.2010.10.005

Airola, J., 2008. Labor supply in response to remittance income: the case of Mexico. The Journal of Developing Areas 41(2), 69-78.

Amuedo-Dorantes, C., & Pozo, S., 2004. Workers' remittances and the real exchange rate: a paradox of gifts. World Development32(8), 1407-1417.

Bai, J. & S. Ng, 2004. A panic attack on unit roots and cointegration. Econometrica 72, 1127-1177.

Barai M K., 2012. Development dynamics of remittances in Bangladesh. SAGE Open, 2(1). Accessed from http://sgo.sagepub.com/content/2/1/2158244012439073.full

Barua S., Majumder M. A., Akhtaruzzaman M., 2007. Determinants of workers' remittances in Bangladesh: An empirical study (Working Paper Series No, WP 0713). Dhaka, Bangladesh: Policy Analysis Unit of Bangladesh Bank

Bayangos V. and Jansen K., 2011. Remittances and competitiveness: the case of the Philippines, World Development 39(10), 1834-1846, 2011, doi:10.1016/j.worlddev.2011.04.019

Bourdet, Y., & Falck, H., 2006. Emigrants' remittances and Dutch disease in Cape Verde. International Economic Journal, 20(3), 267-284.

Bussolo, M., Medvedev, D., 2007. Do remittances have a flip side? A general equilibrium analysis of remittances, labour supply responses and policy options for Jamaica. World bank Policy Research Working Paper 4143

Calero C., Arjun S. Bedi and Sparrow R., 2008. Remittances, liquidity constraints and human capital investments in Ecuador. The Hague, Institute of Social Studies, Working Paper no. 458.

Cavalcanti, T. V. d. V., K. Mohaddes, and M. Raissi, 2011. Growth, development and natural resources: new evidence using a heterogeneous panel analysis. The Quarterly Review of Economics and Finance 51, 305–318.

Chami, R., Fullenkamp, C., & Jahjah, S., 2003. Are migrant remittance flows a source of capital for development? IMF working paper, International Monetary Fund, Washington, DC, August.

Choi I., 2006. Combination unit root tests for cross-sectionally correlated panels. In D Corbae, SN Durlauf, BE Hansen (eds.), Econometrics Theory and Practice: Frontiers of Analysis and Applied Research, chapter 12, 311-333. Cambridge University Press, Cambridge.

Eberhardt, M., and F. Teal. 2010. Productivity analysis in global manufacturing production. Discussion Paper 515, Department of Economics, University of Oxford.

Edwards C. & Ureta, M., 2003. International migration, remittances, and schooling: Evidence from El Salvador. Journal of Development Economics 72, 429-461.

Esman M. Nyamongoa, Roseline N. Misatib, Leonard Kipyegonb,Lydia Ndirangu, 2012. Remittances, financial development and economic growth in Africa, Journal of Economics and Business 64, 240-260. doi:10.1016/j.jeconbus.2012.01.001

Feder, G., 1983. On exports and economic growth. Journal of Development Economics 12(1&2), 59-73.

Giuliano P., Ruiz-Arranz M. 2009. Remittances, financial development, and growth. Journal of Development Economics 90, 144-152.

Guillaumont, P., 1994. Politique d'ouverture et croissance économique: les effets de la croissance et de l'instabilité des exportations. Revue d'économie du développement 1, 91−114.

Gupta, S., Pattillo, C., Wagh, S., 2009. Effect of remittances on poverty and financial development in sub-Saharan Africa. World Development 37 (1), 104-115.

Im, K.S., M. H. Pesaran and Y. Shin., 2003. Testing for unit roots in heterogeneous panels. Journal of Econometrics 115, 53-74.

Insights, 2006. Sending money home: can remittances reduce poverty? Institute of Development Studies, University of Sussex.

Jeanneney G. Sylviane and Ping H., 2011. How does real exchange rate influence labour productivity in China? China Economic Review 22, 628–645.

Jongwanich J., 2007. Workers' remittances, economic growth and poverty in developing Asia and the Pacific countries (Working Paper WP/07/01). Bangkok, Thailand: United Nations Economic and Social Commission for Asia and the Pacific. Retrieved from http://www.unescap.org/pdd/publications/workingpaper/wp_07_01.pdf

Kapetanios, G., M.H. Pesaran and T. Yamagata, 2011. Panels with non-stationary multifactor error structures, Journal of Econometrics 160(2), 326- 348.

Hanson, G. H and Woodruff, C. 2003. Emigration and Educational Attainment in Mexico, Working Paper, University of California.

Levin, A., C.F. Lin and C.S.J. Chu, 2002. Unit root tests in panel data: asymptotic and finite-sample properties. Journal of Econometrics 108, 1-24.

Mamun A. Kawja and Nath K. Hiranya, 2010, Workers' migration and remittances in Bangladesh. Accessed from http://www.shsu.edu/~tcq001/paper_files/wp10-02_paper.pdf on 5th Aug 2012.

Maddala, G.S. and S. Wu, 1999. A comparative study of unit root tests with panel data and a new simple test. Oxford Bulletin of Economics and Statistics 61, 631-652.

Moon, R. and B. Perron, 2004. Testing for unit root in panels with dynamic factors. Journal of Econometrics 122, 81-126.

Levitt, T., (1983). The globalization of markets. Harvard Business Review, Issue May-June, 92-102.

Lartey E. K. K., Federico S. Mandelman, & Pablo A. Acosta, 2008. Remittances, exchange rate regimes, and the Dutch disease: a panel Data analysis. Atlanta: Federal Reserve Bank of Atlanta, Working Paper 2008-12.

Lucas, Robert E. B., and Oded Stark, 1985. Motivations to remit: evidence from Botswana. Journal of Political Economy 93, 901-918.

McCormick, Barry and Jackline Wahba, 2001. Overseas work experience, savings andentrepreneurship amongst return migrants to LDCs, Scottish Journal of Political Economy 48, 164-178.

Nyamongo, E.M., & Misati, R.N. 2011. Remittances and banking sector development in Sub Saharan Africa. Paper presented at the Global Development Forum, Dubai, United Arab Emirates, November.

Pesaran, M.H. and R. Smith, 1995. Estimating long-run relationships from dynamic heterogenous panels. Journal of Econometrics 68, 79-113.

Pesaran, M.H., 2004. General diagnostic tests for cross section dependence in panels. In: Cambridge Working Papers in Economics No. 435. University of Cambridge, and CESifo Working Paper Series No. 1229.

Pesaran, M.H., 2006. Estimation and inference in large heterogeneous panels with a multifactor error structure. Econometrica 74, 967-1012.

Pesaran, M. H.,2007. A simple panel unit root test in the presence of cross-section dependence. Journal of Applied Econometrics 22(2), 265-312.

Pesaran, M.H., Tosetti, E., 2011. Large panels with common factors and spatial correlation. J. Econom. 161, 182-202.

Poirine, Bernard, 1997. A theory of remittances as an implicit family loan arrangement, World Development, 25, 589-611.

Quartey, P., and T. Blankson. 2004. Do migrant remittances reduce the impact of macro-volatility on poor households in Ghana? Final report to the Global Development Network, International Monetary Fund, Washington, DC. http://cloud2.gdnet.org/cms.php?id=research_paper_abstract&research_paper_id=9035.

Rodriguez, E.R., Tiongson, E.R., 2001. Temporary migration overseas and household labor supply: evidence from urban Philippines. International Migration Review, 709–725.

Romer, D.(2006). Advanced Macroeconomics, 4th Edition, Mcgraw Hill Series Economics

Richard H. Adams Jr. and Cuecuecha A., 2010. Remittances, household expenditure and investment in Guatemala. World Development 38 (11), 1626–1641. doi:10.1016/j.worlddev.2010.03.003

Sadorsky Perry, 2013. Do urbanization and industrialization affect energy intensity in developing countries? Energy Economics 37, 52–59.

Siddiqui, R., Kemal, A.R., 2006. Remittances, trade liberalization, and poverty in Pakistan: the role of excluded variables in poverty change analysis. The Pakistan Development Review 45 (3), 383–415.

Shahbaz, M., Qureshi, M. N. and Aamir, N. (2007). Remittances and financial sector's performance: Under two alternative approaches for Pakistan. International Journal of Economics and Finance, 12, 133-146.

Smith, V., S. Leybourne, T.-H. Kim and P. Newbold, 2004. More powerful panel data unit root tests with an application to mean reversion in real exchange rates. Journal of Applied Econometrics 19, 147-170.

Solow, Robert M., 1957. Technical change and the aggregate production function. Review of Economics and Statistics (The MIT Press) 39 (3), 312–320.

Stark, O., & Taylor, J. E., 1989. Relative deprivation and international migration. Demography 26, 1–14.

Stark, Oded, 1991. Migration in LDCs: Risk, Remittances, and the Family, Finance and Development, December, 39-41.

Taylor J. E., Wyatt T. J. (1996). The shadow value of migrant remittances, income and inequality in a household-farm economy. Journal of Development Studies 32, 899-912.

Vargas-Silva, C., 2009. The tale of three amigos: Remittances, exchange rates, and money demand in Mexico. Review of Development Economics 13(1), 1–14.

Weiss, T.J., 1993. Long-term changes in US agricultural output per worker, 1800 to 1900. Economic History Review 46, 324–341.

World Bank, 2013. Migration and Remittance Flows: Recent Trends and Outlook, 2013-20161, Accessed from http://siteresources.worldbank.org/INTPROSPECTS/Resources/334934-1288990760745/Migration and Development Brief21.pdf.

Table -1: Descriptive statistics

Variables	RPW	GFCF	ER	REM
Mean	16169.81	22.50	649.01	2.92
Median	6646.050	21.91	21.88	2.04
Maximum	69482.32	45.96	18612.92	14.58
Minimum	1099.23	5.45	0.0005	0.008
Std. Dev.	17829.83	6.54	2588.38	2.967
Observations	565	565	565	565
Cross section	21	21	21	21

Where, RPW is the real GDP chain per workers in USD; GFCF is the gross fixed capital formation (normalized by GDP); ER is the official exchange rate against US$, and REM is the personal remittance receipt (normalized by GDP).

Table-2: Second generation panel unit-root

Variables	$\hat{\rho}$	CD	Levels	First differences
			CIPS	CIPS
GDP Chain Per Worker	0.728	45.36 [a]	-1.981	-2.963 [a]
Remittance	0.475	19.56 [a]	-1.803	-2.843 [a]
Fixed Capital Formation	0.335	5.00 [a]	0.719	-6.557 [a]
Exchange Rate	0.836	38.58 [a]	-1.988	-2.760 [a]

Note: a, b, c represents significance at 1%, 5% and 10% respectively.

Table-3: Static pooled estimates

Dependent Variable: *Domestic Labor Productivity*	POLS	FE	IV-FE	FD-FE
Exchange rate	-7.530 [a]	2.880 [a]	3.350 [a]	-1.115 [a]
	(1.430)	(6.010)	(6.010)	(3.926)
Fixed capital formation	0.021 [a]	0.023 [a]	0.022 [a]	0.006 [a]
	(0.006)	(0.002)	(0.002)	(0.001)
Remittance	-0.133 [a]	0.045 [a]	0.013 [b]	-0.0160 [a]
	(0.029)	(0.009)	(0.006)	(0.004)
Remittance sq.	0.003	-0.002 [a]		0.001 [a]
	(0.002)	(0.001)		(0.000)
Constant	9.136 [a]	8.621 [a]	8.689 [a]	0.021 [a]
	(0.163)	(0.058)	(0.056)	(0.002)
R-squared	0.133	0.229		0.122

CD	48.30 [a]	8.00 [a]	7.21 [a]	3.43 [a]
CIPS	-0.303	-1.942 [b]	-1.001	-6.677 [a]
Observations	692	692	692	671
Countries	21	21	21	21
Note: a, b, c represents significance at 1%, 5% and 10% respectively.				

Table-4: Panel heterogeneous estimates

Dependent Variables: Labor Productivity	MG	CCEMG	AMG
Exchange rate	0.029	-0.002	0.0002
	(-0.021)	(-0.004)	(-0.005)
Fixed capital formation	0.013 [b]	0.0085 [a]	0.008 [a]
	(-0.005)	(-0.002)	(-0.003)
Remittance	-0.073	0.126	0.174 [a]
	(-0.211)	(-0.079)	(-0.067)
Remittance sq.	0.103	-0.171	-0.155 [b]
	(-0.155)	(-0.137)	(-0.071)
Common dynamic process			1.170 [a]
			(-0.205)
Constant	8.689 [a]	0.572	8.686 [a]
	(-0.381)	(-1.825)	(-0.272)
RMSE	0.0869	0.0359	0.0493
CD Test	5.59 [a]	4.62 [a]	0.38
CIPS	-5.660 [a]	-6.615 [a]	-4.732 [a]
Observations	692	692	692
Number of countries	21	21	21
Note: a, b, c represents significance at 1%, 5% and 10% respectively.			

Table-5.A : Expected country specific effect

Countries	Exchange Rate	Fixed Capital Formation	Remittance	Remittance Sq.
Belgium	-0.003 [a]	0.000	0.696 [a]	-0.224 [a]
France	-0.007 [c]	-0.003	0.786 [a]	-0.712 [a]
Indonesia	0.000 [a]	0.003	0.753 [a]	-0.307 [a]
Mexico	-0.026 [a]	0.032 [a]	0.287 [c]	-0.065
Sri Lanka	-0.003 [b]	0.002	0.161 [a]	-0.011 [a]
Vietnam	0.000	0.006 [a]	0.053 [b]	-0.005 [a]
Note: a, b, c represents significance at 1%, 5% and 10% respectively.				

Table-5.B : Unexpected country specific effect

Countries	Exchange Rate	Fixed Capital Formation	Remittance	Remittance Sq.

Egypt	-0.002	-0.010	-0.085 [b]	0.005 [b]
Nigeria	-0.001	0.022 [a]	-0.046 [b]	0.004 [a]
Philippines	-0.008 [a]	0.016 [a]	-0.069 [a]	0.005 [a]
Ukraine	-0.046 [b]	0.014 [c]	-0.085 [a]	0.011 [a]
Note: a, b, c represents significance at 1%, 5% and 10% respectively.				

Table-5.C : Inclusive country specific effect

Countries	Exchange Rate	Fixed Capital Formation	Remittance	Remittance Sq.
Algeria	-0.002	0.005 [b]	-0.113	0.017
Bangladesh	-0.004 [c]	0.004	0.001	0.001
China	0.036 [a]	0.013 [a]	0.086	-0.141
Germany	-0.027 [b]	0.004	0.351	-1.262 [c]
India	-0.007 [a]	-0.008	0.029	-0.005
Kenya	-0.001	0.007 [c]	-0.012	0.003
Korea	0.000 [a]	0.033 [a]	-0.057	0.046
Pakistan	-0.003	-0.005	-0.016	-0.001
Spain	-0.001	0.011 [a]	0.754	-0.588
Sudan	0.024	0.010 [a]	-0.005	-0.002
Tunisia	0.084 [c]	0.008 [a]	0.195	-0.027
Note: a, b, c represents significance at 1%, 5% and 10% respectively.				