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Introduction

Most often, poverty is viewed in terms of income. People can be considered to live in poverty when they do not have income and other resources required to fulfill the conditions of life such as diets, material, facilities goods and services; this requirement would have made them to play roles and participate in the relationships and traditions of their society (UNDP, 2006). However, it is believed that income gives an inequitable sketch but does not cover the wider standard of living or human development. Poverty is defined by the World Bank as “encompassing not only material deprivation (measured by an appropriate concept of income or consumption) but also low achievements in education and health” (World Bank, 2000, p. 15; Moser & Ichida, 2001, p. 6). Objectively, poverty alleviation has been the foremost goal of foreign aid inflow. Therefore, foreign aid or assistance on concessional terms is usually transmitted either directly or indirectly through multilateral institutions or private voluntary organizations in order to improve the social and economic development of the

developing countries¹. Thus, the broad purpose of international aid is to stimulate economic development and poverty alleviation. Initially foreign aid seems to enhance average income in the aid receiving country and then plays role in poverty mitigation (Alvi & Senbeta, 2012). Sachs and McArthur (2001) demonstrated that the targeted aid can help largely to eliminate poverty in developing countries. In a similar study, Connors (2012) points out that the fundamental objectives of foreign aid are to mitigate poverty; these objectives include encouraging economic growth, boosting institutional reform, and decreasing poverty in the developing world. Riddell (2014) provides reasons for providing aid by arguing that foreign aid offered in principle, directly or indirectly will facilitate the improvement of the lives of those people who really need it.

Regarding the effectiveness of foreign aid, the literature reveals that it does its “work”. For example, Arndt *et al.* (2011) suggest that foreign aid remains an important tool for augmenting the development prospects of poor countries. In a study of the long-term effect of Swedish aid on poverty reduction in three Asian countries, it is concluded that aid has been playing a positive role in Laos and Vietnam, but the results are inconclusive in the case of Sri Lanka (McGillivray *et al.*, 2012). ITAD (2013) reports that the recent sharp decrease in poverty is due to the contribution made by foreign aid funds in Tanzania. The study of Alvi and Senbeta (2012) though shows that foreign aid inflows result in poverty alleviation, however, it does not appear to contribute to economic growth. In a study, Adamu (2013) indicates that foreign aid contributes to economic growth and development through the provision of capital and transfer of technology which boost good governance and practices. In a recent study, Riddell (2014) concludes that in several countries foreign aid has made vital contributions to development and poverty mitigation.

Albeit, the most pervasive ambition of donors’ foreign aid programs is to largely eliminate poverty in the developing world. In 2013 the statistical data on development aid reveals that it increases by 6.1% in real terms to reach the maximum level ever documented; the donors offer almost US\$ 134.8 billion (£80.3 billion) in net ODA and US\$128 billion in 2012 (OECD, 2014). The World Bank (2014) shows that “our dream is a world free of poverty” and to do progressive work in more than 145 client countries that endeavor to mitigate extreme poverty and encourage communal prosperity. The report maintains that in the developing world, almost 21 percent of people live at or below US\$ 1.25 a day, while the estimates are 43 percent and 52 percent in 1990 and 1981, respectively. The data reveals that almost a total of 1.22 billion people live on less than US\$ 1.25 a day in 2010 compare to 1.91 billion and 1.94 billion in 1990, and 1981, respectively. It means that if the current pace of progress is maintained, the extreme poverty would be reduced to 1 billion in 2015. However, in 2010, there were almost 2.4 billion people who lived on less than US\$2 a day, while the figures were 2.59 billion in 1981. Sen (1999) argues for the shortcoming of not including political participation or gender inequalities and for having arbitrary component weights. The author presents a more inclusive approach to development by considering it as the process of enlarging the real freedoms that people enjoy and therefore, uses the idea of human capability. The study of Krueger (2005) argues against the arbitrariness of setting the line for extreme poverty at less than US\$ 1 per day. The study also highlights some problems in using indexes of “Purchasing Power Parity (PPP)”. While explaining the ranking of countries according to the population below poverty line (%), it points out that Chad, Haiti, Liberia appear to be on top with 80% poverty out of 157 countries, followed by Congo, and the least poverty of 3.18% is found in Malaysia and Tunisia and 1.16% in Thailand (CIA World Factbook, 2014).

¹ Barret (2009) defines foreign aid as “the transfer of government resources from rich countries to poorer countries with an intention to reduce poverty and hunger”. This study uses net official development assistance (ODA) and official aid received.

Notwithstanding, for almost above five decades, foreign aid has been constantly flowing from developed countries and international aid agencies to developing countries in order to spur economic growth, reduce poverty and diminish income disparity. Seemingly, majority of the foreign aid recipient developing countries have had nothing to display for any progress in terms of stable upsurge in income growth, reliable increase in employment and reduction in poverty. In practice, as foreign aid rises in most of these aids receiving countries, the impact indicators comprising unemployment and poverty levels have been persistently increasing (Oduor and Khainga, 2009). According to the OECD (1985, p. 18) study, for 25 years review of the official aid system during 1960-1985, the Development Assistance Committee of the OECD affirms confidently that “the most troubling shortcoming of development aid has been its limited measurable contribution to the reduction as distinguished from the relief of extreme poverty, especially in the rural areas”. Connors (2012) also demonstrates that foreign aid, as presently practiced, is fruitless and ineffectual at diminishing poverty or fostering market-based reforms in the developing world. The study of Riddell (2014) has also shown that in practice, there are still hundreds of millions of extremely poor people living in the world, and a lots of developing countries whose needs can be met, in part, by rich “outsiders”, has been used to argue that aid is necessary for development and promoted the false notion that without foreign aid there will be no development (Deaton, 2013). Therefore, the available literature regarding the effect of foreign aid on economic growth is yet controversial.

Foreign remittances generally refer to the money and goods that are transferred to families by migrant workers waged outside of their country of origin. The flows of migrant workers remittances from developing to developed countries have been growing constantly. Remittances have become vital private financial resources for families in home countries of migrants, while they cannot be viewed as an auxiliary for foreign direct investment, official development assistance, debt relief or other public sources of finance development². The World Bank (2014) shows that this year’s foreign remittance will be upsurge to 7.8 percent over the 2013 volume of US\$ 404 billion, expanding to US\$ 516 billion in 2016 to developing countries. For several developing countries, foreign remittances are a vital source of foreign exchange, exceeding earnings from main exports, and covering a considerable portion of imports. Remittances flow far surpassing ODA and relatively stable than private debt and portfolio equity flows. In the case of Nepal, remittances are almost doubled the country’s revenues from exports of goods and services, while in the Philippines and Sri Lanka, remittances are above 39% and 50%, respectively (The World Bank, 2014). IMF (2005) reports that apart from the brain drain, remittances are more stable source of external finance, not showing the fluctuations frequently related with private capital inflows. Growing remittances which increase global migration flows may affect developing country welfare. Even, remittances are relatively stable and certain as compared to other financial flows and, more notably, they are counter-cyclical providing a safeguard against economic shocks (United Nations, 2011). Notionally, remittances have two aspects that are losses and gains, where it is believed that gains are relatively higher than losses. In the form of losses, some researchers believed that brain drain is typically unfavorable to economic development. The confrontational consequences of the brain drain have also been explicated by (Bhagwati & Hamada, 1974; Haque & Kim, 1995; IMF, 2005).

On the other hand, the constructive effects of remittances on economic development have been well recognized (Barai, 2012). In a study, Ratha (2013) has shown that migration can have both positive and negative economic, social, and cultural implications for countries of origin. Apart from money benefit, remittances are also associated with more human

² UNCTAD (2008), UNCTAD XII: Accra Accord, paragraph 122. UNCTAD (2011).

development outcomes across a number of areas including education, health and gender equality. Therefore, money gets from remittances act is a lifeline for the poor people, thus increasing the income for individual and families. Evidently, it is sensible to assume that the money transfer by the migrants to their family members back home have certain some inclusive effect on poverty alleviation because remittances are directly received by the poor people. For example, Uruci and Gedeshi (2003) have shown that majority of the international migrants; around 69.7% send their money to meet “the basic needs of the family”. Rapoport and Docquier (2005) conclude that migration and remittances have an overall positive impact on long-run economic performance in the origin countries. Adams and Page (2005) provide evidence of the positive role played by the international remittances in poverty reduction developing country. Some similar studies include Acosta *et al.* (2006) in 10 Latin American countries, Adams *et al.* (2008) in Ghana and Lokshin *et al.* (2010) in Nepal found that international remittances diminish poverty. Pant (2008) reveals the remittances have an encouraging effect on the economy including poverty and income distribution. The study of Waheed *et al.* (2013) shows that remittances play a positive role in poverty reduction in the case of Nigeria. Hongbo, states that migration, if governed honestly, can make an effective contribution to the economic and social development and play a crucial role in alleviating poverty³. The World Bank (2013) reveals that remittances are increasingly contributing to foreign exchange earnings, economic growth and poverty reduction throughout the Europe and Central Asia.

The purpose of this empirical exercise is mainly to explore whether foreign remittances contribute to poverty reduction for a panel of 39 countries, using panel data over the period from 1990-2014. This study contributes to the literature in three folds: First, this study deals with 39 countries from the income groups including lower middle income, upper middle income and high income countries. Second, whereas most of erstwhile empirical studies have extensively focused on the linkage between poverty- remittances nexus (Adams & Cuecucha, 2013; Brown *et al.*, 2014; Gupta *et al.*, 2009) and poverty-foreign aid nexus (Alvi & Senbeta, 2012; Kaya *et al.*, 2013; Wells, 2015), the present study deals with both the entities in a single framework for empirical consideration. Finally, this study employs relatively sophisticated econometric techniques namely; FMOLS in addition to Granger causality approach and uses more recent data. Thus, the outcomes of the present study will certainly offer a detailed new insight while using improved empirical methodology on the role of aid and remittances effectiveness on poverty alleviation. Therefore, the study adds to the literature on the impacts of foreign remittances and aid on poverty alleviation at the global level.

The rest of the study is organized in the following manner. Section 1 deals with review of relevant literature. Section 2 presents data description and empirical methodology. Section 3 interprets empirical results of the study. Finally, concludes the study.

1. Prior empirical studies

There are plethora of prior studies on the role of international aid in economic growth and poverty elimination, however, international aid’s effectiveness is yet controversial and further holistic studies are required. For example, in a study, Dalgaard and Hansen (2001) shown that foreign aid positively contributed to economic growth regardless of the policy environment. Aid is considered a vital tool for enriching the development prospects of poor countries. To alleviate poverty, boost economic growth and improve the standard of living, the foreign aid inflows should be encouraged and its effectiveness to be improved (Hansen

³ UNIS/INF/488, 11 September 2013.

and Tarp, 2001). The study of Headey (2008) provided evidence on the slight positive impact of foreign aid on economic growth strengthens after the end of the Cold war. Adamu (2013) found the positive and strong effect of foreign aid on economic growth in member countries of the Economic Community of West African States (ECOWAS), using panel data for the 1990-2009 and simultaneous-equation model. The study suggested that member countries of the ECOWAS should seek further foreign aid as it would significantly foster their economic growth. The findings of Armah and Nelson (2008) indicated a significant foreign aid-growth relationship for 21 Sub-Saharan African countries during 1995-2003. The findings suggested that bulky aid to Sub-Saharan Africa is one way to attain the UN's Millennium goals. The study of Qayyum *et al.* (2014) found that foreign aid boosts the economic growth. The study concluded that foreign aid has a positive effect on growth and it plays a fruitful role in promoting the economic activity of an economy.

On the other hand, many prior studies, for example, Boone (1996) found that foreign aid has no significant influence on infant mortality, primary schooling ratio/ life expectancy, using data from 97 developing countries. The finding suggested that aid is largely used for consumption purposes, which tend to help the political elite but not the poor and deprived class. The findings of Arvin and Barillas (2002) revealed that, conditional on the state of democracy, there is no significant causal linkage between foreign aid and income per capita (and by implication poverty), used data from 118 countries. Kosack (2003) investigated the effect of foreign aid on quality of life using the HDI as a proxy variable. The cross-country exploration indicates that the effect of foreign aid depends on the quality of institutions in the aid recipient countries and that aid is effective in promoting quality of life in democracies but has no effect in autocracies. The study of Iyoha (2004) shown that vast foreign aid flows to Africa have done minute to stimulate economic growth and mitigate poverty. In a study, Masud and Yontcheva (2005) portrayed that NGO aid decreases infant mortality but found no evidence that bilateral aid helps decrease infant mortality and illiteracy rates, using panel data from 58 countries during 1990-2001. Nakamura, and McPherson (2005) shown that aid has no significant effect on poverty reduction, while real per capita income has the robust and highly significant impact on poverty reduction for Sub-Saharan Africa during 1990-2001 and used 2SLS technique. The study of Djankov *et al.* (2006) observed that other sources of foreign funds include foreign remittances and private assistance have verified to be relatively effective in promoting growth and investment, while foreign aid has an inverse effect on the democratic stance of developing countries, and on economic growth by condensing investment and expanding government consumption.

The findings of Chong *et al.* (2009) shows no evidence that foreign aid helps alleviate poverty during 1971-2002. The study suggested that the results are consistent with prior empirical studies on aid ineffectiveness in achieving economic growth. Rajan and Subramanian (2008) investigated empirically the effects of aid on growth in cross-sectional and panel data after using meticulous measures for correction any biases in the sample of countries used. The results revealed that there is no statistically significant association between foreign aid and long-term economic growth during 1960-2000. Azam (2014) finds that foreign aid has significantly negative impact on economic growth of in Pakistan during 1972-2012. More recently, Page and Shimeles (2014) observed that the role of development aid in across Africa is problematic, where huge aid went to countries with a little employment intensity of growth.

The study of Campos and Palomo (2002), and Gustafsson and Makonnen (1993) discovered that international remittances help mitigate both poverty and inequality. Hildebrandt and McKenzie (2005) inspected the effect of remittances on both infant mortality and birth weight. The findings indicated solid significant negative effect of remittances on infant mortality. Taylor *et al.* (2005) explored the impact of migration and remittances on the

distribution of rural income and on rural poverty, using Gini and poverty decomposition techniques and data from 2003 for Mexico. The results revealed that the impact of remittances are relatively leveling and have a bigger effect on reducing poverty in regions, where the share of households with migrants working abroad is large. However, the study failed to find such relationship for internal worker remittances in Mexico. Similarly, in a study, Adams (2006) after using a large, nationally representative household survey covering 5998 households to evaluate the effects of internal and international remittances on poverty in Ghana. The study found that poverty is decreased more in case of international remittances as contrasting to internal remittances. In another study, Adams and Cuecuecha (2010) found that international remittances have a large statistical effect on decreasing poverty in Indonesia. Ekanayake *et al.* (2008) observed that remittances inflow significantly encourages economic growth in developing countries covering Asia, Africa, and Latin America and the Caribbean for the period 1980-2006. However, Rosser (2008) discussed that remittances inflows need to be understood as an anti-poverty tool, but not as a direction to development.

In a study, Vargas-Silva *et al.* (2009) tested the potential influence of remittances on alleviating poverty and spurring economic growth in Asia countries using data 20 countries during 1988-2007. The findings revealed that remittances merely have a negligible influence on the overall poverty rate, but they tend to decrease the poverty gap. The results suggested a 10% upsurge in remittances diminish the poverty gap by almost 0.7-1.4% during the period under the study. The positive and significant influence of remittances inflow on growth in Azerbaijan and Armenia during 1995-2010 have also confirmed by Azam and Khan (2011). United Nations (2011) finds that those remittances significantly mitigate poverty in recipient countries but the results are more consistent for countries with remittances larger than 5 percent of GDP for 77 developing countries over the period from 1980-2008. Imai *et al.* (2013) discover that remittances contribute to poverty lessening – particularly through their direct effects for 24 Asia and the Pacific economies during 1980-2009 and used fixed effect-2SLS and random-effects-2SLS approaches. The results of the study generally verified that remittance inflows have been constructive to economic growth. The study of Bertoli and Marchetta (2014) found a significant negative impact of migration on poverty among migrant households of Ecuador. Likewise, Hatemi and Sallahuddin (2014) empirical findings suggested that causality nexus of poverty and remittances is bi-directional for Bangladesh over the period 1976-2010. Azam (2015) finds a significantly positive relationship between workers remittances and economic growth in four developing Asian countries namely Bangladesh, India, Pakistan and Sri Lanka during 1976-2012.

However, the positive impact of remittances on economic growth is challenged in numerous studies, for example, the study of Chami *et al.* (2005) shown that remittances have a negative effect on economic growth as well as between remittances and variables education and investment rates for 113 developing countries. IMF (2005) analyzed that there is no statistically significant direct relation between real per capita output growth and migrant remittances for 101 countries during 1970-2003. Similarly, the study failed to find a significant association between remittances and some of the other variables, such as education levels and investment ratios. The study further revealed regarding the connection between poverty and remittances, if remittances are used mostly to finance basic consumption, they may have an impact on poverty even though their growth effect may be minimum. The study of Serino and Kim (2011) advocated that international remittances have uneven consequences across poverty quantiles for 66 developing countries during 1981-2005, and used a quantile regression analysis. Petreski and Jovanovic (2013) examined the effects of remittances on poverty, inequality and self-employment in 3 Balkan countries namely Bosnia-Herzegovina, Kosovo and Macedonia. The findings indicated a positive role of remittances for poverty reduction in Macedonia and Kosovo, but not in the case of Bosnia. Azam *et al.* (2015)

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observes that foreign remittances and FDI inflows have significantly positive impacts on economic growth in 12 countries from Europe and Central Asia during 1993-2013.

In short, the existing literature demonstrates that there is a considerable ambiguity background about the magnitude and effectiveness of foreign aid and remittances on economic growth and poverty alleviation. A brief summary of erstwhile empirical studies on the impacts of foreign aid and foreign remittances on poverty alleviation are reported in *Table 1* in order to understand the largely the problem of the study.

Table 1. Compact prior studies on the relationship between remittances and poverty alleviation

Author (s)	Methodology, sample periods, country (s)	Dependent variable	Independent variables	Outcomes
Connors (2012)	pooled OLS, 1985-2005 ⁴ 86 countries	Poverty	ODA, Polity IV, Coastal population, location	Negative & significant impact on poverty
Bahmani-Oskooee, and Oyolola (2009)	1981-2002, 49 developing countries, Fixed and Random-effects model	Poverty	ODA, GDP, social programs on poverty, institution	Foreign aid is effective in reducing poverty
Hossain (2013)	2SLS,3SLS,1990-2012, 44 developing countries	Poverty	Remittances, per capita GDP, inequality in terms of Gini coefficient	Remittances have a significant negative impact on poverty
Antwi <i>et al.</i> (2013)	ARDL, Ghana, 1980-2010	Poverty	Remittances, openness, inflation, GDP, human capital	Remittances reducing poverty
Banga and Sahu (2010)	3SLS, 1980-2008, 77 developing countries	Poverty	Remittances, income, income inequality (Gini index), trade, literacy level	Remittances have an important inverse effect on poverty
Goff (2010)	Fixed-effect model, 1980- 2005,65 developing countries	Poverty ⁵	Remittances, Gini index, Income	significant and negative effect on poverty reduction ⁶
Jongwanich (2007)	GMM, 1993-2003, 17 the Asia and the pacific countries	Poverty ⁷	Remittances, growth, inequality, inflation, openness, human capital	Negative impact on remittances

Source: Authors compilation.

2. Empirical Methodology

2.1. Data Sources

Annual data over the period ranging from 1990 to 2014 for a panel of 39 countries from lower middle income, upper middle income and high-income are used. The countries

⁴ The period is broken into two ten-year periods, 1985-1995 and 1995-2005.

⁵ In other two equation Gini index and growth are used dependent variables.

⁶ Then, a 10% increase in the inflow of remittances is associated with a 17% fall in headcount poverty.

⁷ In other equation, growth is used as a dependent variable.

have selected on the basis of data availability. This study manages to collect data from 9-high income countries, 15-upper middle income countries and 13-lower middle income countries. Evidently, countries such as Argentina, Chile, Estonia, Lithuania, Latvia, Poland, Russian Federation, Uruguay, Venezuela, RB are selected from high income group of countries⁸, Bulgaria, Belarus, Brazil, China, Colombia, Costa Rica, Dominican Republic, Ecuador, Mexico, Panama, Peru, Paraguay, Romania, Thailand, Turkey from upper middle income countries and Armenia, Bangladesh, Bolivia, Cote d'Ivoire, Georgia, Guatemala, Honduras, Kyrgyz Republic, Moldova, Pakistan, Philippines, El Salvador, Ukraine from lower middle income countries. Prior studies uses several alternatives such as headcount ratio at US\$ 1.25 income in a day (% of population) and US\$ 2.00 income in a day (% of population) to proxy the poverty variable, while in this study poverty is proxy by the headcount ratio at US\$ 2.00 income in a day. Moreover, some missing data on poverty headcount ratio handled with the help of linear interpolation method. We use secondary school enrollment (% of population) represent human capital, net official development assistance which is measured in US\$ represent foreign aid. Furthermore, foreign remittances measured in US\$ and inflation rate measured in percentage also part of this study. Data on all variables have gleaned from the World Development Indicators (2015).

2.2. Model Specification

For each income group, a panel model is constructed to explore the impacts of foreign remittances and foreign aid along with some other variables namely GDP per capita, inflation rate and human capital on poverty. The specified form of model used can be expressed symbolically as follow:

$$PO_{it} = F(Y_{it}, FR_{it}, FD_{it}, INF_{it}, HC_{it}) \quad (1)$$

Where PO_{it} denotes poverty headcount ratio at US\$ 2.00 income in a day, Y_{it} is the GDP per capita, FR_{it} represents foreign remittances, FD_{it} denotes foreign aid, INF_{it} indicates inflation rate and HC shows human capital. $i=1, \dots, I$ denote the each income group and $t=1, \dots, T$ refers to the time period. After taking the logarithm of Eq (1), we get the equation in the following form:

$$\ln PO_{it} = \beta_1 + \beta_2 \ln Y_{it} + \beta_3 \ln FR_{it} + \beta_4 \ln FD_{it} + \beta_5 \ln INF_{it} + \beta_6 \ln HC_{it} \quad (2)$$

Regarding Eq (2), a priori expectation is that GDP per capita decrease the poverty and hence $\beta_2 < 0$. Likewise, it is often expected that foreign remittances and human capital also decrease the poverty thus, β_3 and $\beta_6 < 0$. Whereas, foreign aid and inflation habitually increase the poverty, therefore, β_4 and $\beta_5 > 0$

2.3. Methods of Analysis

Consistent with the existing literature, the empirical analysis starts with the examination of the stationary property of the included variables using panel unit root tests. The advantage of panel unit root tests over the simple unit root tests is that pooling

⁸ According to World Bank country with per capita income less than 1035US\$, 1036US\$ - 4085US\$, 4086US\$ - 12615US\$ and 12616US\$ and more are categorize as low income, lower middle income, upper middle income and high income respectively.

information across units increases the test power. To check the robustness of the results of three-panel unit root tests including the, the LLC test, the IPS test, the Fisher-ADF test and Fisher-PP test are applied in this study”.

“In a study Maddala and Wu (1999) proposed the Fisher-type tests by combining the p-values from individual unit root tests. The non-parametric test statistic is $\Lambda = -2 \sum_{i=1}^N \ln p_i$, where p_i is the p-value for each individual unit root test. They demonstrated the superiority of the Fisher-type test using the Monte Carlo simulation. The LLC test proposed by Levin, Lin, and James Chu (2002) is based on the following equation:

$$\Delta x_{it} = \alpha_i + \beta x_{i,t-1} + \sum_{j=1}^{p_i} \beta_{ij} \Delta_{i,t-j} + \mu_{it} \quad (3)$$

where $i = 1, \dots, I$ denote the country, $t = 1, \dots, T$ refers to the time period and $x_{i,t}$ is the series for country i over the time period t . The number of lags is determined by p_i and the residual u_{it} is hypothesized. The null hypothesis of the LLC test is $H_0 : \beta = 0$ against the alternative hypothesis $H_0 : \beta < 0$. Like the LLC test, the IPS test proposed by Im, Pesaran, and Shin (2003) is also based on Eq (3) but β can vary in the IPS test. The IPS test is superior to the LLC test in that it allows for heterogeneity for the coefficient of β for all panel units. The null hypothesis of the IPS test is $H_0 : \beta_i = 0 \forall i$, while the alternative hypothesis is $H_0 : \beta_i < 0 \forall i$.

2.4. Panel Cointegration Tests

If all variables are integrated of order one I (1), we will test the cointegration in a panel data context and construct the model as follows:

$$y_{it} = \beta_i + \rho_i t + \beta_{1i} x_{1,it} + \beta_{2i} x_{2,it} + \beta_{3i} x_{3,it} + \varepsilon_{it} \quad (4)$$

where $i = 1, \dots, I$ denotes the each income group, $t = 1, \dots, T$ refers to the time period and β_i and ρ_i are the intercept and deterministic trend specific to each income group, respectively. Pedroni (2000) formulate two sets of tests: panel cointegration tests and group mean panel cointegration tests. The former tests, which are based on the within dimension technique, contained four statistics (panel v-statistic, panel ρ -statistic, panel pp-statistic, and panel ADF-statistic) are based on the between dimension approach. To check the existence of cointegration, the test based on the residual term ε_{it} is conducted as $\varepsilon_{it} = \delta_i \varepsilon_{it-1} + \mu_{it}$.

2.5. Panel Granger Causality

In order to explore the causal relationship among poverty, GDP per capita, foreign remittances, net official development assistance, inflation and human capital, we employ the Engle-Granger two-step test. Let begin with the estimation of Eq (4) and get the estimated residual. Next study estimate a dynamic vector error correction model specified as follows:

$$\begin{aligned} \Delta LnPO_{it} &= \omega_{2i} + \sum_{j=1}^q \theta_{21ij} \Delta LnPO_{it-j} + \sum_{j=1}^q \theta_{22ij} \Delta LnY_{it-j} + \sum_{j=1}^q \theta_{23ij} \Delta LnFR_{it-j} \\ &+ \sum_{j=1}^q \theta_{24ij} \Delta LnFD_{it-j} + \sum_{j=1}^q \theta_{25ij} \Delta LnINF_{it-j} + \sum_{j=1}^q \theta_{26ij} \Delta LnHC_{it-j} + \lambda_2 i \varepsilon_{it-1} + \mu_{2it} \end{aligned} \quad (4a)$$

$$\begin{aligned} \Delta LnY_{it} &= \omega_{2i} + \sum_{j=1}^q \theta_{21ij} \Delta LnY_{it-j} + \sum_{j=1}^q \theta_{22ij} \Delta LnPO_{it-j} + \sum_{j=1}^q \theta_{23ij} \Delta LnFR_{it-j} \\ &+ \sum_{j=1}^q \theta_{24ij} \Delta LnFD_{it-j} + \sum_{j=1}^q \theta_{25ij} \Delta LnINF_{it-j} + \sum_{j=1}^q \theta_{26ij} \Delta LnHC_{it-j} + \lambda_2 i \varepsilon_{it-1} + \mu_{2it} \end{aligned} \quad (4b)$$

$$\begin{aligned} \Delta LnFR_{it} &= \omega_{3i} + \sum_{j=1}^q \theta_{31ij} \Delta LnFR_{it-j} + \sum_{j=1}^q \theta_{32ij} \Delta LnPO_{it-j} + \sum_{j=1}^q \theta_{33ij} \Delta LnY_{it-j} \\ &+ \sum_{j=1}^q \theta_{34ij} \Delta LnFD_{it-j} + \sum_{j=1}^q \theta_{35ij} \Delta LnINF_{it-j} + \sum_{j=1}^q \theta_{36ij} \Delta LnHC_{it-j} + \lambda_3 i \varepsilon_{it-1} + \mu_{3it} \end{aligned} \quad (4c)$$

$$\begin{aligned} \Delta LnFD_{it} &= \omega_{4i} + \sum_{j=1}^q \theta_{41ij} \Delta LnFD_{it-j} + \sum_{j=1}^q \theta_{42ij} \Delta LnPO_{it-j} + \sum_{j=1}^q \theta_{43ij} \Delta LnY_{it-j} \\ &+ \sum_{j=1}^q \theta_{44ij} \Delta LnFR_{it-j} + \sum_{j=1}^q \theta_{45ij} \Delta LnINF_{it-j} + \sum_{j=1}^q \theta_{46ij} \Delta LnHC_{it-j} + \lambda_4 i \varepsilon_{it-1} + \mu_{4it} \end{aligned} \quad (4d)$$

$$\begin{aligned} \Delta LnINF_{it} &= \omega_{5i} + \sum_{j=1}^q \theta_{51ij} \Delta LnINF_{it-j} + \sum_{j=1}^q \theta_{52ij} \Delta LnPO_{it-j} + \sum_{j=1}^q \theta_{53ij} \Delta LnY_{it-j} \\ &+ \sum_{j=1}^q \theta_{54ij} \Delta LnFR_{it-j} + \sum_{j=1}^q \theta_{55ij} \Delta LnFD_{it-j} + \sum_{j=1}^q \theta_{56ij} \Delta LnHC_{it-j} + \lambda_5 i \varepsilon_{it-1} + \mu_{5it} \end{aligned} \quad (4e)$$

$$\begin{aligned} \Delta LnHC_{it} &= \omega_{6i} + \sum_{j=1}^q \theta_{61ij} \Delta LnHC_{it-j} + \sum_{j=1}^q \theta_{62ij} \Delta LnPO_{it-j} + \sum_{j=1}^q \theta_{63ij} \Delta LnY_{it-j} \\ &+ \sum_{j=1}^q \theta_{64ij} \Delta LnFR_{it-j} + \sum_{j=1}^q \theta_{65ij} \Delta LnFD_{it-j} + \sum_{j=1}^q \theta_{66ij} \Delta LnINF_{it-j} + \lambda_6 i \varepsilon_{it-1} + \mu_{6it} \end{aligned} \quad (4f)$$

where $i=1, \dots, I$ denote the each income group, $t=1, \dots, T$ refers to the time period and q is the optimal lag length automatically determined by the Schwarz information criteria. ε_{it-1} is the lag error correction term obtained by estimating the cointegration equation. The short run causality can be identified by examining the significance of the coefficients of the error correction terms in the panel correction model using the Wald test.

3. Results and Discussion

The results of panel unit root tests are presented in *Table 2*. It is evident from *Table 2* that all variables are non-stationary at level values for three income groups of countries. Once taken first difference, all six variables are stationary at I (1), regardless of the income group

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this study examine. It is not surprising that all four different panel unit root tests produced similar results.

Table 2. Panel Unit Root Tests Results

Lower Income Countries				
Variables	LLC	IPS	ADF-Fisher	PP-Fisher
PO	-2.553***	-0.318	40.787	40.496**
ΔPO	-10.850***	-9.515***	119.69***	102.59**
Y	8.044	11.839	0.868	0.960
ΔY	-9.269***	-7.622***	110.376***	111.60***
FR	5.813	8.264	4.913	0.832
ΔFR	-5.627***	-5.014***	70.648***	86.062***
FD	-2.726***	-1.675	40.081	40.394**
ΔFD	-14.307***	-14.597***	212.31***	412.068***
INF	13.088	-13.025***	340.04	616.86***
ΔINF	0.643	-21.771***	482.95***	816.53***
HC	-1.636*	0.423	21.536	32.273
ΔHC	-3.907***	-2.988***	42.967***	44.143***
Upper-Middle-Income Countries				
Variables	LLC	IPS	ADF-Fisher	PP
PO	0.035	1.227	21.185	18.485
ΔPO	-9.411***	-9.824***	137.75***	145.05***
Y	11.405	12.521	1.109	1.005
ΔY	-9.476***	-8.158***	125.08***	158.97***
FR	1.678	4.600	12.917	10.482
ΔFR	-6.939***	-7.567***	117.33***	127.55***
FD	-2.669***	-2.360	58.905	59.464***
ΔFD	-17.857***	-16.420***	245.67***	466.212***
INF	254.57	-8.113***	125.17	107.57***
ΔINF	-1141.20***	-321.59***	734.88***	926.47***
HC	-0.288	3.688	15.346	20.787
ΔHC	-5.339***	-3.857***	82.397***	105.27***
High-Income Countries				
Variables	LLC	IPS	ADF-Fisher	PP
PO	-9.125	-6.267	55.021***	224.757***
ΔPO	-5.396***	-4.845***	54.922***	51.582***
Y	2.096	4.215	2.660	3.083
ΔY	-6.804***	-6.189***	72.149***	85.862***
FR	-1.454*	1.051	14.821	42.403***
ΔFR	-7.721***	-6.012***	67.918***	102.64***
FD	-1.961	-2.499	19.960**	20.031**
ΔFD	-10.964***	-11.710***	92.887***	106.53***
INF	-37.608	-42.075	666.15	1108.48***
ΔINF	-57.644***	-26.845***	322.86***	1095.36***
HC	0.514	1.793	14.239	10.065
ΔHC	-2.221**	-3.426***	42.783***	45.548***

Note: Asterisks ***, ** and * denotes at 1%, 5% level and 10% levels of significance respectively. The Schwarz information criteria is used for optimal lags.

Since all the differenced variables are stationary, the study continues to perform the panel cointegration tests. Panel cointegration tests results are reported in Table 3. The results of Table 3 show that for each of the three income groups, where more statistics inclined to

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reject the null hypothesis of no-cointegration. Thus, we attain at the conclusion that there is a cointegration relationship among those variables in all groups. Given the cointegration relationship among these variables, study proceeds to estimate Eq. (2) using the fully modified OLS (FMOLS). The results of the FMOLS estimates are given in *Table 4*. Overall the FMOLS estimates suggest that the findings vary across income groups.

Table 3. Panel Cointegration Tests Results

Income Groups	Lower Middle Income	Upper Middle Income	High Income
Pedroni Residual Cointegration Tests			
Panel v-Statistic	-1.105	-1.176	-1.178
Panel rho-Statistic	2.253	2.436	0.829
Panel PP-Statistic	-5.085***	-1.392**	-7.430***
Panel ADF-Statistic	-2.782***	-0.844*	-2.050**
Group rho-Statistic	2.914	3.865	1.294
Group PP-Statistic	-5.371***	-8.558***	-8.653***
Group ADF-Statistic	-2.812***	-1.904**	-2.182**

Note: Asterisks ***, ** and * denotes at 1%, 5% level and 10% levels of significance respectively.

Table 4. Panel Long- Run FMOLS Estimates

Dependent Variable: Ln PO						
Panel	Independent Variables					R ²
	Y	FR	FD	INF	HC	
Lower Middle Income	-1.018***	0.002	1.104*	0.282*	-1.007**	0.866
Upper Middle Income	-1.102***	-0.201**	1.102***	-0.0025	-0.035	0.907
High Income	-0.007***	0.001	0.002***	-0.109***	0.007*	0.985

Note: Asterisks ***, ** and * denotes at 1%, 5% level and 10% levels of significance respectively.

The estimated coefficient of GDP per capita in lower middle income, upper middle income and high-income groups are -1.018, -1.102 and -0.007, respectively and are statistically significant at 1% level of significance. These estimates demonstrates that 1% increase in GDP per capita will lead to 1.018%, 1.102% and 0.007% decrease in poverty respectively in the lower middle-income countries, upper middle-income countries and high-income countries. The results are consistent with Chong *et al.* (2009) for China. Whereas, the impact of foreign remittances in lower middle income and high-income countries are small and insignificant, but 1% increase in the foreign remittances decreases the poverty by 0.201% in the upper middle-income countries. The results of foreign remittances in the case of upper middle-income countries are in line with Petreski and Joanovic (2013) for Bosnia-Herzegovina, Kosovo, Macedonia. Foreign development assistance or foreign debt shows positive and significant results in lower and upper middle-income countries. Results given in the *Table 4* shows that 1% increase in the foreign development assistance will increase the poverty by 1.104% in lower middle-income countries and 1.102% in upper middle-income countries. The effect of foreign development assistance in high-income countries is negligible. Results of high-income countries are steady with Lyoha (2004). Moreover, inflation shows expected results in lower middle-income countries and conclude that 1% increase inflation will cause 0.282% increase in poverty. Our results are consistent with Jongwanich (2001). On the other hand, it shows opposite results in high-income countries by causing a decrease in the poverty. In upper middle-income countries effect of inflation on poverty found small and insignificant. Finally, results reported that 1% increase in human

capital will decrease poverty by 1.007% in the lower middle-income countries. These results are similar with Jongwanich (2001). Whereas, human capital shows almost insignificant results in the rest of both income groups.

The results of panel causality tests are reported in *Table 5*. The upper panel reports the results for the lower middle-income countries. As anticipated, we find that there is bidirectional causality between poverty and GDP per capita in the lower middle-income countries, which is consistent with many prior studies including Chong *et al.* (2009). As expected, in the long run bidirectional causality between poverty and human capital as well as unidirectional causality from inflation to poverty. Which demonstrate that human capital has a massive role to alleviate poverty in the lower middle-income countries. In the upper middle-income group results are slightly different. There is unidirectional causality running from GDP per capita to poverty and GDP per capita to human capital. The results revealed that GDP per capita not only help to alleviate poverty but also boost the human capital. There are some other unidirectional causality also observed such as from foreign remittances to GDP per capita, official development assistance to human capital and from human capital to foreign remittances. These results are in line with Jongwanich (2001) in the case of 69 developing countries. In the high-income panel there is only one bidirectional causality between inflation and poverty. However, the other results only show unidirectional causality such as from poverty to inflation, foreign remittances to human capital, human capital to poverty and inflation to human capital.

Table 5. Panel Granger Causality Tests Results

Income Group	Long-Run Causality					
	ΔPO	ΔY	ΔFR	ΔFD	ΔINF	ΔHC
Lower Middle Income						
ΔPO	-	2.872	0.206	0.714	1.418	0.756*
ΔY	0.847*	-	3.914	0.109	4.959	2.111*
ΔFR	0.115*	0.391	-	1.148	2.708**	0.379
ΔFD	1.792*	0.739	2.449**	-	0.645	0.489
ΔINF	0.696	1.055	0.186	0.836	-	1.068
ΔHC	2.941***	1.850	1.124	1.545	1.640	-
Upper Middle Income						
ΔPO	-	0.550	1.551	0.233	0.880	0.604
ΔY	2.842**	-	1.292	5.471	0.251	3.356**
ΔFR	1.658*	0.328**	-	2.668	0.048	0.873
ΔFD	1.161**	0.392	2.286	-	0.069	4.066***
ΔINF	0.186	0.054	0.005	0.089	-	0.616
ΔHC	1.064	1.412	0.236*	2.354	1.253	-
High Income						
ΔPO	-	0.610	0.327	0.714	3.694***	2.081
ΔY	0.156	-	1.728	1.240	0.253	1.629
ΔFR	0.141	0.391	-	1.532	0.690	2.279*
ΔFD	1.231	0.800	0.061	-	0.364	1.310
ΔINF	2.956**	0.519	0.153	1.842	-	2.289*
ΔHC	2.037*	0.339	0.782	0.305	0.215	-

Note: Asterisks ***, ** and * denotes at 1%, 5% level and 10% levels of significance respectively.

Concluding remarks

This study examines empirically the impact of foreign remittances along with some other variables (foreign aid inflation rate, GDP per capita and human capital) on poverty alleviation in 39 countries, including the lower middle income, upper middle income and high income groups, during the period 1990-2014. Panel unit root tests such as LLC test proposed by Levin *et al.* (2002), IPS test suggested by Im *et al.* (2003) and Fisher-types tests introduced by Maddala and Wu (1999) have been employed to check stationarity properties of the data. Afterwards, FMOLS method has been employed to investigate the long-run association in selected variables. Further, the data were analyzed using Granger causality test. The panel unit root results reveal that all six variables are non-stationary at level and become stationary after the first difference. The results of panel cointegration consistently suggest that the variables under investigation are cointegrated. This implies that the variables stably move together in the long run, even though there might be deviation in the short run. The results of Granger causality test indicates that GDP per capita, foreign remittances, foreign debt and human capital Granger cause poverty in the lower middle income countries. Variables such as GDP per capita, foreign remittances and foreign debt Granger cause poverty in upper middle income countries. Lastly, inflation and human capital Granger cause poverty in high income countries. Panel long run FMOLS estimates on foreign remittances show positive impact of poverty elimination but statistically significant only in the case of upper middle income. Moreover, the empirical results reveal that GDP per capita leads to a decrease in poverty, while, inflation rate and human capital show significant results only in lower middle income countries.

The results unfold that both foreign remittance and aid are the notable factors of economic growth, in which the former plays a positive role, while the latter plays a negative role in the process of poverty alleviation during the period under the study. The empirical evidence validates that foreign remittances have a convincing and statistically significant effect on poverty alleviation. The finding signifies that there are considerable conceivable benefits related with foreign remittances for poor people. Therefore, the significance of remittance inflows needs not be negated in terms of growth expansion and poverty mitigation which successively enhance the economic and social conditions of the migrant origin country. This present study maintains that foreign remittances must be accepted as an anti-poverty device. The findings suggest that proper policy and efforts are required to upsurge remittances inflows, in which case, remittances should be channelized to more productive uses rather than merely for consumption in order to maintain sustainable reduction in poverty. In a similar vein, the empirical results further exhibit that there is no visible evidence that foreign aid has an effective apparatus for the poverty alleviation. The finding suggests that if the donors are really serious about poverty alleviation, they need to reverse this trend or the aid tool will have to be amended. Thus, policy makers need to devise an appropriate policy to trim down dependency on foreign aid and mitigate poverty largely by encouraging more foreign remittances inflows.

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