

The Impacts of International Migrants' Remittances on Household Consumption Volatility in Developing Countries

Abstract

In this paper we investigate the impacts of remittances on reducing volatility of household consumption using a panel dataset of 84 developing countries during the period from 1980 to 2014. Our study is a partial replication of Combes & Ebeke (2011), who first investigated this issue using data for the period of 1975 to 2004 and found that international migrants' remittances reduce household consumption volatility in developing countries. We improve their study by using more recent data, additional control variables, and by investigating the long run and the short run implications of international remittances in developing countries. Our results show that the volatility of household consumption can significantly be reduced by international migrants' remittances. The robustness checks reinforce the stabilising impact of migrants' remittances on consumption volatility in developing countries. Since overall consumption is an integral part of household welfare, the findings of this study highlight that international migrants' remittances may indeed contribute significantly to households' welfare by reducing the volatility of consumption in remittance receiving developing countries both in the short and long run.

Keywords: Remittances, Consumption Volatility, Developing Countries, System GMM, Communist countries.

1. Introduction

Over the past two decades, the flows of international remittances among different nations have increased dramatically due to globalisation. Moreover, migrants' remittances have been considered a growing private source of external finance in developing countries after foreign direct investment (FDI). For instance, migrants' remittances to developing countries were approximately three times higher than official development assistance (ODA) and almost half of FDI that those countries received in 2011 (Ratha, 2013). In addition, remittance flows to developing countries were more stable than other financial flows even when the global economy had been affected by the global financial crisis in 2009 (Ratha, 2013; De, et al., 2016). In 2014, international remittances to developing countries were \$436 billion and were projected to reach \$479 billion by 2017 (World Bank, 2015).

Despite the increasing volume and stable nature of international remittances to developing countries, relatively little attention has been paid to its contribution to household consumption smoothing. Since the volatility of household consumption might be increased due to the output shocks caused by trade liberalisation in an economy to a greater extent, it might inversely affect the household welfare in developing countries (Ahmed & Suardi, 2009; Di Giovanni & Levchenko, 2009). Therefore, it is indeed necessary for policy-makers to rethink the determinants of economic stabilisation, giving emphasis on consumption smoothing. While it is obvious that international remittances may act as a shock transmitter to the remittance recipient countries during the economic downturn in migrants' host countries, remittances can also play a role as a shock absorber in stabilising the output volatility, as well as consumption volatility caused by internal negative shocks, such as natural disasters (Jidoud, 2015; Bettin, et al., 2014).

Although the impacts of international remittances on a wide range of issues have been investigated by the existing literature, the study of the impact of migrants' remittances on household consumption volatility is very limited. To the best of our knowledge, only Combes & Ebeke (2011) examined the association between international remittances and household consumption volatility using a panel dataset of

87 developing countries for the period of 1975 to 2004. They found an inverse relationship between international migrants' remittances and instability in household consumption. They also revealed that international remittances can play the role of insurance at the time of income shocks for the households. They also added that the overall consumption stabilizing role of remittances become weaker if a country received remittances of more than 6 percent of its GDP. However, they did not consider the influences of government investment on fixed capital (e.g. roads, bridges, railways, markets etc). In this study we partially replicates Combes & Ebeke (2011)'s study by re-examining the role of remittances to reduce households' consumption volatility using more recent data for the period of 1980 to 2014. In addition, we extend Combes & Ebeke (2011)'s study (1) by using additional control variables, (2) considering government investment on fixed capital formation, (3) conducting further sensitivity analysis and (4) by investigating the long and short run implications of international remittances in developing countries. This study also considers possible bias in the measurement of consumption volatility caused by the difference in the public goods distribution system between communist and non-communist developing countries. Hence, the major research questions investigated in this study are: do remittances significantly reduce household consumption volatility? Does the inclusion of communist countries in the sample affect the measurement of the impact of remittances on consumption volatility? And, what are the impacts of remittances in reducing consumption volatility in the short and long run? We use a new panel dataset composed of 84 developing countries for which reasonable information of remittances and other required variables are available. The system GMM estimation is used to address possible biases due to reverse causality and potential endogeneity of remittances in this paper. The OLS and the Instrumental Variable (IV) estimations are also used to check the consistency of the results. The ratio of remittances to GDP for neighbouring countries and the log weighted GDP per capita of five top most migrants' host countries are used as two external instruments expecting that the potential "weak instrument" problem of traditional GMM estimator would be weakened. Furthermore, the Pesaran and Smith-type Pooled Mean Group estimators are also used to find out the short and long run effects of international remittances on consumption volatility. Controlling for all other factors, we find evidence that

international migrants' remittances significantly contribute to stabilising the volatility of household consumption in developing countries. However, the magnitude of this stabilising impact of remittances is stronger while the influences of the communist countries are excluded from the sample.

The rest of the study is organised as follows. Section 2 discusses governments' policy interventions to increase the inflow of international remittances. Section 3 presents a detailed review of existing literature on international remittances, while Section 4 discusses the relationship between international remittances and the volatility of household consumption. Section 5 describes the data sources and empirical strategy used in this study. Section 6 discusses the empirical findings of this study, and section 7 concludes.

2. Government policy interventions to increase inflow of international remittances

Realising the importance of remittances on household consumption and the country's welfare, developing countries should strive to implement policies to increase remittance flows and promote transfers through formal channels. Due to the high cost of remittance transfer through formal channels, international migrants' prefer illegal methods to send money to their home country. However, among different policy initiatives, tax exemption for remittance income is one of the most successful policies implemented by most remittance-receiving countries today. For instance, when Vietnam exempted its 5 percent tax on remittances in 1997, the flow of remittances through formal channel increased considerably. Similarly, the amount of remittance transferred by non-resident Bangladeshis through the banking channel is fully exempted from income tax in Bangladesh (Amjad et al. 2013). Another most effective policy for attracting remittances through formal channels is the relaxation of controls over the foreign currency transactions. In this system, more banks and financial institutions are permitted to take part in the foreign exchange transactions. The most successful example is from Bangladesh. In 2000, the Ministry of Finance liberalized the exchange rate policy, making it free-floating and allowing the market to decide the exchange rate, which has helped curb hundi transactions significantly in Bangladesh (Siddiqui, 2004).

Better provision of financial services is another important policy adopted by many developing countries. To reduce the cost and time of remittance transfer to the remittance receiving countries, many governments are nowadays allowing more of their domestic banks, mobile phone operators, and different microfinance institutions to operate financial services to their migrants working in other countries. For instance, the Groupe Banques Populaires bank has picked up 66 percent of total remittances to Morocco by offering low fees, simple procedures, and other non-financial services to Moroccans abroad (Amin & Caroline, 2005).

It is well known that the strength of the ties between the worker and his or her home country is a must to increase the remittance inflows in the receiving countries. To achieve this objective, policies related to loan schemes and bonds targeted at the migrants seems to be useful in many countries. For example a number of countries have effectively issued premium bonds to their diaspora at attractive interest rates and tax exemption facilities (for Bangladesh, China, India, Lebanon, Pakistan and the Philippines, see Carling 2005). Schemes were an important factor behind the doubling of remittance flows to India between 2002 and 2003 (Amjad et al. 2013). In addition, policies related to the travel and customs privileges are also very useful to strengthen the ties between the worker and his or her home country. Following this policy, many remittance-receiving countries allow their international migrants to bring certain amount of goods and equipment as tax free.

It is evident that policies to increase remittance are not independent; rather, they are interlinked based on the characteristics of receiving countries. For example, countries like Mexico and the Philippines tend to have well established institutional frameworks to train, support, and ensure the welfare of their expatriates abroad with more successful remittance programs. Some countries help migrants with searching for employment abroad, pre-migration information and orientation (Philippines, Bangladesh), IDs for customs and other purposes (Colombia, Tunisia), finance for study (Tunisia), support in legal and administrative disputes (Morocco) and hotline for migrant investors (Tunisia). Although, some countries like Bangladesh, Egypt, Eritrea, Pakistan, Philippines and Thailand have tried to impose mandatory remittance requirements on their emigrants, they have achieved only little success. In addition,

restrictive emigration policies have driven migrants into using clandestine remittance channels.

3. Review of literature

The impacts of remittances on household welfare, poverty reduction and income inequality have been studied by many researchers. Some researchers found that the depth and severity of poverty can greatly be reduced by the inflow of foreign remittances (Acosta, et al., 2008; Adams & Page, 2005; Gupta, Pattillo & Wagh, 2007; Brown, & Jimenez, 2007). The study conducted by Jimenez & Brown (2012) in Tonga found that 31 percent of the national poverty rate can be reduced through remittances, while their impact on the depth of poverty is about 49 percent. Moreover, household welfare, as well as income and consumption expenditures, can also be increased through remittances received by family members. In addition, large households and particularly female headed households may enjoy greater income stability due to remittances received (Catalina & Pozo, 2011). Seemingly, other non-migrant households, mostly relatives and friends, may also benefit from international migrant households through sharing norms and social pressures (Brown, et al., 2014). Evidence also shows that remittances may sometimes worsen income inequality and rural-urban inequality in the remittance receiving country, mainly because incomes via remittances tend to be invested mostly in the urban sector (Carling, 2004). Similarly, Adams & Cuecuecha (2010) found an increasing Gini coefficient of inequality when remittances are included in the household income in Indonesia. On the other hand, Acosta, et al. (2008) found a negative correlation between international remittances and income inequality in Latin American and Caribbean countries. Adams & Klobodu (2017) did not find any robust impact of remittances on income inequality in Sub-Saharan African countries.

The impacts of remittances on growth have been studied by a number of researchers and many of them found a positive effect of remittances on economic growth, while others found the opposite. For example, some studies (Giuliano & Ruiz-Arranz, 2009; Helen & Robert, 2007) argued that international remittances can positively contribute to economic growth in developing countries in the absence of a

properly functioning credit market. In a similar study, Zuniga (2011) also found a positive association between remittances and economic growth, which may vary with geographical distributions of remittance receiving countries. However, Ahamada & Coulibaly (2013); Adams & Klobodu (2016) found no causal relationship between remittances and economic growth in Sub-Saharan countries. Similarly, some studies (see, for example, Barajas, et al., 2009; Chami, et al., 2005) found that economic growth may sometimes be negatively affected by remittances.

Several other studies (see, for example, Bugamelli & Paterno, 2009, 2011; Chami, Hakura & Montiel, 2009) examined the impact of remittances on output growth (GDP per capita) stabilisation in developing countries and found positive effects. Anzoategui et al. (2014) and Demirgüç-Kunt et al. (2011) found that remittances can strengthen the financial development of the recipient country and can be used to meet its needs during negative income shocks (Osili 2007). In another recent study, Mohapatra et al. (2012) found that remittances had been used as an *ex post* coping strategy during natural disasters such as floods, droughts and earthquakes in order to smooth household consumption in countries such as Bangladesh and Ethiopia. They also found that remittances had also been used as *ex ante* investment as part of risk management after negative income shocks in Burkina Faso and Ghana, where remittance receiving households built their houses with concrete rather than mud. Bettin, et al. (2014) found a negative correlation between remittances and the business cycles.

A small number of studies examined the impact of policies on international remittances inflow using qualitative analysis, and some of these policy initiatives are discussed in the above section. Buencamin and Gorbunov (2002) and Carling (2005) used qualitative analysis along with some case studies to examine the impact of remittances policies. Siddique (2004) interviewed a number of key people from different public and private officials from different financial institutions in Bangladesh to investigate the policy impact on international remittances. Amjad et al. (2013) explored the impact of remittance policies based on descriptive analysis of remittance data from different countries. They calculated the growth in remittance inflows in relation to different time periods. However, in a later study, Carling (2008) mention that economic performance, financial development and financial openness

are the most commonly used determinants of remittance inflows. In our present study, we have used the KAOPEN index and bank credit as a proxy for financial openness and financial sector development respectively.

Combes & Ebeke (2011)'s study was the first that investigated the impact of migrants' remittances on household consumption volatility. They found that remittances can significantly reduce the consumption instability in developing countries by playing the role of insurance during periods of negative income shocks. Jidoud (2015) also examined the relation between international remittances and consumption volatility as a part of their study in African countries. He found very small impact of remittance on reducing consumption volatility in African countries. However, both these studies (Combes & Ebeke (2011); Jidoud (2015)) have not considered the influences of government investment on fixed capital formation. It is worth noting that government investment on fixed capital formation that/which produces fixed assets is an important factor for household consumption. These fixed assets are produced assets that are used repeatedly for the production process for more than one year. For instance, the stock of produced fixed assets are roads, bridges, markets, airports, railways, schools, hospitals, residential and non-residential buildings, transport equipment, office equipment, and so forth. Although it is obvious that these assets play a significant role in accelerating and smoothing household consumption, the household by itself could not create these assets. Therefore the present study has considered government investment on fixed capital formation to capture its external effect on household consumption volatility. Furthermore, this study also considers the possible bias in the measurement of consumption volatility caused by the difference in the public goods distribution system between communist and non-communist developing countries. It is well known that there is a big difference in the economic system between the democracy and communism ideology. In communism, the government has complete control over the production and distribution of resources. This system prevents any single person or household from rising to a higher position than others. Therefore, households might not be able to use international remittances to increase their consumption according to their desired level. On the contrary, a household from a democratic/non-communist/capitalist country is able to increase its consumption level without any restriction. Hence, it is

indeed necessary to analyse consumption volatility, considering the possible bias in measurements due to the factors of communism and non-communism. A recent study by De et al. (2016) found that workers' remittances are more stable than all other types of financial flows and this helps to smooth household consumption over the business cycle. However, the reverse causality of international remittances and long and short run effects have not been considered in De et al. (2016). This study addresses these issues using different estimations methods and using most recent data available up to 2014. Hence, this study certainly captures the effect of the 2009 Global Financial Crisis on international remittances as well. Therefore, this study will be an important addition to the existing literature.

4. International remittances and the volatility of household consumption

Following the work of Bugamelli & Paterno (2009), Combes & Ebeke (2011), and Jidoud (2015), the standard deviation of household consumption per capita growth is defined as the volatility of consumption in this study. Although the volatility of private consumption is driven by a number of factors such as: economic shocks, factors of household income elasticity to these shocks, and factors of household consumption elasticity to household income shocks, various country characteristics are also responsible for household consumption volatility (Wolf, 2004). For instance, large economies with diversified production tend to positively affect the volatility of consumption. Likewise, volatility in fiscal policy can also be associated with consumption instability (Herrera & Vincent, 2008).

[Fig. 1(a) about here]

However, the trends of consumption volatility in different regions for all developing countries in figure 1(a) show that the household consumption in developing and transitory economies in the Europe and Central Asia (ECA) region and the South Asia (SA) region is more volatile as compared to other regions in all developing countries. In contrast, the other regions such as East Asia and the Pacific

(EAP), Latin America and the Caribbean (LAC), the Middle East and North Africa (MENA) and Sub-Saharan Africa (SSA) regions have experienced an overall decreasing trend in consumption volatility during the period 1980 to 2014. Even though the SSA region shows a decreasing trend in consumption volatility, the volatility of consumption is still higher in that region compared to other regions shown in figure 1(a).

[Fig. 1(b) about here]

In addition, the trend in consumption volatility of the developing and transitory economies of the Europe and Central Asia region has changed substantially, while all the former and present communist countries are excluded from the sample as shown in figure 1(b). As well as this, the East Asia and Pacific region also has experienced a considerable change in the trend of consumption volatility while all communist countries are excluded from the sample. These findings could be a reason to re-think the measurement of the impact of remittances on consumption volatility, assuming a possible bias caused by the nature of the public goods distribution system of former and present communist countries within the group of developing countries. Since some regions with a low (high) level of remittances do not always produce a high (low) level of consumption volatility in the given data for our analysis, it seems difficult to confidently predict an inverse relationship between migrants' remittances and the volatility of consumption. However, the East Asia and Pacific region and the Sub-Saharan Africa region of all developing countries (including all former and present communist countries) and the Sub-Saharan Africa region while excluding all communist countries, show low level of remittances with a high level of consumption volatility. In contrast, the Middle East & North Africa region has experienced a high level of remittances with a low level of consumption volatility in our given dataset. Therefore, these findings could be a sign of the impact of remittances on the volatility of household consumption, which this study tries to investigate further in the empirical analysis.

5. Empirical Strategy and Data

We use the following empirical specification to estimate the impact of international remittances on consumption volatility in developing countries.

$$\begin{aligned}\sigma_{i,t}^c = & \alpha + \rho\sigma_{i,t-1}^c + \varphi_1 R_{i,t} + \beta_1 \ln GDP_{i,t} + \beta_2 Gov_con_{i,t} \\ & + \beta_3 Trade_open_{i,t} + \beta_4 GDP_volatility_{i,t} \\ & + \beta_5 Inv_volatility_{i,t} + \beta_6 Bank_credit_{i,t} + \beta_7 Aid_{i,t} \\ & + \beta_8 Finan_open_{i,t} + v_i + \mu_t + \epsilon_{i,t},\end{aligned}$$

where σ_{it}^c is defined as the consumption volatility and is estimated by the standard deviation of the real consumption per capita growth over non-overlapping 5-year periods. Country and non-overlapping 5-year periods are expressed by i and t respectively and their corresponding fixed effects are indicated by v_i and μ_t respectively. Thus, time invariant heterogeneity is expected to be controlled by μ_t and periodical shocks among countries are expected to be controlled by v_i . The idiosyncratic disturbance term is denoted by $\epsilon_{i,t}$. R is denoted as the remittance variable, measured as the ratio of personal remittances received to GDP. Following the World Bank's (2010) definition, the remittance variable is comprised of migrant workers' remittances and compensations of employees. In the baseline specification, the standard deviation of household consumption per capita growth (σ_{it}^c) is a function of the ratio of remittance to GDP ($R_{i,t}$), the log of initial GDP per capita ($\ln GDP_{i,t}$), the ratio of government consumption to GDP ($Gov_con_{i,t}$), the ratio of trade openness to GDP ($Trade_open_{i,t}$), the output growth volatility ($GDP_volatility_{i,t}$), the government investment growth volatility ($Inv_volatility_{i,t}$), the ratio of bank provided private sector credit to GDP ($Bank_credit_{i,t}$), the ratio of foreign aid to GDP ($Aid_{i,t}$), and financial openness ($Finan_open_{i,t}$). The key coefficient of interest is φ_1 which shows the correlation between remittances and volatility of household consumption. A negative sign of the remittances coefficient, $\varphi_1 < 0$, offers evidence in favour of the stabilising impact of remittances on household consumption volatility. Since the initial level of income could capture the heterogeneity of a country's technological progress (Sala-i-Martin, 1994; Barro, 1991), the $\ln GDP_{i,t}$ is included,

with the expectation that the volatility of consumption would be higher in lower per capita income countries than that of the higher income countries.

In order to control the size of the government, the $Gov_con_{i,t}$ variable is used such that a larger government size could be associated with macroeconomic instability and economic inefficiency in developing countries (Bekaert et al., 2006). Therefore, consumption volatility may exhibit a positive relationship with the size of the government in developing countries. Likewise, the trade openness variable is also used expecting a positive correlation ($\beta_3 > 0$) with the consumption volatility (Di Giovanni & Levchenko, 2009). In addition, a positive sign for the $GDP_volatility_{i,t}$ variable, $\beta_4 > 0$, is expected to grasp the collective shocks on volatility of household consumption in developing countries (Herrera & Vincent, 2008; Combes & Ebeke, 2011). Since government investment in fixed capital formation, such as investment in land improvements, construction of roads, schools, hospitals and so forth, is an important factor for facilitating household consumption, $Inv_volatility_{i,t}$ is included expecting a positive relation, $\beta_5 > 0$, with consumption volatility. Again, the $Bank_credit_{i,t}$ variable is included to capture the financial development of a country assuming that the efficiency of the financial market could largely influence the extent of consumption volatility in developing countries (Ahmed & Suardi, 2009; Bekaert et al., 2006). Since the availability of bank provided private sector credit is an important determinant for household consumption smoothing, the ratio of bank provided private sector credit to GDP is treated as the proxy for financial development (Combes & Ebeke, 2011). Two alternative variables, namely broad money (M2) to GDP ratio (M2/GDP), and the banks' deposit to GDP ratio are used as alternative measures of financial development to re-examine the stabilising role of remittances on the consumption volatility. The financial openness variable is used to capture the effect of the global financial systems on consumption volatility. The dynamic nature of the consumption volatility is captured by the lag level of the dependent variable.

The estimation of the above equation using the Ordinary Least Squares (OLS) estimator will be biased and inconsistent because the lagged dependent variable is correlated with the error term due to the presence of fixed effects (Combes & Ebeke, 2011). Hence, the system GMM estimator is employed in this study since it allows for

the lagged differences and lagged levels of the explanatory variables as an instrument. The potential endogeneity of remittances and other explanatory variables are controlled by the system GMM estimator (Blundell & Bond, 1998). Additionally, two external instruments are used with the expectation that the potential “weak instruments” problem of the traditional GMM estimator would be weakened. These external instruments are: (1) the ratio of remittances to GDP for neighbouring countries located in the same region and (2) the log-weighted GDP per capita of the five top most migrants’ host countries (Acosta, Baerg & Mandelman, 2009; Aggarwa et al., 2011). The first instrument is used to capture the regional trend of remittances in remittance receiving countries, including changes in transaction costs, while not affecting the consumption volatility in recipient countries. In addition, the impact of the economic condition of the migrants’ host countries on the flow of remittances will be captured by the later instrument, assuming that the economic condition of migrants’ host countries is not directly related with the consumption volatility of the recipient countries. Since the consistency of the GMM estimator depends on the validity of the instruments, two specification tests are used: (1) the Hansen test for over-identifying restrictions assuming the null hypothesis that the instruments are valid overall, and, (2) the autocorrelation test which examines the hypothesis that there is no second-order serial correlation in the first differenced error term (Arellano & Bond, 1991; Roodman, 2009). Moreover, the OLS and the Instrumental Variable (IV) approaches are also used to check the consistency of the results obtained by the system-GMM estimator. In addition, the Pesaran and Smith-type Pooled Mean Group estimators are used to find out the long and short run relationships among remittances and consumption volatility, considering the dynamic heterogeneity in the panel dataset. Since we were not able to find any suitable indicator for remittance policies that is common for all developing countries, we are not able to empirically investigate the impact of remittance policies on the international migrants’ remittances in developing countries.

5.1 Data sources

The World Development Indicator 2015 is used as the main source of data for constructing a large panel consisting of 84 developing countries over the period from

1980 to 2014. Additionally, data for the variables of private credit ratio and bank deposit ratio were collected from the Global Financial Development database 2015 of the World Bank for the same periods. The data period and countries are selected based on the availability of information required for all variables in the study. The dataset is then rearranged into 7 observations by taking the average of non-overlapping 5-year periods. As a result, 7 observations per country were available in the panel dataset for this study. Furthermore, the dataset is also rearranged into overlapping 5-year periods which increases the number of observations and time series dimensions needed for the pooled mean group estimations. The precise definition of each variable and their sources are shown in table 1.

[Table 1 about here]

The financial openness variable is measured using KAOPEN from the Chinn-Ito Index (2014) which measures the degree of openness of a country's capital accounts. A greater value of this index reflects that the country is more open to cross-border financial transactions. Chinn & Ito (2008) have used the following four major categories of restrictions on external accounts in construction of the KAOPEN index: (1) the presence of multiple exchange rates, (2) the restrictions on current account transactions, (3) the restrictions on capital account transactions, and (4) the requirement of the surrender of export proceeds (Combes & Ebeke, 2011; Kose, Prasad & Terrones, 2003). Summary statistics of different variables in all developing countries are presented in table 2.

[Table 2 about here]

6. Results and Discussion

6.1 Empirical results

Across all estimations, the control variables in this study are the log of initial GDP per capita, the ratio of government consumption to GDP, the ratio of trade openness (total trade volume) to GDP, the output growth volatility (standard deviation of GDP per capita growth), the government investment volatility (standard deviation of government investment growth), the ratio of available bank credit to GDP, the ratio of aid inflow to GDP, and the financial openness variable.

Table 3 shows the impacts of remittances on the volatility of household consumption in all developing countries (including former and present communist countries). The Ordinary Least Squares (OLS) technique has been estimated using the country and time fixed effects based on the Hausman test for fixed effects without considering the dynamic nature of the panel dataset. After controlling for all other explanatory variables, the results reveal that the coefficient of the ratio of remittances to GDP is about 0.06 which is negative and is statistically significant at the five percent level. It suggests that the standard deviation of household consumption growth is decreased due to an increase in the ratio of remittances to GDP, which is, in turn, related to a decrease in consumption volatility in developing countries. Among all the control variables included in the OLS estimation, the coefficients for the ratio of government consumption to GDP, the ratio of trade openness to GDP, the standard deviation of GDP per capita growth (output growth volatility), and the standard deviation of government investment growth (govt. investment volatility) are positive and statistically significant, meaning that consumption volatility increases due to the increase in those variables. On the other hand, the coefficient for the ratio of available bank credit to GDP is also statistically significant and negatively related to the volatility of consumption. Therefore, the consumption volatility decreased due to an increase in the ratio of bank credit to GDP in the private sector. Although the coefficients for other control variables such as log of initial GDP per capita, the ratio of aid flow to GDP, and financial openness have the sign as expected, these are not statistically significant in the OLS estimation.

[Table 3 about here]

The results obtained using the instrumental variable (IV) estimation considering all control variables other than the lag of dependent variable are shown in column 2 of table 3. Two external instruments such as the ratio of remittances to GDP for neighbouring countries located in the same region for each country, and the log-weighted GDP per capita of the five top most migrants' host countries for each country have been used for the IV estimation. The results show that the coefficient of the ratio of remittances to GDP is not only statically significant, but also about 6.5 times larger than that of the OLS estimation. Unlike the OLS estimation presented in table 3, the IV estimation shows the significant and negative impact of the initial GDP per capita on consumption volatility, suggesting that initial relative income of a country is an important factor for reducing the volatility of household consumption. Like the OLS estimation presented in table 3, the coefficients for the ratio of government consumption to GDP, and the ratio of trade openness to GDP are also positive and statistically significant where the magnitude of the variables are larger than that of the OLS estimation. In addition, the output growth volatility and the government investment volatility are also positively and significantly associated with the volatility of consumption. As well as this, the ratio of bank credit to GDP also reveals the negative impact on consumption volatility while the size of the coefficient is almost same as obtained from the OLS estimation. Among all control variables, the ratio of aid flows to GDP, and the financial openness have not shown any significant impact on the volatility of consumption. Although the IV estimation certainly captures the biases caused by the measurement error, it does not address the problem of reverse causality (Aggarwal, et al., 2011).

The last column of table 3 reports the results obtained using the system GMM estimation for all developing countries (including the former and present communist countries). Results reveal that the coefficient of the ratio of remittances to GDP, 0.14, is negative and highly significant at the one percent level. This finding reinforces the stabilising impact of remittances on consumption volatility considering the potential endogeneity of remittances in developing countries. Furthermore, the size of the coefficient of the ratio of remittances to GDP is also consistent with the results obtained from the OLS and IV estimations. Among other control variables included in the system GMM estimation in table 3, the log initial GDP per capita, and the ratio

of bank credit to GDP shows the negative and significant impact on consumption volatility. On the other hand, the coefficients of the ratio of government consumption to GDP, the ratio of trade openness to GDP, the output growth volatility, and the government investment volatility are positive and significant in the system GMM estimation. Like the two other estimations (OLS and IV) presented in table 3, the ratio of aid flows to GDP, and financial openness do not appear to be associated with consumption volatility in the system GMM estimation. The Hansen test confirms the validity of the instruments, and the autocorrelation tests also do not reject the model due to the presence of second order serial correlation in the system GMM framework.

Table 4 presents the empirical results obtained from different estimators with the exclusion of the influences of the former and present communist countries on consumption. In the first column, the results from the OLS estimation show the significant and negative impact of the ratio of remittances to GDP on the volatility of consumption considering the effects of other control variables as fixed. In addition, the magnitude of the coefficient of the ratio of remittances to GDP (0.075) is almost similar to that estimated without considering the influences of all communist countries on consumption. Among all control variables included in the OLS estimation in table 4, the coefficients for the ratio of government consumption to GDP, the ratio of trade openness to GDP, output growth volatility, and the government investment volatility, are positive and statistically significant. Additionally, the ratio of available bank credit to GDP is also statistically significant at the 10 percent level with the expected sign. Other control variables such as the log of initial GDP per capita, the ratio of aid flows to GDP, and financial openness do not have any significant impact on consumption volatility.

[Table 4 about here]

The empirical results obtained from the IV estimation while excluding the influences of former and present communist countries presented in table 4 also confirm the negative association between the ratio of remittances to GDP and the consumption volatility. Moreover, the size of the coefficient for the remittance variable is 0.40, which is almost similar to that obtained considering the influences of

all former and present communist countries on consumption. However, the magnitude of this coefficient is about 5.5 times larger than that of the OLS estimation as shown in table 4. The coefficients for all control variables other than financial openness are also statistically significant in the IV estimation.

The last column of table 4 reports the system GMM estimation results without consideration of the influences of former and present communist countries. Results show that the coefficient for the ratio of remittances to the GDP variable is negative and statistically significant at the one percent level. This result also reinforces the finding obtained from the OLS and IV estimations. The magnitude of the coefficient for the remittances variable is 0.186, which shows a stronger stabilising impact of remittances on the volatility of consumption. Although the size of the remittance coefficient is about 2.5 times larger than that of the OLS estimation, it is about 2 times smaller than the result obtained from the IV estimation presented in table 4. As well as this, the coefficient for the ratio of bank credit to GDP is negative and significant. Among other control variables, the ratio of trade openness to GDP, the output growth volatility, and the government investment volatility are found to be positively and significantly associated with the volatility of consumption, whereas the initial GDP per capita is significantly and negatively associated with the household consumption volatility. The diagnostic tests for the system GMM estimation presented in table 4 also confirm the validity of the instrumentation in the system GMM framework.

6.2 Robustness checks

Since financial development of a country has been considered as an important determinant of consumption smoothing, two alternatives of financial development have been used to re-examine the stabilising contribution of remittances to the volatility of household consumption based on the financial development.

[Table 5 about here]

The ratio of bank deposits to GDP, and the ratio of broad money to GDP (M2/GDP) instead of the ratio of bank credit to GDP have been used as the proxy variable for financial development in table 5. After controlling for the ratio of bank deposit to

GDP along with other control variables in table 5, the results in column 1 and column 3 show the highly significant and negative association of international remittances with consumption volatility in developing countries. Moreover, the size of the coefficient for the remittances variable in column 3 is 0.19, which is larger than that of column 1 (0.15), when the influences of former and present communist countries have not been excluded. Likewise, the broad money to GDP (M2/GDP) ratio has been used as an alternative measurement of financial development in column 2 and column 4. The findings also reinforce the stabilising impact of international remittances on the volatility of household consumption following the same trend as other measures of financial development in developing countries.

[Table 6 about here]

The results of robustness checks after controlling for fewer variables for all developing countries including former and present communist countries have been reported in table 6. At the beginning, this study has controlled for the lag of consumption volatility, and log of initial GDP per capita in column 1. The ratio of government consumption to GDP and the government investment volatility are used as additional control variables in column 2 and column 3, respectively. Although the results obtained still suggest the significant stabilising impact of international remittances on the volatility of household consumption, the diagnostic tests fail to confirm the validity of instrumentation in the system-GMM framework. The diagnostic tests confirm the validity of the instrumentation (with a negative and significant impact of remittances on consumption volatility) when the ratio of trade openness to GDP is introduced in column 4. Moreover this negative and significant relation between remittances and consumption volatility has not been changed even when the output growth volatility, the ratio of bank credit to GDP, the ratio of aid flow to GDP, and financial openness variables have been used as additional control variables in the regressions from column 5 to column 8. However, the ratio of aid flow to GDP and financial openness variable do not show any significant impact which are added into the column 7 and 8 respectively.

[Table 7 about here]

Table 7 presents the results for robustness checks controlling for fewer variables using the system GMM estimation, excluding the influences of former and present communist countries. The diagnostic tests confirm the validity of the instrumentation in the SYS GMM framework in all the regressions except in column 1 and column 3. The ratio of international remittance to GDP significantly contributes to stabilising the volatility of consumption when the government consumption to GDP variable is introduced as an additional control variable in column 2. The findings of other columns also reinforce the significant and negative impact of international remittances on the volatility of household consumption, regardless of which control variables are introduced one by one across all columns in table 7. Moreover, the magnitude of the coefficient for the ratio of remittances to GDP is found to be stronger compared to the results presented in table 6 following the same order to control additional variables from column 1 to column 8.

6.3 Pooled mean group estimation (PMG) results

[Table 8 about here]

Table 8 reports the results of the PMG estimations of the long and short run coefficients of international remittances on household consumption volatility along with other control variables. The co-integration equations are estimated following Pesaran et al. (1999), and do not include trends. The estimation provides more interesting results. First, we notice that while the coefficients of almost all control variables excluding the ratio of aid flows and financial openness are significant in the long run estimations (both in column 1 and 3), only the ratio of bank credit and the ratio of remittance to GDP are significant in the short run (in column 2 and 4). Since short run coefficients mainly reflect adjustment of the economy to shocks (Eggoh & Bangake 2012), our results suggest that international remittances are certainly capable in reducing the volatility of household consumption in the short run. The reasoning behind this is that capital flows in the form of international remittances in the short term, which might be used to finance the consumption during bad times of the

households. However, the magnitude of the coefficient of remittance variable in the long run (0.18) is about 6 times higher than that of this in the short run (0.03) in all countries. Likewise, the magnitude of the remittance coefficient, while excluding the communist countries, is about 0.23, which is about 4.5 times larger than in the short run. Therefore, it is evident from the PMG results that as a source of relatively stable foreign capital, international remittances are playing important roles in reducing household consumption volatility both in the short run as well as in the long run.

6.4 Discussion

International remittances can be used for the consumption of durable goods as well as non-durable consumption of goods which both help to smooth the consumption growth of remittance receiving households. Nevertheless, international remittances can also play a role as insurance for smoothing the consumption during a period of various negative income shocks in the country. According to the results of this study, the household consumption volatility can be reduced to about 1.4 to 1.8 points with a 10 point increase in the remittance inflows. The results are consistent with the findings of Bettin, et al. (2014); and Chami, et al. (2009). The magnitude of this coefficient is much lower than in Combes & Ebeke (2011), the reason may be that, our study has used most recent data from 1980 to 2014 and extended the coverage period than that of Combes & Ebeke (2011). Our study captures the global financial crises in 2009 and has used an additional control variable with different estimations. Although Combes & Ebeke (2011) found significant impact of financial openness on consumption volatility, our study doesn't find this relationship as significant.

Furthermore, the consumption volatility may be amplified due to an increase in trade openness and the size of the government. Although the magnitude of the trade openness of this study is almost similar with Combes & Ebeke (2011), the magnitude of government consumption is almost half in size. This result is not surprising, since the government investment in fixed capital formation could have influence on the government consumption. On the other hand, the volatility of consumption is lower in more developed countries, since the initial GDP per capita is negatively associated with consumption volatility. These results are consistent with the findings of early studies (Bekaert et al., 2006; Herrera & Vincent, 2008; Chami et al., 2009). In

addition, this study also suggests that a small increase in output volatility (e.g. one point) will cause 0.42 to 0.45 point increase in household consumption volatility. The magnitudes of the output volatility are almost similar to Combes & Ebeke's (2011) findings. However, less volatile government investment in various fixed capital formation such as land improvements (construction of drains, fences, ditches, etc.), construction of roads, highways, markets, schools, hospitals, and so forth, is associated with less volatile consumption. While smooth growth of government investment in fixed capital formation facilitates household consumption from the country specific side, international remittances could directly contribute to stabilising the volatility of consumption by increasing the purchasing power of remittance receiving households. Although this suggests that consumption smoothing could depend on the level of financial development of a country, the magnitude for consumption smoothing is much lower than that of international remittances. Furthermore, it is evident from our findings that only remittances, as a macro variable, have the consumption volatility reducing ability both in the short and long run. For instance, 0.18 to 0.23 point consumption volatility (table 8) reduction is possible in the long run with only one unit increase in the remittance inflows. Nevertheless, the robustness checks confirm the stabilising impact of international remittances on the volatility of household consumption, regardless of the controls or measurement of financial development used in this study. Additionally, our findings confirm the bias in the measurement of the impact of remittances on consumption volatility due to the difference in public goods distribution systems between the communist and non-communist developing countries. Therefore, the overall findings of this study have confirmed the significant and robust relationship between international remittances and the consumption volatilities of developing countries using additional controls and different estimates than in Combes & Ebeke (2011).

7. Conclusions

Although the impact of international remittances has increasingly been recognised, its contribution in reducing the volatility of household consumption has not been studied thoroughly. Therefore, a better understanding of the impact of remittances on the consumption volatility is important. Using panel data of 84

developing countries for the period 1980 to 2014, this study partially replicates the study of Combes & Ebeke (2011) to investigate the role of international migrants' remittances as a source of external finance that may help in reducing the macroeconomic volatility of household consumption in developing countries. However, we improve Combes & Ebeke (2011)'s study in several ways. We extend data coverage period of Combes & Ebeke (2011) by using more recent data. We consider the influences of government investment on fixed capital formation, which have not been considered by Combes & Ebeke (2011). In addition, we consider the potential measurement bias of consumption volatility caused by the difference in the public goods distribution system between communist and non-communist developing countries. We also examine the long and short run impacts of international remittances in developing countries.

Although the results of our study confirms the inverse relationship between consumption volatility and international remittances, the magnitude of consumption volatility stabilizing effect is lower than that in Combes & Ebeke (2011). The results of this study suggest that remittance receiving countries exhibit, on average, lower consumption volatility. This result is robust, since we consider the biases arising from omitted variables, reverse causation and measurement error. In addition, the magnitude of the stabilising impact of remittances on consumption volatility is found to be much stronger in the long run. Therefore policymakers should develop appropriate policies that increase international remittance inflows in order to achieve consumption stabilisation in the short and long run. Countries should be aware of, evaluate, and learn from the successes and failures of other countries when designing and implementing remittance policies of their own. However, policies to maximize remittance inflows and channel them into productive uses should be seriously considered to increase the living standard, especially for countries with significant number of workers abroad. Lowering the remittance transfer costs and improving financial systems in remittance receiving countries would be major instruments in attracting more remittance inflows through formal channels. The main findings of this study reveal that the stabilising impact of remittances on consumption volatility is appreciably acceptable, as the remittance flow is found to be more stable compared to other capital flows that act as external sources of capital in developing countries.

The findings of this study, therefore, highlight that international migrants' remittances may indeed contribute significantly to households' welfare by reducing the volatility of consumption in remittance receiving developing countries.

Although some interesting findings are revealed in this study, a few caveats pertain. Firstly, we were not able to identify any common indicator of remittance policy for all developing countries. Therefore, we are not able to empirically investigate the impact of remittance policies on international remittances. Further, heavy dependence by the remittance receiving country on the international remittance flow as an external source of finance may lead to an increase in macroeconomic vulnerability to exogenous shocks; this issue has not been considered in this study. These issues are beyond the scope of the current study and deserve future investigation.

References

- Acosta, P. A., Baerg, N. R., & Mandelman, F. S. (2009). "Financial development, remittances, and real exchange rate appreciation". *Economic Review*, 1–12.
- Acosta, P., Calderon, C., Fajnzylber, P. & Lopez, H. (2008). "What is the impact of international remittances on poverty and inequality in Latin America?" *World Development*, 36(1), 89–114.
- Adams, R. (2004). "Remittances and poverty in Guatemala", World Bank policy research paper, No. 3418.
- Adams, R. H. & Cuecuecha, A. (2010). "The economic impact of international remittances on poverty and household consumption and investment in Indonesia", World Bank Policy Research Working Paper 5433, World Bank, Washington, DC.
- Adams, R. H. (2009). "The Determinants of International Remittances in Developing Countries", *World Development*, 37(1), 93-103.
- Adams, R. H., & Page, J. (2005). "Do international migration and remittances reduce poverty in developing countries?" *World Development*, 33(10), 1645–1669.
- Adams, S., & Klobodu, E. K. M. (2016). "Remittances, regime durability and economic growth in Sub-Saharan Africa" *Economic Analysis and Policy*, 50, 1-8
- Adams, S., & Klobodu, E. K. M. (2017). "Capital flows and distribution of income in sub-Saharan Africa" *Economic Analysis and Policy*, 55, 169-178
- Aggarwal, R., Demirgüç-Kunt, A., Peria, M., & Soledad, M. (2011). "Do remittances promote financial development?" *Journal of Development Economics*, 96, 255-264.
- Ahamada, I., & Coulibaly, D. (2013). "Remittances and Growth in Sub-Saharan African Countries: Evidence from a Panel Causality Test", *Journal of International Development*, 25, 310–324.
- Ahmed, A., & Suardi, S. (2009). "Macroeconomic volatility, trade and financial liberalization in Africa", *World Development*, 37(10), 1623–1636.
- Amin, M., & Caroline, F. (2005). "Migration and Remittances in ESA Countries", Washington, DC: The World Bank.

- Amjad, R., Irfan, M., & Arif, G. M. (2013). "How to Increase Formal Inflows of Remittances: An Analysis of the Remittance Market in Pakistan", Working Paper, International Growth Centre.
- Anzoategui, D. Demirguc-kunt, A., & Marti´nez peri´, M. (2014). "Remittances and Financial Inclusion: Evidence from El Salvador", *World Development*, 54, 338–349.
- Arellano, M. & Bond, S. (1991). "Some tests of specification for panel data: Monte Carlo Evidence and an Application to Employment equations", *Review of Economic Studies*, 58, 277-297.
- Barajas, A., Chami, R., Fullenkamp, C., Gapen, M., & Montiel, P. (2009). "Do Workers' Remittances Promote Economic Growth?" IMF Working Paper, WP/09/153.
- Barro, R.J. (1991). "Economic growth in a cross section of countries", The *Quarterly Journal of Economics* 106(2), 407-443.
- Bekaert, G., Harvey, C., & Lundblad, C. (2006). "Growth volatility and financial liberalization", *Journal of International Money and Finance*, 25(3), 370–403.
- Bettin, G., Presbitero, A. F. & Spatafora, K. (2014). "Remittances and vulnerability in developing countries", IMF working paper WP/14/13.
- Blundell, R., & Bond, S. (1998). "Initial conditions and moment restrictions in dynamic panel data models", *Journal of Econometrics*, 87(1), 115–143.
- Brown, R. C., Connell, J., & Jimenez-Soto, E. V. (2014). "Migrants' Remittances, Poverty and Social Protection in the South Pacific: Fiji and Tonga", *Population. Space Place*, 20, 434–454.
- Brown, R. P., & Jimenez, E. (2007). "Estimating the Net Effects of Migration and Remittances on Poverty and Inequality; Comparisons of Fiji and Tonga", UNU-Wider Research Paper No. 2007/23.
- Buencamino, L., & Gorbunov, S. (2002). Informal Money Transfer Systems: Opportunities and Challenges for Development Finance: DESA Discussion Paper 26, UN.
- Bugamelli, M., & Paterno`, F. (2009). "Do workers' remittances reduce the probability of current account reversals?" *World Development*, 37(12), 1821–1838.

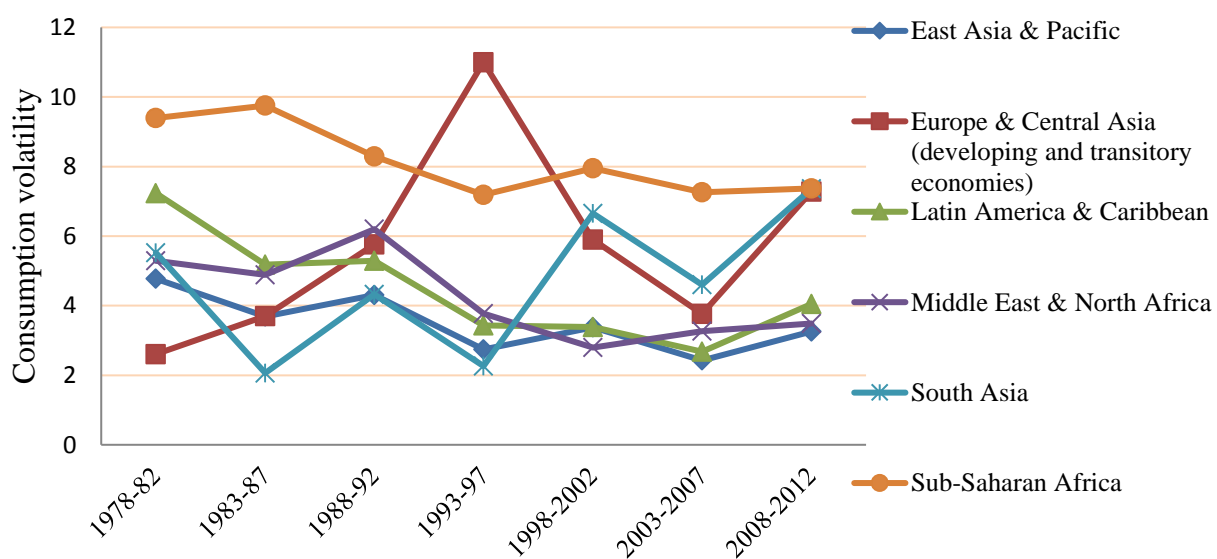
- Bugamelli, M., & Paterno, F. (2011). "Output growth volatility and remittances", *Economica*, 78, 480-500.
- Carling, O. J. (2004). "Emigration, return, and development in cape verde: The impact of closing borders", *Population, Society, and Place*, 10(2), 113–132.
- Carling, J. (2005). "Migrant Remittances and Development Cooperation", PRIO Report 1/2005, Oslo.
- Carling, J. (2008). "The determinants of Migrants Remittances", *Oxford Review of Economic Policy*, 24(3), 581–598
- Catalina, A. D., & Pozo, S. (2011). "Remittance and Income Smoothing", *American Economic Review*, 101(3), 582–587.
- Chami, R., Fullenkamp, C., & Jahjah, S. (2005). "Are immigrant remittance flows a source of capital for development?", IMF Staff Paper, International Monetary Fund, 52(1) 55-81.
- Chami, R., Hakura, D., & Montiel, P. (2009). "Remittances: An automatic output stabilizer?" IMF working paper no. 09/91.
- Chinn, M. D. & Ito, H. (2008). "A new Measure of Financial Openness", *Journal of Comparative Policy Analysis*, 10(3), 309-322.
- Combes, J., & Ebeke, C. (2011). "Remittances and Household Consumption Instability in Developing Countries", *World Development* 39(7), 1076–1089.
- De, S., Islamaj, E., Kose, M. A., & Yousefi, S. R. (2016). "Remittances over the business cycle: Theory and Evidence", KNOMAD working paper 11, Washington DC: World Bank
- Demirgüç-Kunt, A, Córdova, E. L., Martínez Perí, M., & Woodruff, C. (2011). "Remittances and banking sector breadth and depth: Evidence from Mexico", *Journal of Development Economics*, 95, 229–241.
- Di Giovanni, J., & Levchenko, A. (2009). "Trade openness and volatility", *Review of Economics and Statistics*, 91(3), 558–585.
- Eggoh, J. C., & Bangake, C. (2012). "Pooled Mean Group estimation on international capital mobility in African countries", *Research in Economics*, 66, 7-17

- Giuliano, P. and Ruiz-Arranz, M. (2009). “Remittances, financial development and growth”, *Journal of Development Economics*, 90(1), 144–152.
- Gupta, S., Pattillo, C., & Wagh, S. (2007). “Impact of remittances on poverty and financial development in Sub-Saharan Africa”, IMF working paper, WP/07/38.
- Helen, S. T., & Robert, L., (2007). “Remittances and Financial Inclusion in Development”, UNU-Wider, Research Paper No. 2007/49.
- Herrera, S. & Vincent, B. (2008). “Public expenditure and consumption volatility”, Policy research working paper series 4633. The World Bank.
- Jidoud, A. (2015). “Remittances and macroeconomic volatility in African countries”, IMF working paper, WP/15/49.
- Jimenez-soto, E. V, & Brown, R. P. (2012). “Assessing the Poverty Impact of Migrants’ Remittances’ Using Propensity Score Matching: the Case of Tonga”, *The Economic Record*, 88(282) 425–439.
- Kose, M., Prasad, E., & Terrones, M. (2003). “Financial integration and macroeconomic volatility”, *IMF Staff Papers*, 50, 119–142.
- Maria, C., & Lazarova, E. A., (2012). “Migration, Human Capital Formation, and Growth: An Empirical Investigation”, *World Development*, 40(5), 938–955.
- Mohapatra, S., Joseph, G., & Ratha, D. (2012). “Remittances and natural disasters: Ex-post response and contribution to ex-ante preparedness”, *Environment, Development and Sustainability*, 14, 365–387 (Springer).
- Osili, U. O. (2007). “Remittances and savings from international migration: Theory and evidence using a matched sample”, *Journal of Development Economics* 83, 446–465
- Pesaran, H., Shin, Y., Smith, R. (1999). “Pooled Mean Group estimation and dynamic heterogeneous panels”, *Journal of the American Statistical Association*, 94, 621–634.
- Ratha, D. (2013). “The impact of remittances on economic growth and poverty reduction”, Migration Policy Institute, The World Bank, Washington, DC
- Roodman, D. (2009), “How to do xtabond2: An introduction to difference and system GMM in stata”, *The Stata Journal*, 9 (1), 86-136

- Sala-i-Martin, X. (1994). "Cross sectional regressions and empirics of economic growth", *European Economic review*, 38, 739-747
- Siddiqui, T. (2004) "Efficiency of migrant workers' remittance: the Bangladesh case". Asian Development Bank, Manila.
- Wolf, H. (2004). "Accounting for consumption volatility differences", IMF Staff Papers, 51, 109-126
- Wooldridge, J. M. (2010). "Econometric Analysis of Cross Section and Panel Data", the MIT press, Cambridge Massachusetts, London, England
- World Bank. (2006). "Global economic prospects 2006", The world Bank, Washington, DC
- World Bank (2010). "Outlook for Remittance Flows 2010-2011. Migration and Development Brief", The World Bank, Washington, DC
- World Bank (2015). "Migration and Development Brief, 24", The World Bank, Washington, DC
- Zuniga, M. C. (2011). "On the path to economic growth, do remittances help? Evidence from panel VARS", *The Developing Economies*, 49(2), 171-202

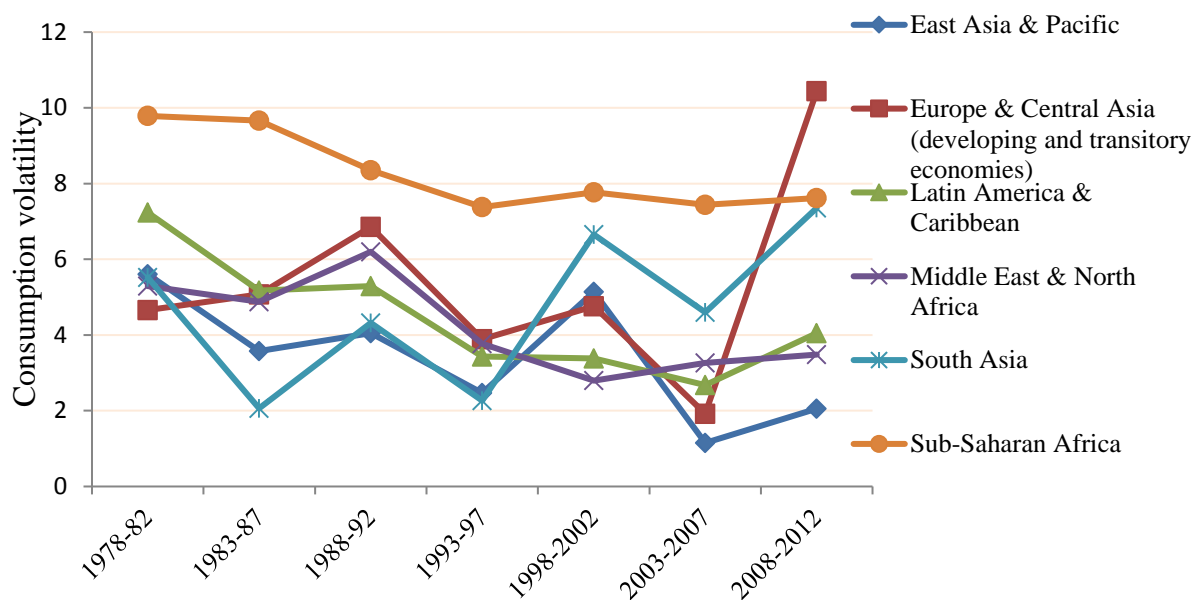
Figures

Fig. 1(a) Regional trend of consumption volatility in all developing countries (including former and present communist countries)



Source: Calculated by the authors using the World Bank Development Indicator, 2015.

Fig. 1(b) Regional trend of consumption volatility in all developing countries (excluding former and present communist countries).



Source: Calculated by the authors using the World Bank Development Indicator, 2015.

Table 1: Variable definitions and sources

Variable	Definition	Sources
σ	Standard deviation of household consumption per capita growth (Consumption volatility), estimated over non-overlapping 5-year periods.	World Development Indicator, 2015
R	Sum of remittances, migrants transfers and workers compensation as a ratio to GDP	World Development Indicator, 2015
$IniGDP$	Logarithm of initial GDP per capita at the beginning of each period at constant 2010 US\$	World Development Indicator, 2015
Gov_con	The ratio of total government consumption expenditure to GDP	World Development Indicator, 2015
$Trade_open$	Sum of exports and imports measured as a ratio to GDP.	World Development Indicator, 2015
$GDP_volatility$	Standard deviation of GDP per capita growth estimated over non-overlapping 5-year periods.	World Development Indicator, 2015
$Inv_volatility$	Standard deviation of government fixed investment growth (annual) estimated over non-overlapping 5-year periods	World Development Indicator, 2015
$Bank_credit$	The ratio of private credit provided by deposit money banks to GDP	Global Financial Development , 2015
Aid	The ratio of official development aid (ODA) and other official aid to GDP	World Development Indicator, 2015
$Finan_open$	Chinn-Ito Index (KAOPEN)	web.pdx.edu/~ito/Chinn-Ito_website.htm
$M2 / GDP$	The ratio of broad money to GDP	World Development Indicator, 2015
Bank Deposit / GDP	The ratio of deposits by deposit money banks to GDP	Global Financial Development, 2015
GDP per capita of migrants' host country	GDP per capita of five top most migrants' host countries, weighted by the share of migrants of the remittance receiving countries.	Bilateral Migration Matrix of the world Bank

Table 2: Summary statistics of different variables in all developing countries

Variable	Obs	Mean	Std. Dev.	Min	Max
SD of household consumption per capita growth	487	0.052765	0.049165	0.00046	0.480738
Log of initial GDP per capita	558	7.545192	1.077581	4.898139	9.899512
Ratio of Govt. consumption to GDP	546	0.145256	0.055888	0.02601	0.428533
Ratio of trade openness to GDP	551	0.714549	0.352116	0.091057	2.055394
SD of GDP per capita growth	564	0.033658	0.027114	0.002703	0.22845
SD of Govt. investment growth	495	0.137592	0.151733	0.003901	1.94548
Ratio of Bank credit to GDP	552	0.278506	0.230738	0.003351	1.465452
Ratio of Bank Deposit to GDP	554	0.306727	0.265432	0.020393	2.266332
Ratio of M2 to GDP	552	0.407664	0.301128	2.36E-05	2.462965
Ratio of aid flow to GDP	551	0.057737	0.070365	4.33E-06	0.467924
Financial openness	550	1.674918	1.314775	0.105202	4.389193
Ratio of remittances to GDP	502	0.042389	0.081824	0.00019	0.844556

Note: "SD" refers to the Standard Deviation.

Table 3: The impacts of international remittances on household consumption in developing countries (including former and present communist countries). Dependent variable: Standard deviation (SD) of household consumption per capita growth.

Independent Variables	OLS	IV	SYS GMM
<i>Lag</i> of dependent variable			0.076 (0.057)
Log of initial GDP per capita	-0.001 (0.004)	-0.033* (0.018)	-0.056** (0.022)
Ratio of Govt. consumption to GDP	0.110* (0.063)	0.147** (0.066)	0.190*** (0.057)
Ratio of trade openness to GDP	0.034*** (0.012)	0.052*** (0.014)	0.034** (0.014)
SD of GDP per capita growth	0.357*** (0.118)	0.362*** (0.104)	0.427*** (0.123)
SD of Govt. investment growth	0.111*** (0.021)	0.117*** (0.020)	0.118*** (0.023)
Ratio of bank credit to GDP	-0.023* (0.012)	-0.022* (0.013)	-0.024* (0.013)
Ratio of aid flow to GDP	0.007 (0.062)	-0.065 (0.080)	-0.077 (0.071)
Financial openness	0.001 (0.002)	0.004 (0.003)	0.001 (0.002)
Ratio of remittances to GDP	-0.060** (0.022)	-0.383*** (0.106)	-0.138*** (0.042)
Constant	0.011 (0.029)	0.095 (0.060)	0.019 (0.034)
Observations	418	418	371
Countries	83	83	83
R squared	0.364	0.213	
AR(1) p-value			0.003
AR(2) p-value			0.374
Hansen p-value			0.349
Instruments			26

Notes: The estimation method is one step System GMM and time effects are included in all the regressions. Robust standard errors are in parentheses. “***”, “**” and “*” denote significant at 1% level, 5 % level and 10 % level respectively.

Table 4: The impacts of remittances on household consumption in developing countries (Excluding former and present communist countries). Dependent variable: Standard deviation (SD) of household consumption per capita growth

Independent variables	OLS	IV	SYS GMM
<i>Lag</i> of dependent variable			0.092 (0.063)
Log of initial GDP per capita	-0.024 (0.026)	-0.011* (0.006)	-0.010** (0.005)
Ratio of Govt. consumption to GDP	0.128* (0.072)	0.136** (0.066)	0.225*** (0.067)
Ratio of trade openness to GDP	0.042** (0.018)	0.053*** (0.012)	0.043** (0.018)
SD of GDP per capita growth	0.356** (0.148)	0.319*** (0.112)	0.447*** (0.158)
SD of Govt. investment growth	0.118*** (0.026)	0.126*** (0.020)	0.119*** (0.025)
Ratio of bank credit to GDP	-0.029* (0.017)	-0.041** (0.015)	-0.033* (0.017)
Ratio of aid flow to GDP	-0.030 (0.082)	-0.124* (0.065)	-0.115* (0.061)
Financial openness	0.001 (0.002)	0.003 (0.002)	0.001 (0.002)
Ratio of remittances to GDP	-0.075* (0.039)	-0.402** (0.155)	-0.186*** (0.052)
Constant	0.029 (0.032)	0.077 (0.043)	0.041 (0.038)
Observations	354	354	312
Countries	64	64	64
R squared	0.377	0.301	
AR(1) p-value			0.006
AR(2) p-value			0.360
Hansen p-value			0.496
Instruments			26

Notes: The estimation method is one step System GMM and time effects are included in all the regressions. Robust standard errors are in parentheses. “***”, “**” and “*” denote *significant at 1% level, 5 % level and 10 % level respectively.*

Table 5: Robustness checks using alternatives of financial development in developing countries. Dependent variable: Standard deviation (SD) of household consumption per capita growth

Independent variables	Including former and present communist countries		Excluding former and present communist countries	
	(1)	(2)	(1)	(2)
Lag of dependent variables	0.104* (0.059)	0.060 (0.058)	0.127** (0.062)	0.074 (0.066)
Log of initial GDP per capita	-0.026* (0.014)	-0.018** (0.007)	-0.010** (0.004)	-0.009* (0.005)
Ratio of Govt. consumption to GDP	0.189*** (0.057)	0.193*** (0.059)	0.215*** (0.068)	0.230*** (0.071)
Ratio of trade openness to GDP	0.031** (0.013)	0.036** (0.014)	0.040** (0.018)	0.046** (0.018)
SD of GDP per capita growth	0.441*** (0.122)	0.415*** (0.121)	0.460*** (0.155)	0.447*** (0.154)
SD of Govt. investment growth	0.116*** (0.022)	0.117*** (0.022)	0.116*** (0.023)	0.116*** (0.024)
Ratio of aid flow to GDP	-0.072 (0.072)	-0.079 (0.070)	-0.115 (0.100)	-0.120 (0.098)
Financial openness	0.001 (0.002)	0.001 (0.002)	0.001 (0.002)	0.001 (0.002)
Ratio of bank deposit to GDP	-0.028* (0.015)		-0.032** (0.012)	
Ratio of M2 to GDP		-0.028** (0.013)		-0.041** (0.018)
Ratio of remittances to GDP	-0.154*** (0.043)	-0.164*** (0.043)	-0.193** (0.083)	-0.179** (0.071)
Constant	0.018 (0.034)	0.020 (0.033)	0.045 (0.037)	0.039 (0.039)
Observations	369	370	310	311
Countries	83	83	63	64
AR(1) p-value	0.020	0.004	0.028	0.007
AR(2) p-value	0.714	0.365	0.729	0.358
Hansen p-value	0.248	0.597	0.442	0.835
Instruments	26	26	26	26

Notes: The estimation method is one step System GMM and time effects are included in all the regressions. Robust standard errors are in parentheses. “***”, “**” and “*” denote *significant at 1% level, 5 % level and 10 % level respectively.*

Table 6: Robustness checks through controlling fewer variables in developing countries (including former and present communist countries). Dependent variable: Standard deviation (SD) of household consumption per capita growth

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Independent variables								
Lag of dependent variable	0.171*** (0.058)	0.143** (0.060)	0.126** (0.061)	0.096 (0.059)	0.105* (0.055)	0.071 (0.057)	0.074 (0.057)	0.076 (0.057)
Log of initial GDP per capita	-0.002 (0.003)	-0.004 (0.003)	-0.001 (0.002)	-0.003 (0.003)	-0.005* (0.003)	-0.023** (0.011)	-0.026* (0.014)	-0.056** (0.022)
Ratio of Govt. consumption to GDP		0.199*** (0.062)	0.192*** (0.056)	0.159*** (0.052)	0.163*** (0.047)	0.161*** (0.048)	0.187*** (0.057)	0.190*** (0.057)
SD of Govt. investment growth			0.117*** (0.036)	0.113*** (0.036)	0.083** (0.032)	0.116*** (0.023)	0.118*** (0.023)	0.118*** (0.023)
Ratio of trade openness to GDP				0.027** (0.012)	0.027** (0.012)	0.032** (0.013)	0.034** (0.013)	0.034** (0.014)
SD of GDP per capita growth					0.482*** (0.142)	0.419*** (0.134)	0.426*** (0.123)	0.427*** (0.123)
Ratio of bank credit to GDP						-0.023* (0.013)	-0.024* (0.013)	-0.024* (0.013)
Ratio of aid flow to GDP							-0.075 (0.071)	-0.077 (0.071)
Financial openness								0.001 (0.002)
Ratio of remittances to GDP	-0.052** (0.024)	-0.115** (0.050)	-0.129*** (0.031)	-0.105** (0.037)	-0.131*** (0.039)	-0.126*** (0.040)	-0.121** (0.041)	-0.138*** (0.042)
Constant	0.044 (0.025)	0.035 (0.027)	0.006 (0.020)	0.010 (0.020)	0.009 (0.019)	-0.003 (0.020)	0.019 (0.034)	0.019 (0.034)
Observations	386	386	381	381	381	380	371	371
Countries	84	84	84	84	83	83	83	83
AR(1) p-value	0.000	0.000	0.003	0.001	0.004	0.004	0.003	0.003
AR(2) p-value	0.422	0.372	0.419	0.391	0.371	0.317	0.378	0.374
Hansen p-value	0.002	0.007	0.035	0.261	0.259	0.382	0.350	0.349
Instruments	19	20	21	22	23	24	25	26

Notes: The estimation method is one step System GMM and time effects are included in all the regressions. Robust standard errors are in parentheses. “***”, “**” and “*” denote significant at 1% level, 5 % level and 10 % level respectively.

Table 7: Robustness checks through controlling fewer variables in developing countries (excluding former and present communist countries). Dependent variable: Standard deviation (SD) of household consumption per capita growth

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Independent variable								
Lag of dependent variable	0.183*** (0.061)	0.158** (0.064)	0.147** (0.064)	0.112* (0.063)	0.123** (0.059)	0.089 (0.063)	0.091 (0.063)	0.092 (0.063)
Log of initial GDP per capita	-0.004 (0.003)	-0.006 (0.004)	-0.003 (0.002)	-0.007** (0.003)	-0.008*** (0.003)	-0.005** (0.002)	-0.010** (0.004)	-0.010** (0.005)
Ratio of Govt. consumption to GDP		0.207*** (0.075)	0.208*** (0.064)	0.156*** (0.058)	0.178*** (0.054)	0.183*** (0.054)	0.222*** (0.066)	0.225*** (0.067)
SD of Govt. investment growth			0.114*** (0.039)	0.108*** (0.038)	0.079** (0.034)	0.116*** (0.025)	0.119*** (0.025)	0.119*** (0.025)
Ratio of trade openness to GDP				0.036** (0.016)	0.033** (0.016)	0.041** (0.018)	0.043** (0.018)	0.043** (0.018)
SD of GDP per capita growth					0.476** (0.189)	0.407** (0.175)	0.448*** (0.157)	0.447*** (0.158)
Ratio of bank credit to GDP						-0.030* (0.018)	-0.033* (0.018)	-0.033* (0.017)
Ratio of aid flow to GDP							-0.113 (0.098)	-0.115* (0.061)
Financial openness								0.001 (0.002)
Ratio of remittances to GDP	-0.111 (0.090)	-0.132* (0.077)	-0.192** (0.066)	-0.179** (0.073)	-0.173** (0.071)	-0.156** (0.078)	-0.168** (0.081)	-0.186*** (0.052)
Constant	0.070 (0.030)	0.058 (0.033)	0.018 (0.020)	0.031 (0.020)	0.027 (0.017)	0.009 (0.018)	0.040 (0.038)	0.041 (0.038)
Observations	321	321	316	316	316	315	312	312
Countries	64	64	64	64	64	64	64	64
AR(1) p-value	0.000	0.001	0.006	0.002	0.009	0.007	0.007	0.006
AR(2) p-value	0.431	0.447	0.550	0.518	0.349	0.322	0.364	0.360
Hansen p-value	0.032	0.044	0.106	0.194	0.237	0.524	0.947	0.496
Instruments	19	20	21	22	23	24	25	26

Notes: The estimation method is one step System GMM and time effects are included in all the regressions. Robust standard errors are in parentheses. “***”, “**” and “*” denote *significant at 1% level, 5 % level and 10 % level respectively.*

Table 8: Long run and short run effect of international remittances on household consumption volatility in developing countries.

Variables	Including former and present communist countries		Excluding former and present communist countries	
	Long run coefficients	Short run coefficients	Long run coefficients	Short run coefficients
Log of initial GDP per capita	-0.8447*** (0.2507)	-10.091 (9.2051)	-1.4085*** (0.3326)	-9.5466 (11.5453)
Ratio of gov. consumption to GDP	0.0638*** (0.0186)	0.0399 (0.1460)	0.0857*** (0.0258)	0.0430 (0.1694)
SD of GDP per capita growth	0.8788*** (0.0373)	0.0569 (0.0467)	0.9130*** (0.0494)	0.0751 (0.0504)
SD of Gov. investment growth	0.0609*** (0.0102)	0.0095 (0.0204)	0.0462*** (0.0148)	0.0019 (0.0238)
Ratio of trade openness to GDP	0.0138** (0.0058)	-0.0016 (0.0296)	0.0193** (0.0085)	-0.0256 (0.0369)
Ratio of Bank credit to GDP	-0.0147** (0.0061)	-0.0485* (0.0252)	-0.0176** (0.0064)	-0.0622* (0.0314)
Ratio of aid flow to GDP	0.00533 (0.0061)	-0.6894 (1.3028)	0.0077 (0.0144)	-0.6489 (1.5521)
Financial Openness	0.0301 (0.0432)	0.2523 (0.1832)	0.0711 (0.0528)	0.3025 (0.2116)
Ratio of remittances to GDP	-0.1809*** (0.0216)	-0.0309** (0.0116)	-0.2313*** (0.0227)	-0.0537*** (0.0186)

Notes: The Pesaran and Smith-type Pooled Mean Group estimators have been applied to find the long run and short run effects. Dependent variable is the consumption volatility (standard deviation of household consumption per capita growth). Standard errors are in parentheses. “***”, “**” and “*” denote *significant at 1% level, 5 % level and 10 % level respectively.*

Appendix 1: List of developing countries

Country	Country	Country	Country
Algeria	Ecuador	Mali	Seychelles
Argentina	Egypt, Arab Rep.	Mauritania	Sierra Leone
Armenia ^C	El Salvador	Mauritius	South Africa
Azerbaijan ^C	Gabon	Mexico	Sri Lanka
Bangladesh	Gambia, The	Moldova ^C	Sudan
Belarus ^C	Guatemala	Mongolia ^C	Swaziland
Belize	Honduras	Morocco	Tajikistan ^C
Benin	Hungary ^C	Mozambique ^C	Tanzania
Bhutan	India	Namibia	Thailand
Bolivia	Indonesia	Nepal	Togo
Botswana	Iran, Islamic Rep.	Nicaragua	Tunisia
Brazil	Jordan	Nigeria	Turkey
Bulgaria ^C	Kazakhstan ^C	Oman	Uganda
Burkina Faso	Kenya	Pakistan	Ukraine ^C
Cambodia ^C	Kyrgyz Republic ^C	Panama	Uruguay
Cameroon	Lao PDR ^{C*}	Paraguay	Venezuela, RB
China ^{C*}	Lebanon	Peru	Vietnam ^{C*}
Colombia	Lesotho	Philippines	Zambia
Comoros	Macedonia, FYR ^C	Romania ^C	
Congo, Rep.	Madagascar	Russian Federation ^C	
Costa Rica	Malawi	Rwanda	
Dominican Republic	Malaysia	Senegal	

Note: “c” denotes the communist countries, and “c*” denotes the present communist countries.

Appendix 2: The Hausman test for fixed effect OLS estimation in all developing countries (including former and present communist countries. Dependent variable: Standard deviation of household consumption per capita growth

---- Coefficients ----

	(b) Fixed	(B) Random	(b-B) Difference	sqrt(diag(V_b- V_B)) S.E.
<i>IniGDP</i>	-0.0353	-0.0125	-0.0227	0.0087
<i>Gov_con</i>	0.1706	0.2256	-0.0550	0.0464
<i>Trade_open</i>	0.0389	0.0580	-0.0191	0.0109
<i>GDP_volatility</i>	0.3979	0.4262	-0.0283	0.0321
<i>Inv_volatility</i>	0.1312	0.1690	-0.0378	0.0073
<i>Babk_credit</i>	-0.0267	-0.0425	0.0158	0.0156
<i>Aid</i>	-0.0470	0.0723	-0.1193	0.0471
<i>Finan_open</i>	0.0021	0.0031	-0.0009	0.0014
<i>R</i>	-0.0798	-0.1357	0.0559	0.0405

b = consistent under Ho and Ha; obtained from xtreg

B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

$$\begin{aligned} \text{chi2}(9) &= (\mathbf{b}-\mathbf{B})'[(\mathbf{V}_b-\mathbf{V}_B)^{-1}](\mathbf{b}-\mathbf{B}) \\ &= 23.72 \\ \text{Prob}>\text{chi2} &= 0.008 \end{aligned}$$

Notes: Time effects are not included in the regressions because the Hausman test cannot be performed while time and time invariant variables are included in the model. (Wooldridge, 2010; Aggarwal, et al., 2011)

Appendix 3: The Hausman test for fixed effect OLS estimation for developing countries (excluding former and present communist countries). Dependent variable: Standard deviation (SD) of household consumption per capita growth

	---- Coefficients ----			
	(b) Fixed	(B) Random	(b-B) Difference	sqrt(diag(V_b- V_B)) S.E.
<i>IniGDP</i>	-0.0327	-0.0054	-0.0273	0.0105
<i>Gov_con</i>	0.1345	0.1467	-0.0122	0.0421
<i>Trade_open</i>	0.0277	0.0366	-0.0089	0.0122
<i>GDP_volatility</i>	0.3852	0.4285	-0.0433	0.0339
<i>Inv_volatility</i>	0.0977	0.1159	-0.0181	0.0073
<i>Babk_credit</i>	-0.0344	-0.0697	0.0353	0.0152
<i>Aid</i>	-0.0142	0.0412	-0.0554	0.0556
<i>Finan_open</i>	0.0014	0.0022	-0.0007	0.0014
<i>R</i>	-0.0863	-0.1413	0.0550	0.0592

b = consistent under Ho and Ha; obtained from xtreg

B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

$$\begin{aligned}
 \text{chi2}(9) &= (b-B)'[(V_b-V_B)^{-1}](b-B) \\
 &= 18.26 \\
 \text{Prob}>\text{chi2} &= 0.0153
 \end{aligned}$$

Notes: Time effects are not included in the regressions because the Hausman test cannot be performed while time and time invariant variables are included in the model (Wooldridge, 2010; Aggarwal, et al. 2011).

Appendix 4: Impact of remittances on consumption volatility (two way fixed effect OLS estimations including county and time fixed effects). Dependent variable: Standard deviation (SD) of household consumption per capita growth

	Including former and present communist countries	Excluding former and present communist countries
Independent variables		
Log of initial GDP per capita	-0.001 (0.004)	-0.024 (0.026)
Ratio of Gov. consumption to GDP	0.110* (0.063)	0.128* (0.072)
Ratio of trade openness to GDP	0.034*** (0.012)	0.042** (0.018)
SD of GDP per capita growth	0.357*** (0.118)	0.356** (0.148)
SD of Gov. investment growth	0.111*** (0.021)	0.118*** (0.026)
Ratio of bank credit to GDP	-0.023* (0.012)	-0.029* (0.017)
Ratio of aid flow to GDP	0.007 (0.062)	-0.030 (0.082)
Financial openness	0.001 (0.002)	0.001 (0.002)
Ratio of remittances to GDP	-0.060** (0.022)	-0.075* (0.039)
Constant	0.011 (0.029)	0.029 (0.032)
Observations	418	354
Countries	83	64
R squared	0.364	0.377
F statistic for time fixed effect	4.25	5.16
p-value	0.000	0.000

Robust standard errors are in parentheses. “***”, “**” and “*” denote significant at 1% level, 5 % level and 10 % level respectively.

Appendix 5: First stage IV estimation results. Dependent variable: Ratio of remittances to GDP

Independent variables	Developing countries	
	Including former and present communist countries	Excluding former and present communist countries
Log of initial GDP per capita	-0.0453*** (0.0100)	-0.0338*** (0.0106)
Ratio of Gov. consumption to GDP	-0.0280 (0.0530)	0.0222 (0.0648)
Ratio of trade openness to GDP	0.0422*** (0.0111)	0.0173 (0.0130)
SD of GDP per capita growth	0.0818 (0.0735)	0.0516 (0.0845)
SD of Gov. investment growth	-0.0333** (0.0139)	-0.0097 (0.0167)
Ratio of bank credit to GDP	0.0023 (0.0147)	0.0087 (0.0179)
Ratio of aid flow to GDP	-0.186*** (0.0565)	-0.227*** (0.0628)
Financial openness	0.0039** (0.0017)	0.0016 (0.0022)
Weighted GDP per capita in top most remittance sending countries	0.181*** (0.0560)	0.196*** (0.0720)
Ratio of remittances to GDP for neighbour countries	0.1130*** (0.0161)	0.0902*** (0.0098)
Constant	0.310*** (0.0743)	0.240*** (0.0791)
Observations	418	354
Countries	83	64
F test statistic	8.91	5.60
P-value for F test	0.000	0.000
R-squared	0.433	0.312
F-statistic for weak instruments	15.54	20.19
P-value for sargan statistic (over-identifying restriction)	72.90	85.38

Instruments are Weighted GDP per capita in top most remittance sending countries and Ratio of remittances to GDP for neighbour countries. Robust standard errors are in parentheses and time effects are included in all the regressions. “***”, “**” and “*” denote *significant at 1% level, 5 % level and 10 % level respectively*.