Remittances, growth and poverty reduction in Asia

A critical review of the literature and new evidence from cross-country panel data

by
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Investing in rural people

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Acknowledgements

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Abstract

This study provides a critical review of the role of international remittances and migration in promoting growth and reducing poverty and inequality in developing countries in Asia and the Pacific. It also uses cross-country panel data and examines the effects of remittances on economic growth, poverty and inequality, after taking into account the endogeneity of remittances. First, from our econometric results, it has been found that remittances promote economic growth and reduce poverty – both national and rural – based on the international poverty lines of the US$1.25 or US$2.00 per day thresholds, while they do not reduce inequality. Second, we have suggested the importance of understanding the underlying factors that enable households to undertake migration and remittances in relation to the underlying structural transformation of the rural economy, such as its shift to the non-farm sector. This typically takes place as village infrastructure develops and the educational level of households improves. Third, we argue that the risk-coping roles of remittances at both macro- and micro-levels are important in understanding the poverty-reducing mechanisms associated with migration and remittances. Fourth, poor households outside village networks should be supported through policy measures. This is very important, as our results suggest that remittances increase inequality in rural areas.

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Introduction

It is now widely recognized that remittances are important not only for economic growth, but also for poverty reduction. In 2009 migrants from developing countries (i.e. low- and middle-income countries) sent over US$271 billion to their countries of origin, which decreased from US$284 billion in 2008 (figure 1). This reached US$423 billion in 2015, which was considerably larger than remittances received by high-income countries: US$150 billion.[1] Remittances have recently played an important role as a stable source of finance at the macro-level, and a key role in poverty reduction at the micro-level, in particular after 2000 (Imai et al. 2014). Remittance flows to low- and middle-income countries accelerated sharply (figure 1) and poverty declined in many of these countries.

It might be useful to break down the category of 'developing world' further into groups by country income classes. As can be seen in figure 2, lower-middle-income countries have attracted the highest amount of remittances, with a sharply increasing trend, to be followed by upper-middle-income countries and then by low-income countries.

Figure 1: Trends in remittances (received, current US$) by income class, aggregate levels (Developing countries only)
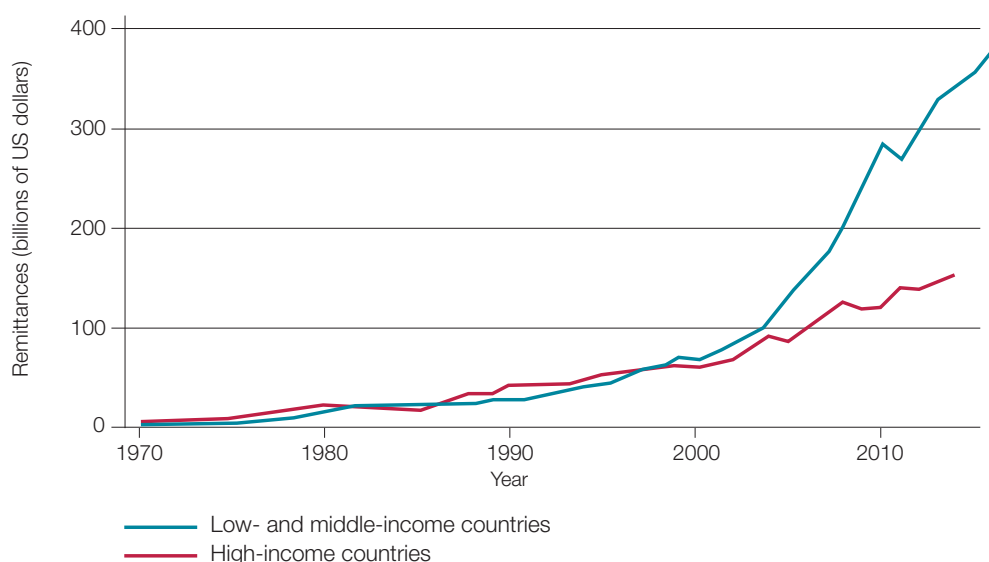
Source: World Bank 2016.

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1. Remittance figures for developing countries and high-income countries cannot be compared in a strict sense. To developing countries, person-to-person (P2P) remittances are the bulk of these flows, to support family mainly, whereas to high-income countries, it is rather repatriation of non-resident employees' savings (in other words, wealthy expatriates sending their money back home).

Figure 2: Trends in remittances (received, current US$) by income class, aggregate levels
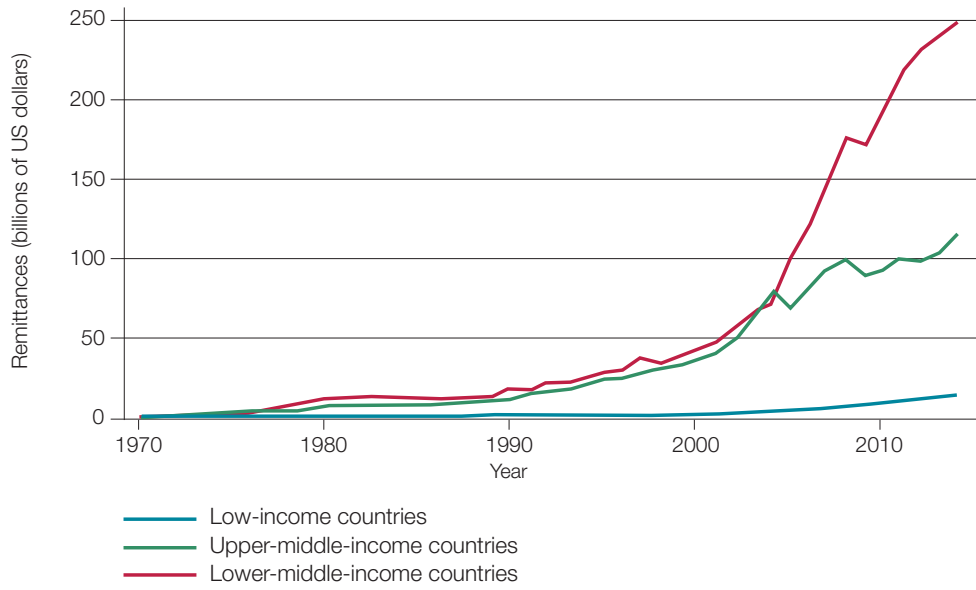
Source: World Bank 2016.

Figure 3: Share of remittances in GDP by income class, aggregate levels
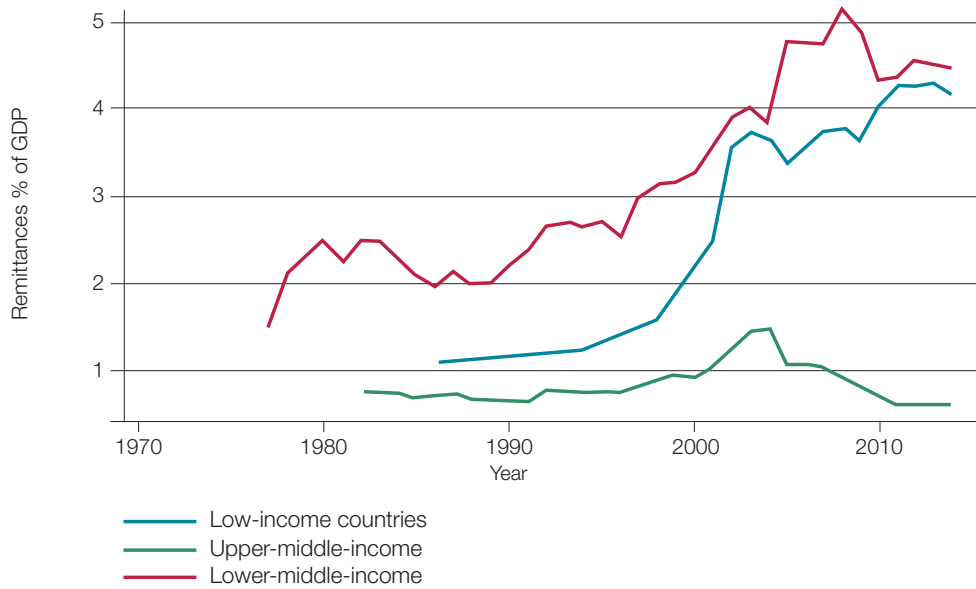
Source: World Bank 2016.

However, once we derive the shares of remittances in GDP, we find that macro-level remittance inflow has non-negligible shares in low-income and lower-middle-income countries (above 4 per cent after 2010), although there is some degree of heterogeneity, as smaller countries tend to have higher shares (e.g. Nepal 32.2 per cent, Philippines 10.3 and Sri Lanka 8.5 in 2015, based on World Bank 2016). It is interesting to find that the share of remittances in GDP of upper-middle-income countries has decreased in recent years. We can safely conclude that remittance inflow at the macro-level has played an important role in lower-middle-income countries – in terms of its volume and share in GDP – and in low-income countries in terms of its share.[2] Our study aims to examine the relationships among remittances, growth and poverty reduction in Asia and the Pacific, drawing on a critical review of the literature and econometric analyses based on cross-country panel data.

Following the above observation that remittances have increased in low-income and lower-middle-income countries in recent years, the objective of this document is twofold. First, we will provide a critical review of recent literature on the role of remittances and international migration[3] in promoting economic growth and reducing poverty – in particular, rural poverty. In the review, we pay particular attention to the mechanisms through which remittances reduce poverty at micro-levels – for instance, how the income structure or behaviour of recipients is changed as a result of migration and remittances.[4] Second, we will review the macro-level statistics of remittances and migration, drawing on cross-country panel data, and present econometric analyses estimating economic growth and various poverty measures, including rural poverty measures.

As can be seen in figure 1, remittances received in developing countries[5] across the regions have steadily increased in the period 1970-2014. This reflects: (i) the increased financial openness influencing developing countries over the years (Baltagi, Demetriades and Law 2009); (ii) remittances representing a large share of the total financial inflows of some countries, such as Kyrgyzstan and Tajikistan (IFAD and World Bank 2015, p. 19); (iii) increased net migrants (migrant outflows minus inflows) (IFAD and World Bank 2013); and (iv) increased financial networks through microfinance institutions, post offices and mobile operators (ibid.). Because the logarithm of remittances in real terms has been taken (amount in US$), the slope shows the growth rate of remittances.[6]

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2. We will investigate trends in remittances by country further in section III.

3. It is evident that domestic migration (as well as remittances from migrants in urban areas to those left behind in rural areas) affects growth and poverty in a complex manner, but this document focuses on the role of international migration and remittances. The role of domestic migration has been discussed by Imai, Gaiha and Garbero (2014).

4. An alternative approach to assessing the impact of remittances on rural poverty would be to evaluate their vulnerability to financial shocks and resilience and to estimate the role of remittances in reducing vulnerability, in line with IFAD and the World Bank (2015). However, as remittances are endogenous to the measure of vulnerability, it has been recommended that vulnerability should be estimated by exogenous variables, such as household or community characteristics (e.g. Mina and Imai 2016).

5. Remittances comprise personal transfers and compensation of employees.

6. Trends in remittances and migration by country will be reviewed later.

Figure 4: Trends in log remittances (received, current US$) at regional levels
(Developing countries only)

Source: World Bank 2016.

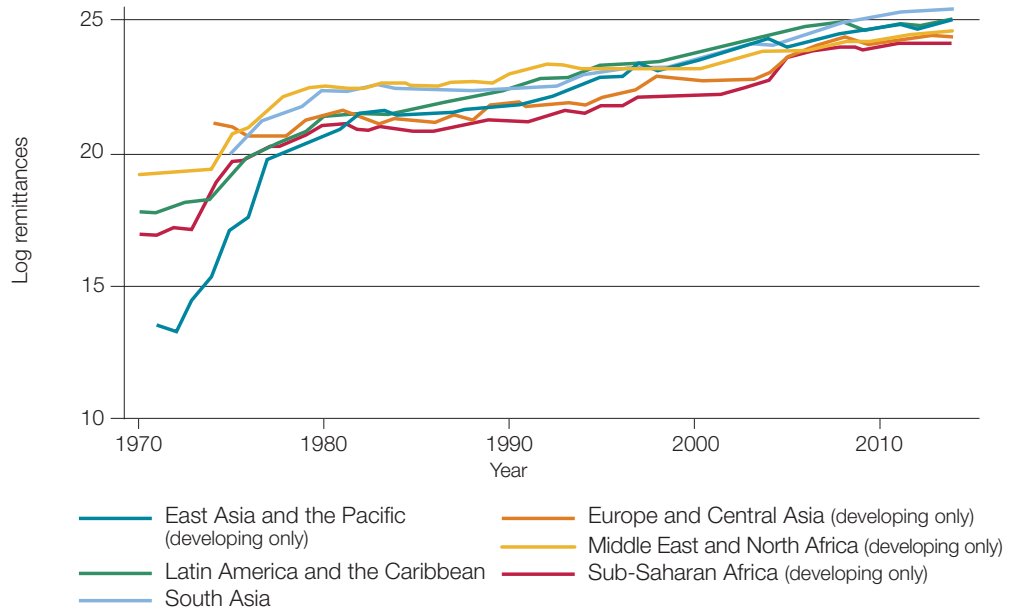Figure 5: Trends in the share of remittances in GDP at regional levels
(Developing countries only)
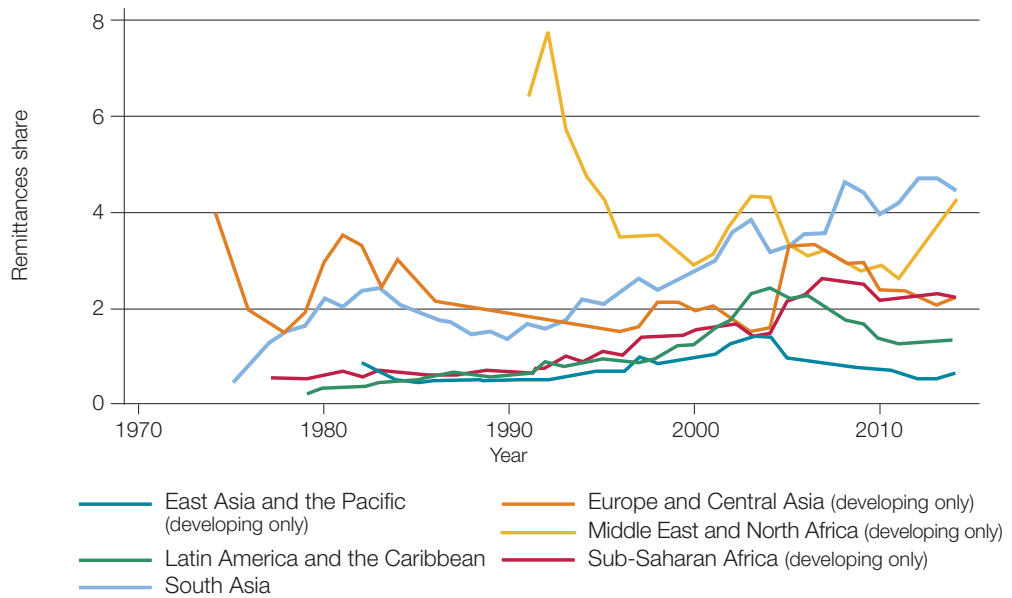
Source: World Bank 2016.

As figure 4 indicates, the East Asia and the Pacific region has seen the fastest growth over the years, with very fast growth in the 1970s. South Asia and East Europe and Central Asia have also seen an increase in remittances over the years.

Figure 5, on the contrary, shows that the share of remittances in GDP (derived as an unadjusted average of countries in the region) does not show increasing trends across regions. For instance, the share of remittances has been more or less stable over the years in East Asia and the Pacific (including South-East Asia) and in East Europe and Central Asia. In the former, the share has remained at about 1 per cent of GDP, and in the latter, at about 2 per cent. It has increased from about 1 per cent to 4 per cent in South Asia. However, this does not reflect the heterogeneity across countries. A few countries are characterized by a high share of remittances in GDP (e.g. Nepal 32.2 per cent, the Philippines 10.3 and Sri Lanka 8.5 in 2015).

Trends in net international migration (defined as the total number of immigrants less the annual number of emigrants) are summarized in figure 6. They fluctuate and have not seen any clear increasing or decreasing trends over the years. However, the figure of net migrants has decreased over the years in East Asia and the Pacific, and since 1990 in South Asia. It is not easy to confirm these trends, as the data are available only once in five years (based on World Bank 2016). As the total volume of remittances has increased, net migration has decreased since 1990 in these regions, possibly as a result of the increase in emigration. A continuous increase in emigration tends to increase the stock of migrants abroad, which will have a positive effect on remittances over the years. IFAD and the World Bank (2013) have shown that migrant outflows exceeded migrant inflows in many Asian countries.

Figure 6: Trends in net international migration at regional levels
(Developing countries only)
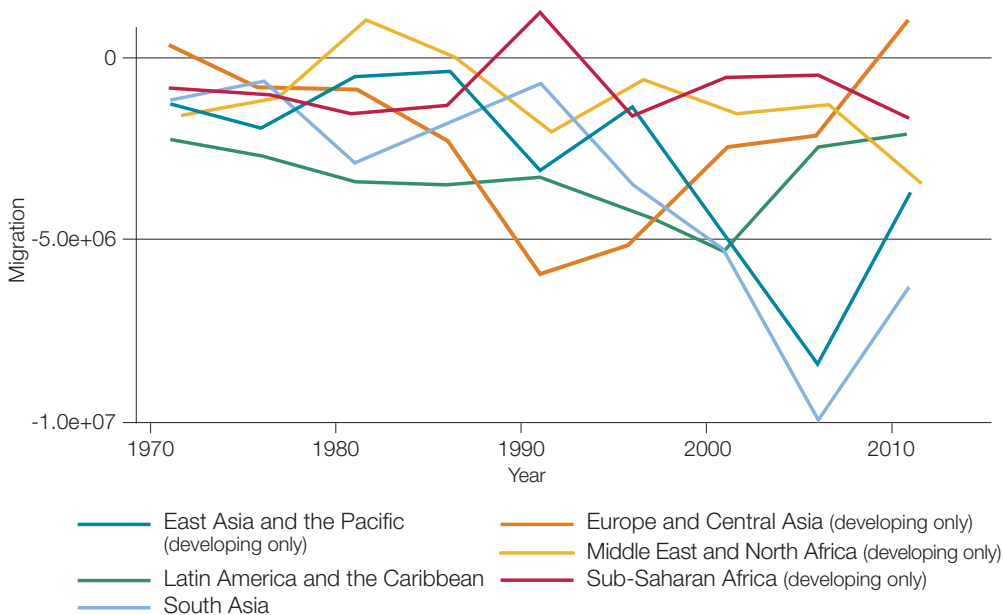
Source: World Bank 2016.

The present paper is organized as follows. The next section provides a critical review of the empirical literature on remittances and migration. In particular, it focuses on the role of remittances in promoting economic growth and poverty reduction from diverse angles, including their role in stabilizing economic growth and the effect of remittances on the income structure of recipient households or the aggregate economy. This is followed by a review of trends in remittances and migration at country levels through cross-country panel data. Econometric results on the relationship between remittances (and migration) and economic growth or poverty are then provided, taking into account the endogeneity of remittances. The paper concludes with some policy implications for the countries in Asia and the Pacific.

Review of the literature

Role of remittances in promoting growth and stabilizing the economy

There is a great deal of literature analysing the effect of international remittances on economic growth. As discussed by Barajas et al. (2009), part of remittance inflows will be used to directly finance physical and human capital investment, such as education. If firms or households face credit constraints, remittances may be useful in easing them, and access to remittances would also improve the creditworthiness of firms or households, which enables them to borrow more and leads to lower capital costs. Imai et al. (2014) used panel data for 24 Asia/Pacific countries and confirmed that remittances have been beneficial to economic growth, after taking into account the endogeneity of remittances in their econometric models. The present study will extend their study by updating the data and econometric models (e.g. use of the dynamic panel-data model based on system GMM estimator).

Other empirical works have similarly concluded that remittances will promote growth. For instance, Pradhan, Upadhyay and Upadhyaya (2008) examined the effect of workers' remittances on economic growth using panel data from 1980-2004 for 39 developing countries and confirmed a positive impact on growth. Using data for more than 100 countries in 1975-2002 and taking into account the endogeneity of remittances and financial development by system GMM, Giuliano and Ruiz-Arranz (2009) investigated the relationship between remittances and growth and the interaction of remittances with financial development in the recipient country. They found that remittances have promoted growth in less financially developed countries.[7]

Remittances would also make an economy less volatile (Barajas et al. 2009). Chami, Hakura and Montiel (2012) have provided evidence that remittance flows have contributed to reducing the volatility of GDP growth in recipient countries, after controlling for other determinants of growth volatility and reverse causality. However, evidence of the existence of threshold effects suggests that the stability-enhancing effects of remittances appear to be achieved rather quickly. Thus whatever benefits may be associated with very large remittance flows, enhanced macroeconomic stability may not loom large among them. This suggests the importance of strengthening macroeconomic resilience through other means in recipient countries (ibid., p. 17). As the previous section showed, low- and lower-middle-income countries tend to be dependent on remittances. While this is likely to enhance and stabilize growth, macro-level policies of these countries need to consider: (i) the longer-term macro-level effects of remittance flows; and (ii) possible complementary measures to further stabilize the economy in the mid to long term.

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7. Kelegama's (2011) review of the relationship between remittances and development in South Asia is broadly in line with these conclusions.

Other empirical studies that have shown the negative relationship between remittances and growth volatility include Bugamelli and Paternò (2011), Combes and Ebeke (2011), Bettin, Presbitero and Spatafora (2015) and Jidoud (2015). Bugamelli and Paternò used the cross-country panel data for 60 emerging economies and showed that remittances help reduce output growth volatility. Using the dynamic panel-data model applied to the cross-country panel, Combes and Ebeke have shown that recipient countries exhibit, on average, lower consumption instability where remittances serve as a hedge against various types of macroeconomic instability: natural disaster, agricultural shocks, systemic banking crises and exchange rate instability. However, the stabilizing effect is weakened when the private credit ratio exceeds 20 per cent of GDP and the remittance ratio is above 6 per cent of GDP. This may be because, above the thresholds, private credit or remittance inflows themselves tend to be more fluctuating and weaken the stabilizing role of remittances. Most of the studies reviewed here are based on cross-country panel data (typically the *World Development Indicators* [WDI]), but the conclusion has been confirmed by Bettin, Presbitero and Spatafora (2015), who used a rich panel dataset on bilateral remittances from 103 Italian provinces to 79 developing countries over the period 2005-2011. They concluded that remittances contributed significantly to macroeconomic stability in the recipient countries. The stabilizing effect is stronger where migrant communities have a larger share of newly arrived migrants, who tend to have closer relationships with their home countries.

Using a different approach, Jidoud (2015) investigated the mechanisms through which remittances affect macroeconomic volatility, using a general equilibrium framework, and showed that the stabilization impact of remittances: (i) depends on the size of the negative effect on labour supply induced by remittances; and (ii) is larger in countries with an underdeveloped financial sector (where remittances can play a more important role by inducing financial-sector development through providing recipients with greater access to financial markets). This underscores the need for recipient countries to further promote financial development, so as to channel remittances through the financial system and help the poor have greater access to credit. Based on panel data and the panel smooth transition regression (PSTR) approach,[8] Ahamada and Coulibaly (2011) showed, indeed, that the impact of remittances on GDP growth volatility is nonlinear, changing over time and across countries in function of financial development, and that a high level of financial development helps remittances play a stabilizing role.

To examine further the stabilizing role of remittances, Chami, Cosimano and Gapen (2006) assessed how remittances influence the incentives and decisions of economic agents and investigated the impact of these decisions on the recipient economy at large. Using a theoretical framework drawing on the literature on business cycles and public finance, they found that remittances may increase macroeconomic risk through higher business cycle volatility, while they increase consumption and have the ability to smooth household consumption against income shocks (ibid.).[9,10] The presence of remittances also changes the underlying relationship between labour and output, thereby changing the functioning of government policy instruments.

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8. The model was developed by González, Teräsvirta and van Dijk (2005), and allows regression coefficients that vary across countries and over time by assuming that the (heterogeneous) coefficients are continuous functions of an observable variable through a bounded function of this variable and fluctuate between two (or more) 'extreme regimes' – an extension of Hansen (1999).

9. The permanent income hypothesis suggests that if remittances are perceived as temporary income by recipient households, they are more likely to be saved to help smooth consumption (McKenzie and Sasin 2007, p. 6).

10. Using 2004 Vietnamese household data, Niimi and Reilly (2011) found that women show more-reliable remittance behaviour than men, suggesting that the contribution of female migrants to the well-being and risk-coping ability of their household of origin is potentially larger. However, the gender dimensions of remittance behaviour are under-researched, and this conclusion should not be generalized, as in other countries, such as India, male migrants' remittance behaviour is more reliable.

If the set of policy instruments is not sufficiently varied, this may result in an increased reliance on the inflation tax (ibid.). It has been suggested by these authors that governments should examine a wider variety of policy instruments when countries rely on large remittance inflows. Chami et al. (2008) provide detailed theoretical and empirical examinations of the relationship between remittances and macro-level stability, and conclude that: (i) remittances should not be taxed directly, as taxation of remittances will cause a decline in remittance activity[11] or increase transaction costs, undermining their poverty-reducing potential; and (ii) any loosening of the government budget constraint as a result of positive remittance flows must be used to channel remittances into activities that promote long-run economic development, while preserving their poverty-reducing effects in the short run. It should be noted, however, that remittances are private flows normally in support of families and cannot be easily controlled by governments. If a government can help potential recipients of remittances use the money for investment purposes, for example through easier access of the poorest to livestock (Bandiera et al., forthcoming), this may promote growth and reduce poverty at the same time.

Even if policymakers recognize the importance of public policies to maximize the poverty-reducing potential of remittances, these policies may not be well implemented, depending on the country's institutional settings. Ajide, Raheem and Adeniyi (2015) examined the effect of institutional settings on the relationship between output growth and volatility by applying system GMM to 71 recipient countries. Their findings include: (i) the potential of remittances to reduce growth volatility was found to be more pronounced in the presence of well-functioning institutions; and (ii) the interaction of remittances with six institutional quality measures showed that growth volatility was reduced considerably with better institutions. However, it should be noted that remittances themselves may have an adverse effect on macro-level institutional quality – a point not addressed by Ajide, Raheem and Adeniyi. In addressing issues of endogeneity and robustness, Abdih, Chami, Dagher and Montiel (2012) found a negative and statistically significant effect of remittance inflows on institutional quality (e.g. control of corruption, government effectiveness and rule of law). That is, if a country tries to increase total inflows of remittances by improving institutional quality, the increased remittances may risk undermining institutional quality. As the relationship among remittances, finance, monetary/fiscal policies and institutions is likely to be complex, the recipient country would need to pay careful attention not only to policies, but also to their setup (e.g. control of corruption) in the face of a surge of remittance inflows. Our overview of the data in section I suggests that this point is likely to be more relevant to lower-middle-income countries.

A surge in remittances, while benefiting the macro-level economy by stabilizing economic growth, may have an adverse effect in a different way. Using the two-sector dynamic general equilibrium model for small economies and adapting it to El Salvador, Acosta, Lartey and Mandelman (2009) showed an illuminating case of the Dutch disease,[12] where an increase in remittances leads to a decline in labour supply and to an increase in production costs in the non-tradable sector, which is relatively labour-intensive. In their model, this will, in turn, raise prices in the non-tradable sector and appreciate exchange rates, while the non-tradable sector expands and the tradable sector shrinks. In a similar vein, Amuedo-Dorantes and Pozo (2004) argued that remittances may appreciate the real exchange rate in the receiving economies and reduce the competitiveness of exported goods in the international economy. The authors found that doubling remittances results in real exchange-rate appreciation of about 22 per cent in the panel of 13 Latin American and Caribbean nations.

11. However, Chami et al. (2008) did not take into account a possible increase in informal remittances due to taxation, which may involve additional costs and risks for senders and receivers.

12. "[T]he 'Dutch disease' is defined as: 'The deindustrialization of a nation's economy that occurs when the discovery of a natural resource raises the value of that nation's currency, making manufactured goods less competitive with other nations, increasing imports and decreasing exports.' " – *Handbook of Development Economics*.

Role of remittances in reducing poverty and inequality

Even if a country receives more inflows of remittances and this promotes and stabilizes the economic growth of the country, there is no guarantee that this will lead to a reduction in poverty and inequality. In analysing the effects of remittances on poverty, it is important to consider the *direct* effect of remittances on poverty (e.g. households under the poverty threshold have access to remittances and thus escape poverty), as well as their *indirect* effects on poverty through economic growth (e.g. remittances facilitate capital acquisitions, lower the cost of capital and increase output, and poor people benefit from the increased outputs indirectly[13]). Using panel data for Asian countries, Imai et al. (2014) decomposed the poverty-reducing effect of remittances into direct and indirect effects and showed that remittances contributed to poverty reduction monthly through their direct rather than indirect effects. The result was robust to two measures of international poverty: the cut-off points of US$1.25 and US$2.00 per capita per day. As reviewed by Imai et al. (2014), Vargas Silva, Jha and Sugiyarto (2009) examined the impact of remittances on poverty and economic growth in Asia using annual data. Their econometric results imply that while the impact of remittances on growth is positive, the impact on poverty is negative in Asia.

Some studies have examined the relationship between remittances and poverty or inequality using household survey data. Adams (1991) found that international remittances reduced the number of poor households by 9.8 per cent in rural Egypt, but had a negative impact on income distribution, because rich households in the top 20 percentile group disproportionately benefited from remittance inflows. In Mexico, Taylor et al. (2005) found that international remittances increase rural income inequalities, while they reduce rural poverty owing to the relatively larger benefits from remittance inflows to the relatively poor. Using village-level microdata for Burkina Faso and the method of Gini decomposition, WouTerSe (2010) found that a marginal increase in remittances from intra-African migration reduces inequality, whereas a marginal increase in remittances from the more-costly and risky intercontinental migration has the opposite effect. The costs incurred to finance these two types of migration are different and thus only better-off households were able to invest in international migration. Brown, Connell and Jimenez-Soto (2014), using household data for Fiji and Tonga, demonstrated that where formal social protection systems are largely absent, migration and remittances can perform a similar function informally, contributing significantly to poverty alleviation and wealth creation, while the impacts on Gini coefficients were unclear.

Relevance of remittances in rural household income structure

Covarrubias et al. (2012) – in a background paper for the *World Development Report 2013* – present the results of a descriptive analysis of income-generating activities in 19 countries based on the Rural Income-Generating Activities (RIGA) database. The RIGA database produced the analysis using the rural sample of Living Standards Surveys (produced by the World Bank's Living Standards Measurement Study programme).

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13. Indirect effects include the positive effect of remittance reception on the financial inclusion of households. For instance, access to remittance services may serve as an alternative to formal credit, by helping poor people cover basic expenditures, cope with risks or channel a complementary source of income that can be transformed into savings (IFAD and World Bank 2015).

Covarrubias et al. broke down household income into several categories to analyse the income structure of rural households in selected developing countries for which RIGA data are available. We highlight only Asian countries in tables 1 and 2. RIGA data show that: (i) the share of households with positive values in transfers – the sum of remittances and other transfers, such as transfers from the government (column 6 of table 2) and the average share of transfers (column 6 of table 1) – appear to increase as per capita GDP of the country increases (if Nepal – with a high share of transfers – is dropped from the sample in the latter case); and (ii) both non-agricultural and non-farm income, as well as the share of households participating in the activities related to the non-agricultural/non-farm sector, tend to increase as per capita GDP increases. Using RIGA data for 19 developing countries, including those outside Asia, Covarrubias et al. conclude:

> *Despite high levels of participation across GDP levels, the shares of income originating from on-farm and agricultural activities drop with increasing [per capita gross domestic product]. Conversely, nonfarm, off-farm and non-agricultural income are generally positively related to the level of development, driven largely by a greater share of income from nonfarm wage employment. Moreover, a greater share of income is derived from transfers among wealthier countries than poorer countries. This last trend could be due to greater resources in the government (translated into more public transfers) or greater extended-family wealth (resulting in greater remittances income).*
>
> *– Covarrubias et al. 2012, p. 3*

An important implication is that change in the effects of household remittances is likely to be closely associated with the income structure of recipient households at micro-levels. However, Covarrubias et al. only present the overall pattern of income sources and no causal inference should be made between remittances and the income structure of recipient households based on their statistical analyses. One possible extension is to carry out econometric estimations in which, for instance, a measure of diversification of household income sources is regressed on the remittances estimated by valid instruments in order to infer any causality from the RIGA data. This is a useful exercise, as most of the empirical literature on remittances relies on cross-country panel data and the studies based on micro-level household survey data are relatively scarce.

Tables 1 and 2 imply that, as a country progresses, household income structure is more diversified, but this change is likely to be associated with a more-fundamental transformation of the rural economy. This could involve modernization of rural infrastructure, expansion of the rural non-farm sector or dynamic interactions between rural and urban or rural and foreign sectors, for instance through the expansion of supermarkets or direct contacts between multinational corporations and rural farmers, creating high-value chains (Imai, Gaiha and Bresciani 2016; Reardon and Timmer 2014).[14] Ramos et al. (2012) analysed in detail patterns and causes underlying the transformation of the rural economy in the Philippines in the period 1988-2006. As can be seen in table 3, as household income increased, the income structure gradually changed, with higher shares in non-farm-sector income and remittances both at national levels (the upper panel of table 3) and in progressive towns (the lower panel of table 3). That is, the overall pattern of the changes in income structure that we observed from the cross-country analyses for a limited number of Asian countries in table 1 can be confirmed in the time-series analysis for the Philippines.

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14. Reardon and Timmer argue that agricultural transformation is characterized by: (i) urbanization; (ii) growth of the rural non-farm economy; (iii) dietary diversification; (iv) a revolution in supply chains and retailing; and (v) transformation of the agricultural sector. See Imai, Gaiha and Bresciani for further discussion of rural transformation.

Table 1: Share of income-generating activities in total income (means of shares)
– based on RIGA data

Country/ year	Per capita GDP 2005 US$	(1) Agriculture - crops	(2) Agriculture - livestock	(3) Agricultural wage employment	(4) Non-farm wage employment	(5) Non-farm self-employment
Nepal 2003	919	18.6%	16.0%	11.5%	23.7%	11.2%
Bangladesh 2005	1 165	14.7%	7.2%	12.5%	28.8%	17.2%
Tajikistan 2007	1 674	46.5%	5.0%	5.3%	26.0%	7.7%
Viet Nam 2002	1 784	32.2%	4.5%	5.5%	23.7%	20.9%
Pakistan 2001	1 843	11.8%	10.5%	6.8%	38.4%	14.2%
Indonesia 2000	2 623	13.9%	1.4%	6.7%	31.6%	20.3%

Source: Based on Covarrubias et al. 2012 (table 3, p. 5).

Table 2: Participation in income-generating activities (share of households undertaking each activity)
– based on RIGA data

Country/ year	Per capita GDP 2005 US$	(1) Agriculture - crops	(2) Agriculture - livestock	(3) Agricultural wage employment	(4) Non-farm wage employment	(5) Non-farm self-employment
Nepal 2003	919	88.2%	79.9%	34.8%	38.7%	23.7%
Bangladesh 2005	1 165	74.8%	63.9%	22.8%	43.3%	27.4%
Tajikistan 2007	1 674	89.8%	58.1%	21.3%	49.9%	16.4%
Viet Nam 2002	1 784	78.7%	67.5%	11.2%	38.7%	40.1%
Pakistan 2001	1 843	40.1%	49.8%	15.1%	56.0%	21.5%
Indonesia 2000	2 623	33.8%	6.8%	13.4%	44.8%	36.6%

Source: Based on Covarrubias et al. 2012 (table 2, p. 4).

(6) Transfers from the government	(7) Other	(1)+(2)+(3) Agricultural total	(4)+(5)+(6)+(7) Non-agricultural total	1)+(2) On-farm total	(4)+(5) Non-farm total	(6)+(7) Transfers and other	(3)+(4)+(5)+(6)+(7) Off-farm total
16.4%	2.7%	46.0%	**54.0%**	34.6%	**34.9%**	19.1%	65.4%
7.4%	12.1%	34.5%	**65.5%**	22.0%	**46.0%**	19.5%	78.0%
8.7%	0.7%	56.9%	**43.1%**	51.6%	**33.7%**	9.4%	48.4%
10.7%	2.4%	42.2%	**57.8%**	36.7%	**44.6%**	13.1%	63.3%
13.7%	4.7%	29.1%	**70.9%**	22.3%	**52.6%**	18.4%	77.7%
22.7%	3.5%	22.0%	**78.0%**	15.3%	**51.9%**	26.1%	84.7%

(6) Transfers from the government	(7) Other	(1)+(2)+(3) Agricultural total	(4)+(5)+(6)+(7) Non-agricultural total	1)+(2) On-farm total	(4)+(5) Non-farm total	(6)+(7) Transfers and other	(3)+(4)+(5)+(6)+(7) Off-farm total
37.3%	28.4%	93.0%	**83.7%**	91.3%	**54.3%**	54.4%	91.7%
37.3%	57.5%	75.2%	**91.9%**	71.2%	**64.0%**	72.9%	96.5%
45.6%	2.7%	90.8%	**81.6%**	90.7%	**61.4%**	47.4%	88.6%
83.4%	25.3%	78.8%	**95.7%**	83.1%	**64.4%**	86.5%	96.4%
31.5%	14.7%	56.4%	**83.6%**	52.4%	**67.2%**	40.4%	88.5%
85.5%	15.9%	42.1%	**94.2%**	34.4%	**66.5%**	87.2%	95.0%

Table 3: Sources of real per capita income of rural households, the Philippines and its progressive towns, 1988-2006

Income sources	1988	1997	2000	2006
Philippines (US$ purchasing power parity [PPP])	578	857	826	943
Farm (%)	45	39	35	32
Non-farm (%)	41	46	48	46
Formal salary work (%)	28	33	35	32
Informal work (%)	13	13	13	14
Manufacturing (%)	2	2	2	1
Trade, transportation and communication (%)	10	10	10	11
Others (%)	1	1	1	1
Remittances (%)	14	15	17	22
Domestic (%)	8	9	9	12
International (%)	**6**	**6**	**8**	**10**
Total (%)	100	100	100	100
Central Luzon, CALABARZON, Western Visayas and Central Visayas (US$ PPP)	286	974	941	1026
Farm (%)	38	32	26	26
Non-farm (%)	45	50	54	50
Formal salary work (%)	32	39	40	35
Informal work (%)	13	11	14	14
Manufacturing (%)	2	1	2	1
Trade, transportation and commuication (%)	9	9	10	12
Others (%)	2	1	1	1
Remittances (%)	17	18	20	24
Domestic (%)	9	10	10	12
International (%)	**8**	**8**	**9**	**12**
Total (%)	100	100	100	100

Note: CALABARZON refers to the provinces of Cavite, Laguna, Batangas and Quezon.
Source: Ramos et al. 2012 (table 2, p. 1633). Emphasis has been added by the authors.

Using provincial data for the Philippines and applying the instrumental variable (IV) (where infrastructure variables are treated as endogenous), Ramos et al. found that infrastructure – such as electricity, roads, and secondary and tertiary education – is an important factor in the economic transformation of the rural economy, for example an increase in non-farm income.[15] In the online appendix, Ramos et al. estimated the determinants of international and domestic remittances, using IV where access to electricity or proportion of paved local road is instrumented by the number of islands at the province level and a few other variables, such as population density.

15. The results of Ramos et al. should be interpreted cautiously, because: (i) exclusion restrictions are not statistically validated in their main cases where farm or non-farm income (and its subcomponent) is estimated by IV, that is, there is a possibility that their instruments, such as the number of islands or population density, are correlated with the error terms in the equation for subcomponent of income (pp. 7 and 9 of the online appendix); and (ii) F test statistics of excluded instruments are low (less than 10) in 6 out of 8 cases, suggesting the weak instrument problem. On the former, there is a possibility that geographical isolation (by having many islands) or a lower concentration of people would serve as disincentives for farmers to undertake non-farm activities (pp. 7 and 9). In the case of remittances, tests for over-identification support the validity of instruments in 7 out of 8 cases. However, geographical conditions may be important determinants of the indirect costs of remittances (e.g. how easily the recipients can do bank transactions).

Table 4: Determinants of remittances at the provincial level in the Philippines, 1988-2006
(Second stage of the IV regression)

	International remittances		Domestic remittances	
	1988-1997	2000-2006	1988-1997	2000-2006
Access to electricity (an endogenous variable, Instrumented)	1.02 [0.39]	**6.02*** **[3.03]**	-0.13 [-0.12]	**2.49**** **[1.83]**
Proportion of paved local road (an endogenous variable, instrumented)	-2.24 [-0.42]	-2.3 [-1.33]	0.47 [0.22]	1.5 [1.44]
Proportion of paved national road	0.55 [0.78]	-0.15 [-0.31]	-0.14 [-0.46]	0.13 [0.45]
National road density	0.71 [0.15]	-1.08 [-0.61]	0.5 [0.26]	1.64 [1.57]
Local road density	1.02 [1.25]	0.09 [0.33]	0.47 [1.43]	0.06 [0.42]
Proportion of the labour force: Female	0.24 [0.19]	2.3 [1.21]	**2.05*** **[3.24]**	0.99 [1.15]
Between 15 and 25 years old	2.83 [1.21]	1.8 [0.77]	0.44 [0.37]	**2.04**** **[2.04]**
Between 26 and 35 years old	-3.01 [-1.03]	0.57 [0.21]	-1.25 [-0.92]	-2.04 [-0.16]
Between 36 and 45 years old	-3.57 [-1.45]	0.05 [0.02]	-0.62 [-0.44]	-1.62 [-1.23]
Between 46 and 59 years old	-1.24 [0.35]	3.23 [0.91]	0.51 [0.28]	70.89 [70.56]
With primary schooling	71.89 [1.05]	-3.52 [-1.15]	**2.21**** **[2.42]**	**3.78**** **[2.48]**
With secondary schooling	2.68 [1.04]	-1.32 [-0.40]	**3.85*** **[3.36]**	**2.78**** **[1.66]**
With tertiary schooling	0.27 [0.06]	5.83 [-1.18]	**3.77**** **[2.03]**	2.71 [0.89]
Proportion of irrigated area	0.2 [0.62]	-0.22 [-0.62]	0.12 [0.85]	-0.26 [-1.43]
Land acquisition and distribution (LAD)	0.11 [0.18]	-0.52 [-0.87]	0.05 [0.15]	-0.07 [-0.22]
Farmland to labour ratio	-0.02 [-0.09]	**-0.03**** **[-1.66]**	0.003 [0.03]	-0.14 [-1.40]
Distance	0.005 [1.48]	-0 [1.48]	-0 [-0.54]	0 [-0.12]
Road** distance	-0 [-0.57]	0.002 [0.44]	0.002 [0.58]	0 [-0.21]

* Significant at 1 per cent significance level; ** significant at 5 per cent.
Source: Ramos et al. 2012 (table A4, online appendix). Emphasis has been added by authors.

Table 4: Determinants of remittances at the provincial level in the Philippines, 1988-2006
(Second stage of the IV regression) *(continued)*

	International remittances		Domestic remittances	
	1988-1997	2000-2006	1988-1997	2000-2006
Luzon** distance	**-0.004** ** **[-1.99]**	-0 [-0.25]	0 [-0.31]	0 [0.00]
Visayas** distance	0 [0.01]	0.003 [0.98]	0.002 [1.32]	**0.003** ** **[1.85]**
Constant	2.87 [1.01]	1.73 [0.48]	0.23 [0.16]	1.04 [0.65]
Number of observations	244	186	248	186
R-squared	0.56	0.57	0.59	0.62

* Significant at 1 per cent significance level; ** significant at 5 per cent.
Source: Ramos et al. 2012 (table A4, online appendix). Emphasis has been added by authors.

Table 4 suggests that infrastructure, such as access to electricity, which is treated as endogenous, was an important determinant of international and domestic remittances in 2000-2006. Because infrastructure is an important determinant of non-farm income, as well, it is inferred that, as the rural economy undergoes transformation, overall access to remittances will improve. Interestingly, households with more female members tended to receive a larger amount of remittances in 1998-1997 – a result consistent with Niimi and Reilly (2011). Contrary to our intuition, the coefficient estimates for variables on the education of recipients are positive and significant for domestic remittances and not for international ones. Because the unit of the regressions is a province, neglect of intra-province variations may explain this counter-intuitive result. Using different data (the Survey of Households and Children of Overseas Workers in 1999-2000), Semyonov and Gorodzeisky (2005) showed that the education of recipients (schooling years) is positively and significantly associated with remittances sent from overseas workers to households in the Philippines, the results of which are deemed more reasonable.

Proximity to urban centres affects the sources of household income. 'Distance' interacted by a dummy variable for the island of Luzon was negative and significant for international remittances in 1998-1997. This implies that, in Luzon, the geographical location of the household – aggregated at the provincial level – was an important determinant for international remittances. Overall, results for remittances are similar to those for non-farm income in Ramos et al. (2012).

Contrary to the results in table 4, McKay and Deshingkar (2014) used the secondary data from household surveys for six countries in Africa and Asia (Nigeria, Rwanda, South Africa and Uganda, and Bangladesh and Viet Nam) and found that: (i) domestic remittances are more likely to be received by poorer households, while international remittances tend to be received by richer households; and (ii) if a poor household does receive international remittances, these will have a substantial poverty-reduction impact for that household, but few poor households benefit from such remittances. The latter result implies that the poverty-reducing effect of international remittances can be statistically significant using micro-level data, but may not be significant at the aggregate level.

Migration and remittances: Incentives, costs and dynamics

In discussing the roles of remittances and migration in the economic outcomes of recipient households, it is important to consider the underlying determinants of migration. This is not necessarily easy, as each household has a different incentive and costs for migration and remittances, and these are normally unobservable to researchers. Empirically, panel data will allow a researcher to model unobservable characteristics specific to each household, but incentives and costs for migration cannot be convincingly disaggregated in normal data settings.

A short review article entitled The New Economics of Labor Migration, published in the *American Economic Review* almost three decades ago (Stark and Bloom 1985), still offers insights into theoretical and empirical research on migration. Stark and Bloom pointed out that a more-relatively deprived person can be expected to have a stronger incentive to migrate than a person who is less-relatively deprived, and emphasized the importance of empirically modelling the income incentive and the direct and indirect costs of migration – including physical and psychological costs – when modelling. In terms of empirical modelling, however, no suggestions were made by Stark and Bloom (1985) on how researchers will discern migrants' incentives and transaction costs, while they argue that it is important to include wages of the locations before and after migration to capture the incentives for migration. In this context, using data for Mexico, Stark and Taylor (1991) found that, if absolute income is controlled for, relatively deprived households are more likely to be engaged in international migration than are households more-favourably situated in their village's income distribution. As far as we are aware, no studies have convincingly distinguished incentives and transaction costs for migration because such data are not easily available.

Even though people in rural areas migrate to foreign countries or urban areas, they do not necessarily send money to the household members left in rural areas. Lucas and Stark (1985) theoretically modelled the motivations behind remittances and empirically applied the model to data for Botswana. They argued that altruism alone does not appear to be a sufficient explanation of the motivations to remit.[16] Other motivations include: (i) risk-spreading, which allows household members left in rural areas to take greater risk – partly evidenced by the positive statistical association between degree of drought and amount of remittance in Botswana; and (ii) investment in the education of youngsters, who will migrate to town to reap returns and remit to repay the family's outlay.

Taylor, Rozelle and De Brauw (2003) investigated the complex relationship of migration, remittances, and crop and self-employed income using household data for China. They found that: (i) loss of labour in rural areas to migration has a negative effect on household cropping income in the source areas, although it does not negatively affect crop yields; and (ii) remittances sent home by migrants partially compensate directly for the loss due to migration and stimulate crop production indirectly. That is, remittances will ease constraints on production in the imperfect credit market. Taylor, Rozelle and De Brauw concluded that participating in migration at the household level increases household per capita income for those left behind by 16-43 per cent, which is substantial.

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16. Admittedly, this is not a recent work, but their theoretical modelling can provide rich empirical implications in understanding the motivations behind remittance behaviour.

In a similar context, Taylor and Wyatt (1996) used data for Mexico and empirically showed that remittances stimulate farm income by relaxing credit and risk constraints on household farm production. They argue that the distribution of remittances across different income groups and the initial distribution of constraints on production will shape income distribution over time. Because the shadow value of remittances is higher for relatively poorer households, remittances have an income-equalizing effect in the long run, once the indirect effect is taken into account (e.g. of loosening constraints on investing in income-producing assets).

First, in terms of the policy implications of these analyses, policymakers should lower both the direct and indirect costs of remittances and migration. Proven measures include introduction of banking via mobile phones or online banking systems,[17] or reduction of transaction costs. These can be achieved by: reducing fees or relevant taxes related to international and domestic remittances; reducing risk-related and transportation costs; and introducing more automated teller machines (ATMs) and other cash-out access points through mobile agents in village centres or innovative mechanisms to reach the last mile. Second, policymakers aiming to promote rural transformation (e.g. supporting the rural non-farm sector or rural infrastructure) should be aware that development of the non-farm sector and increases in remittances and/or migration occur at the same time. Starting a new business or shop in rural areas not only requires an initial investment, but also creates the need for more-frequent financial flows. Measures to facilitate financial transactions, including remittances (e.g. by lowering remittance fees) would be useful in enhancing both non-farm businesses and remittance behaviour simultaneously. Third, there may be some households that do not have access to remittances or migration at all, particularly if they are outside village networks. Policies supporting these poor households are as important as those facilitating remittances and/or migration. These policies should focus on rural infrastructure and new communication networks.

17. See IFAD and World Bank (2013, 2015) for a much-broader recommendation related to payment systems and market competition, as well as financial inclusion opportunities. These issues are important, but beyond the scope of this paper.

Review of cross-country data and econometric analyses

In the previous section we reviewed cross-country and country-level studies to investigate the role of remittances in promoting and stabilizing economic growth and reducing poverty and inequality. This section first reviews country-level data on remittances and migration. It then carries out econometric analyses to provide insight into the effects of remittances on economic growth, poverty or inequality, after taking into account the endogeneity of remittances.

Review of trends in remittances and migration at country levels

Figures 7A and 7B show trends in remittances as a share of GDP for South Asia and for East Asia and the Pacific. Selection of countries and years is based on availability of the relevant data in *World Development Indicators 2015* (World Bank 2016). Figure 7A indicates that the share of remittances in GDP gradually increases over the years in most South Asian countries except Pakistan, which has experienced a decline in the share in 1980-2000, and Nepal, with a sharp increase in the share in 2000-2014.

Figure 7B shows that in East and South-East Asia there are no common trends – neither increasing nor decreasing – across countries. Table 3 shows that the share of remittances in GDP increased over 1988-2006, which is consistent with the trend for remittances in the Philippines,[18] but that it decreased in 2006-2014. Though we need to avoid drawing a definite conclusion, it is interesting to find that in 2007-2008, the period when many Asian countries were influenced by the global financial crisis, the share of remittances in GDP decreased in the Philippines, while it increased in Viet Nam. The former could be due to a decline in employment or in the wages of overseas contract workers in the case of the Philippines,[19] while in Viet Nam remittances played a risk insurance role – insuring against the loss of income of family members left in rural areas. In 1997-1998, the period of the Asian financial crisis, Cambodia, the Lao People's Democratic Republic (Lao PDR) and the Philippines experienced an increase in the share of remittances in GDP, which suggests that remittances might have played a risk insurance role. However, these observations should not be generalized, as there are some countries (e.g. Thailand) in which the trend in remittances was more or less stable in these crisis periods.

Figures 8A and 8B present trends in the absolute amount of remittances for each region. In figure 8A, we find that the absolute amount of remittances has increased over the years, except in Bhutan – reflecting stable economic growth over the years and the gradually increasing trend of the share of remittances in GDP. In India, remittances have increased very sharply.

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18. The difference in the absolute value of percentages (e.g. 22% in 2006 in table 4 versus 13% in 2006 in figure 7B) is likely due to a difference in the definition of remittances.
19. Migration from the Philippines to the European Union and United States was likely to be negatively influenced by the financial crisis.

Figure 7A: Remittances, received (% of GDP), South Asia

Legend: Bangladesh, Bhutan, India, Nepal, Pakistan, Sri Lanka
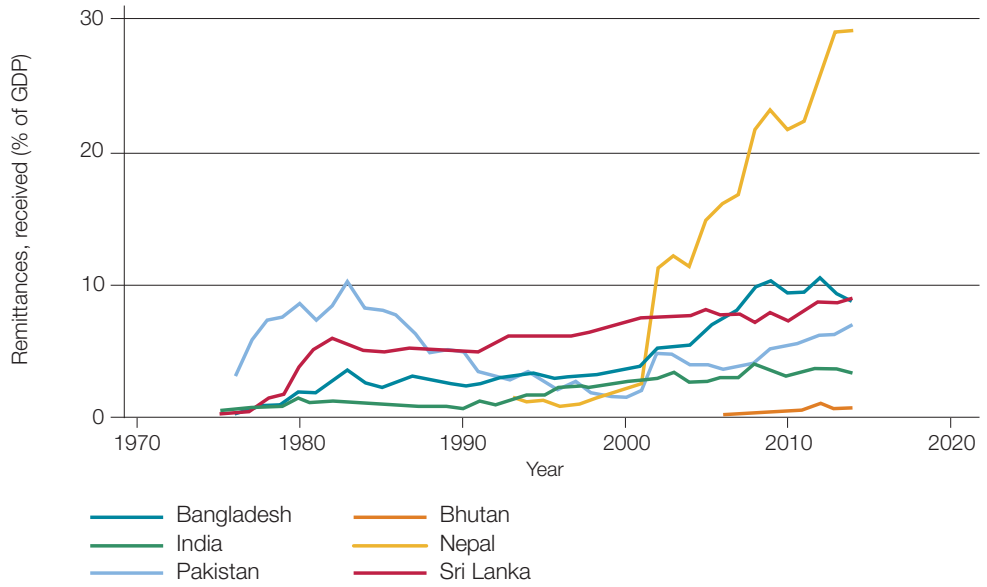
Figure 7B: Remittances, received (% of GDP), East Asia and the Pacific

Legend: Cambodia, China, Fiji, Indonesia, Lao PDR, Malaysia, Micronesia, Papua New Guinea, Philippines, Thailand, Timor-Leste, Viet Nam
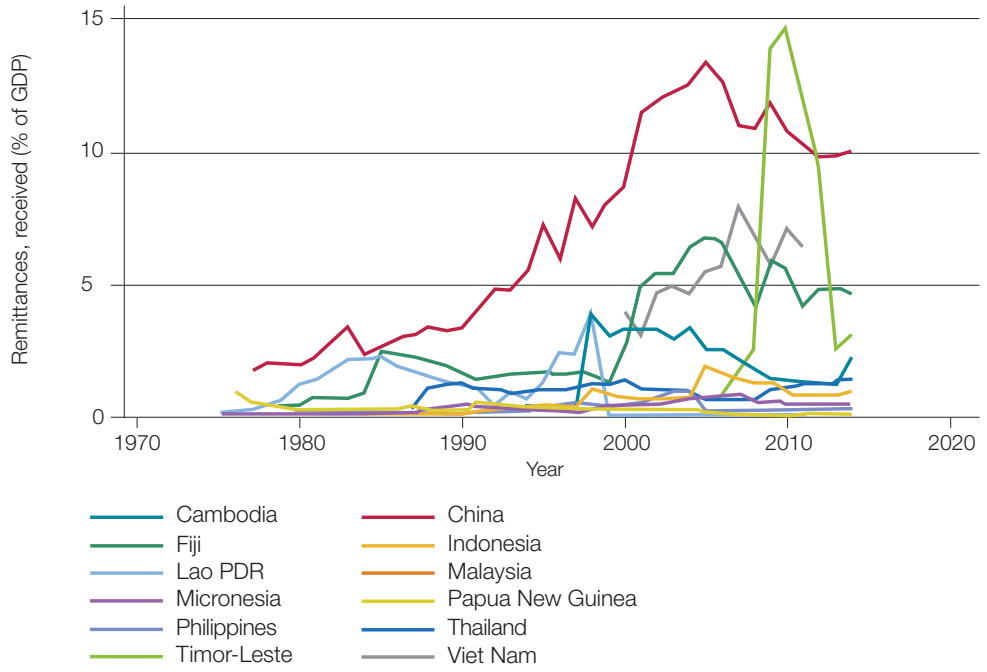
Figure 8A: Remittances, received (current US$), South Asia

Legend: Bangladesh, Bhutan, India, Nepal, Pakistan, Sri Lanka
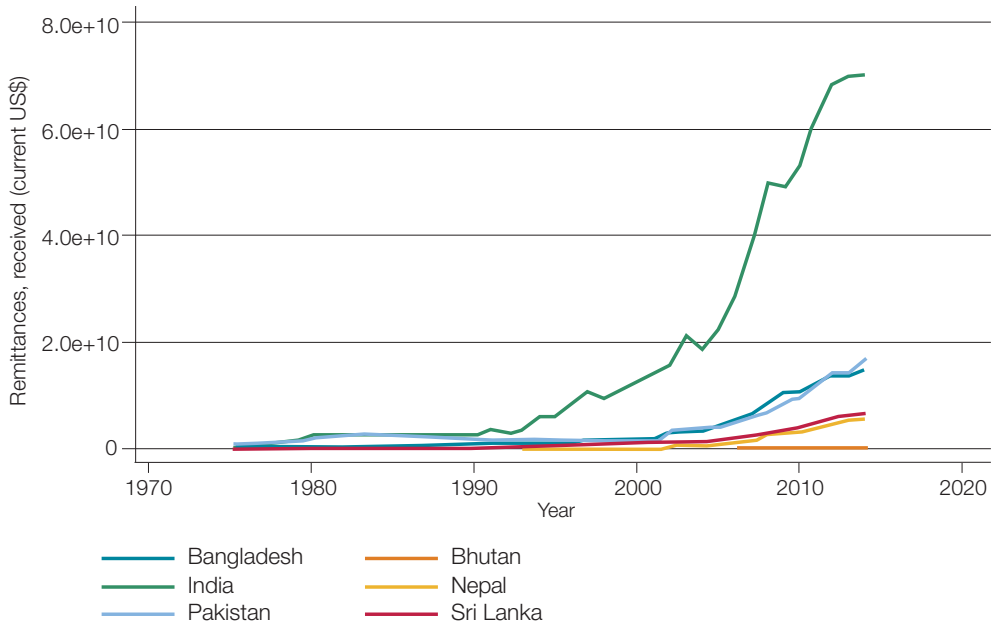
Figure 8B: Remittances, received (current US$), East Asia and the Pacific

Legend: Cambodia, China, Fiji, Indonesia, Lao PDR, Malaysia, Micronesia, Papua New Guinea, Philippines, Thailand, Timor-Leste, Viet Nam
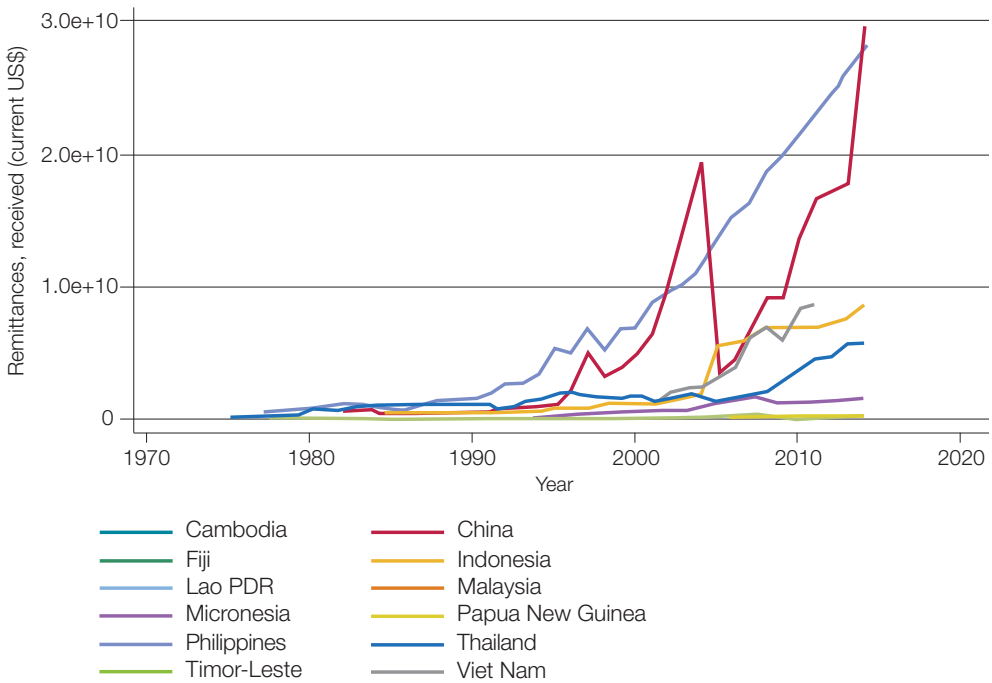
In figure 8B, we can observe that China and the Philippines are the two major countries with the largest and most increasing volume of international remittances. Indonesia, Thailand and Viet Nam have also had a relatively large amount of remittances from abroad and it has been increasing in recent years. It is not easy to see the trends due to scaling, but the other countries have also had a marginally increasing trend in the amount of remittances.

Figures 9A and 9B present trends in the absolute amount of outgoing remittances for each region. In figure 9A, we find that the absolute amount of outgoing remittances has an increasing trend in India and Sri Lanka. However, it is difficult to find a common trend among the countries in East and South-East Asia and the Pacific in figure 9B. We can argue that China, Indonesia, the Lao People's Democratic Republic and the Federated States of Micronesia have seen an increasing trend in outward remittances.

Consistent with an overall trend in inward remittances, net immigration (the total number of immigrants minus emigrants during the period) has shown an overall decreasing trend across many Asian countries: the number of emigrants generally exceeded the number of immigrants in several. Trends are shown in figures 10A and 10B for South Asia and East and South-East Asia. The countries where net immigration has declined since the late 1970s include Bangladesh, China, India, Indonesia, Pakistan and the Philippines. In these countries, there have been more emigrants than immigrants over the years. Other countries have had a relatively stable trend. These trends are broadly consistent with the increasing trend of inward remittances over the years in these countries.

Figure 9A: Remittances, paid (current US$), South Asia
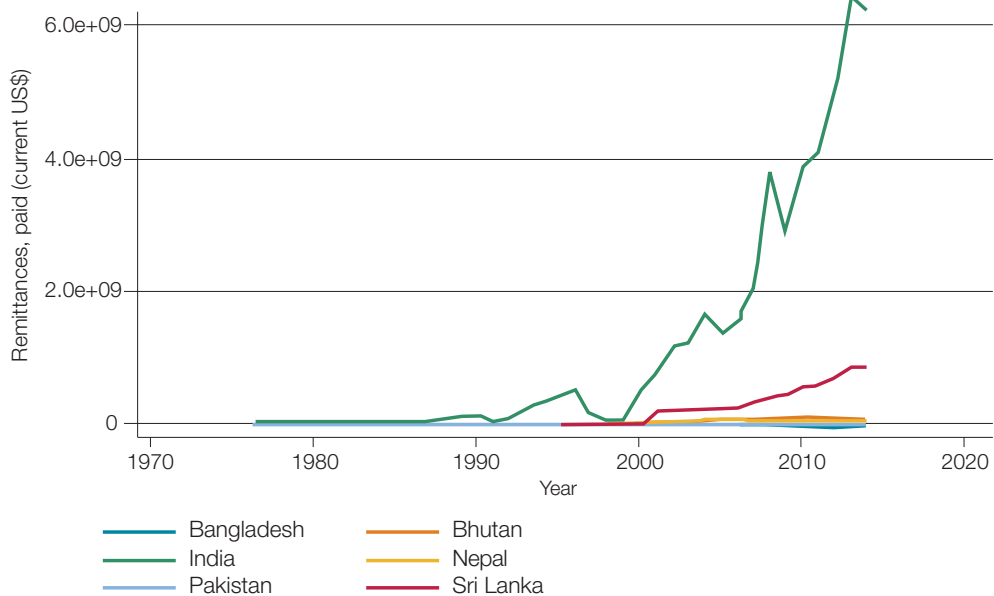
Figure 9B: Remittances, paid (current US$), East and South-East Asia and the Pacific

Cambodia	China
Fiji	Indonesia
Lao PDR	Malaysia
Micronesia	Papua New Guinea
Philippines	Thailand
Timor-Leste	Viet Nam
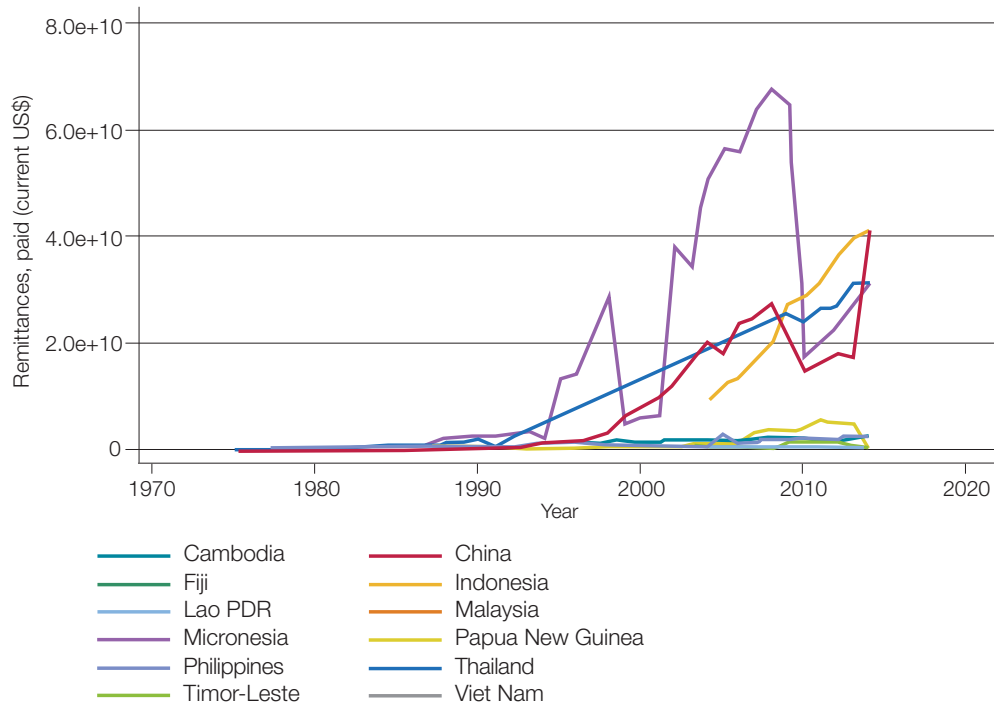
Figure 10A: Net immigration, South Asia

code1 = 7	code1 = 11
code1 = 51	code1 = 77
code1 = 81	code1 = 99
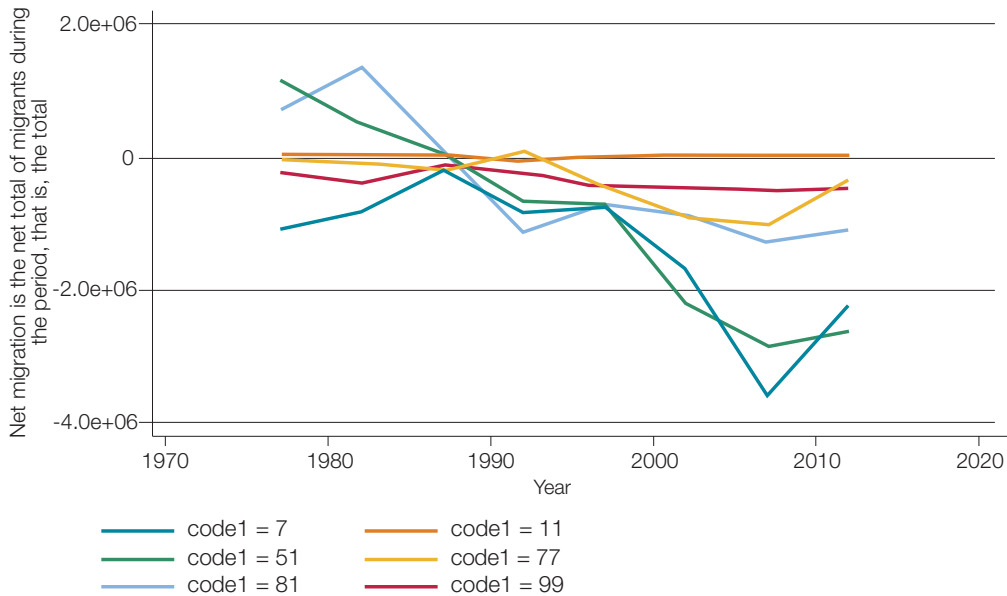
Note: Code1 – 7-Bangladesh, 11-Bhutan, 51-India, 77-Nepal, 81-Pakistan, 99-Sri Lanka.
Net migration is the net total of migrants during the period.

Figure 10B: Net immigration, East and South-East Asia and the Pacific
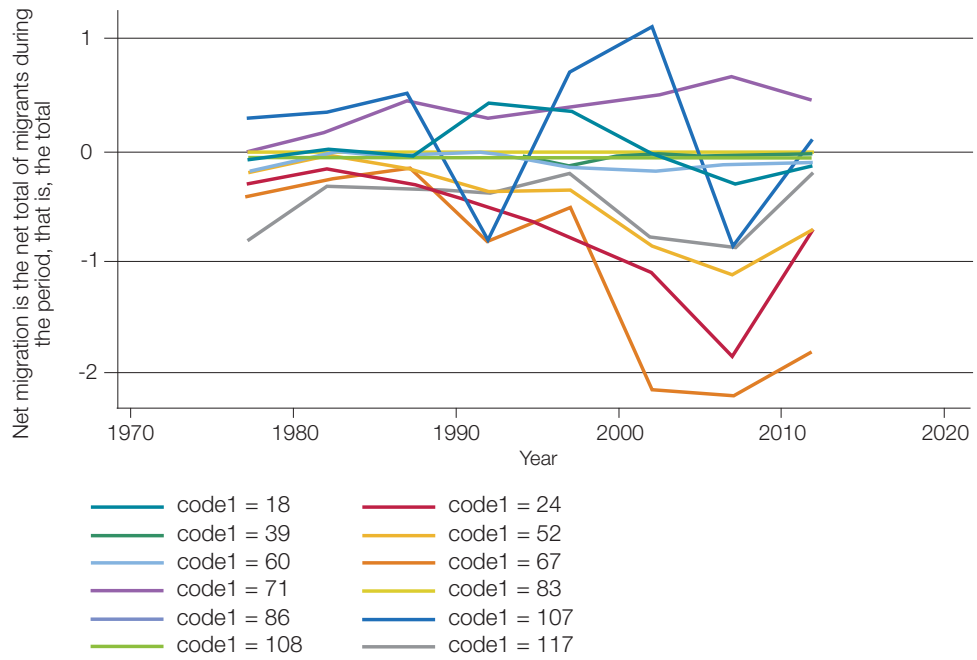
Notes: Code1 – 18-Cambodia, 24-China, 39-Fiji, 52-Indonesia, 60-Lao PDR,67-Malaysia, 71-Micronesia, 83-Papua New Guinea, 86-Philippines, 107-Thailand, 108-Timor-Leste, 117-Viet Nam.

Figure 11A: Emigration rate of tertiary educated (% of total tertiary educated population), South Asia
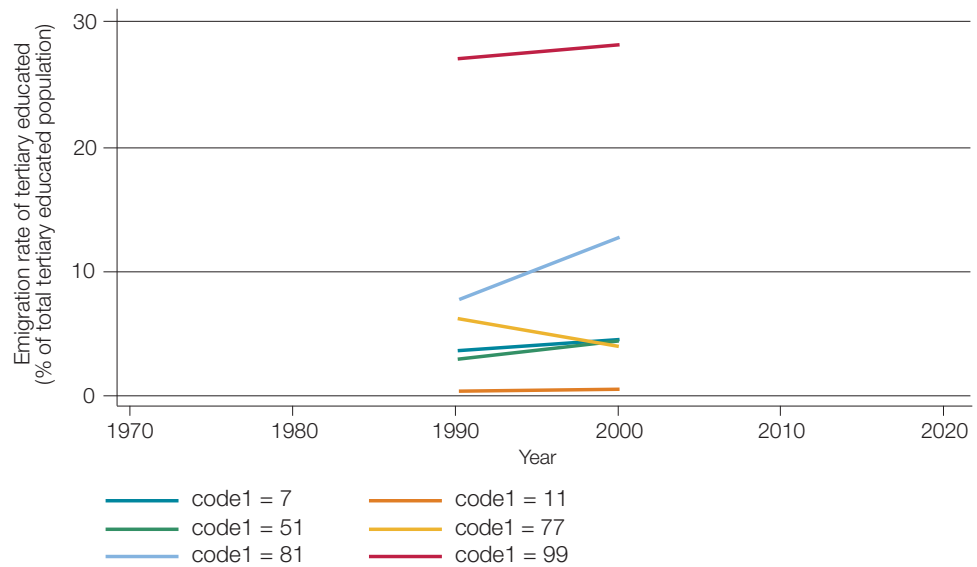
Note: Code1 – 7-Bangladesh, 11-Bhutan, 51-India, 77-Nepal, 81-Pakistan, 99-Sri Lanka.

Figure 11B: Emigration rate of tertiary educated (% of total tertiary educated population), East Asia and the Pacific

Note: Code1 – 18-Cambodia, 24-China, 39-Fiji, 52-Indonesia,60-Lao PDR, 67-Malaysia, 71-Micronesia, 83-Papua New Guinea, 86-Philippines, 107-Thailand, 108-Timor-Leste, 117-Viet Nam.

In figures 11A and 11B, trends in the emigration rate of people with tertiary (post-secondary) education based on the years 1990 and 2000 are summarized. The data are limited, and thus it is best to avoid drawing conclusions from them. Given these limitations, the countries with a clearly increasing trend in the emigration rate of tertiary educated include Bangladesh, India, Lao People's Democratic Republic and Pakistan. Other countries did not experience a significant change in the emigration rate of tertiary educated.

In figures 12A and 12B, the trend in the average transaction cost of remittances is based on a limited number of data points in 2010-2014. Here, the long definition of the average transaction cost of remittances is "the average of the total transaction cost in percentage for sending the local currency equivalent of US$200 charged by each single remittance service provider." Given the data limitations, we can observe that average transaction costs have declined over the years, with some fluctuations across Asian countries. This might be partly associated with the increased outward remittance flow seen in figures 8A and 8B.

Figure 12A: Average transaction cost of remittances (%), South Asia

Note: Code1 – 7-Bangladesh, 11-Bhutan, 51-India, 77-Nepal, 81-Pakistan, 99-Sri Lanka.

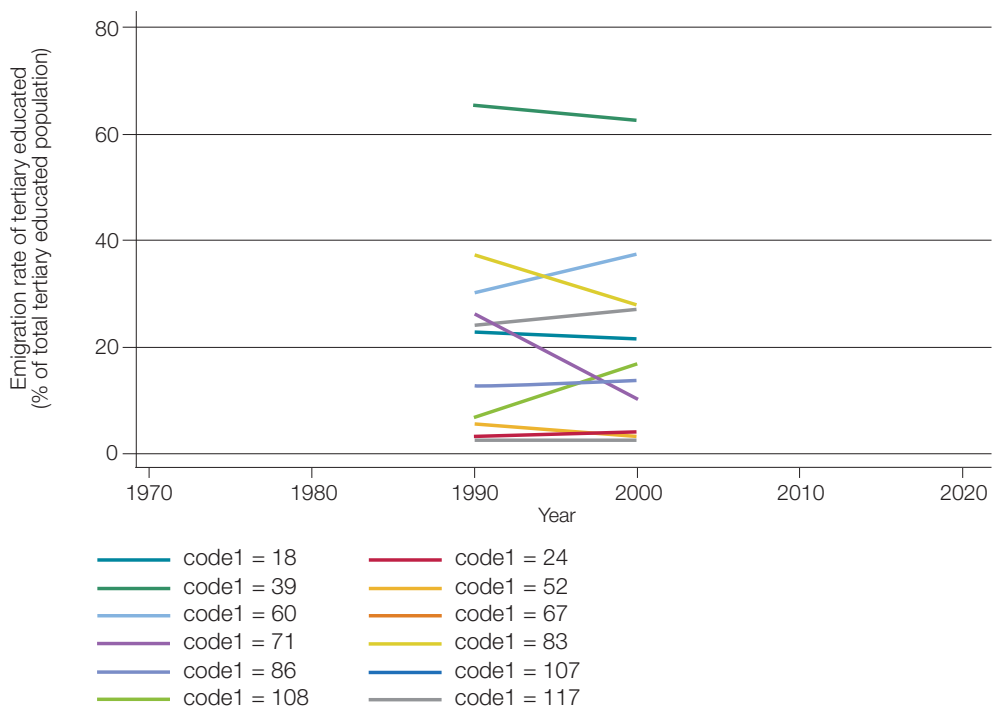Figure 12B: Average transaction cost of remittances (%), East Asia and the Pacific
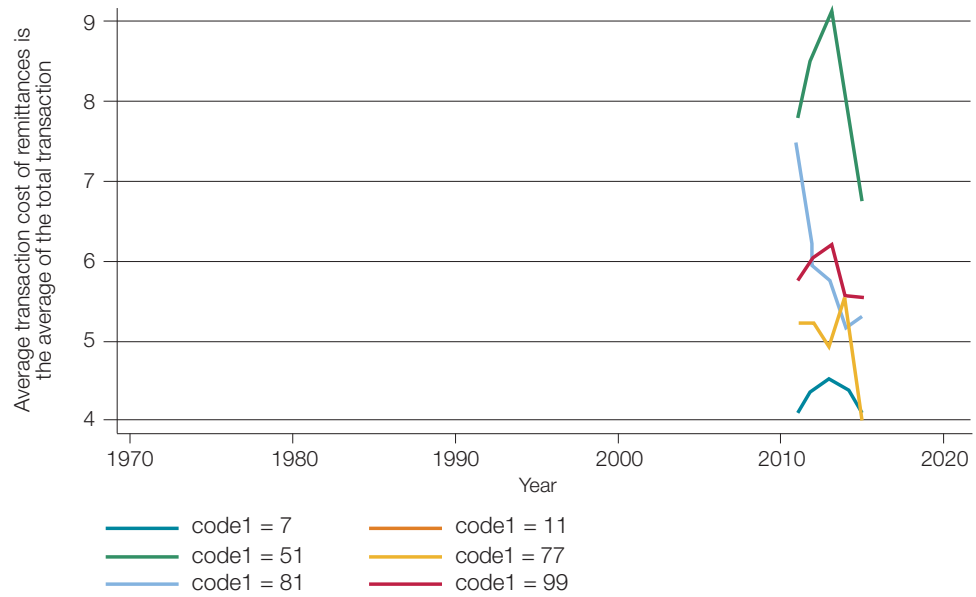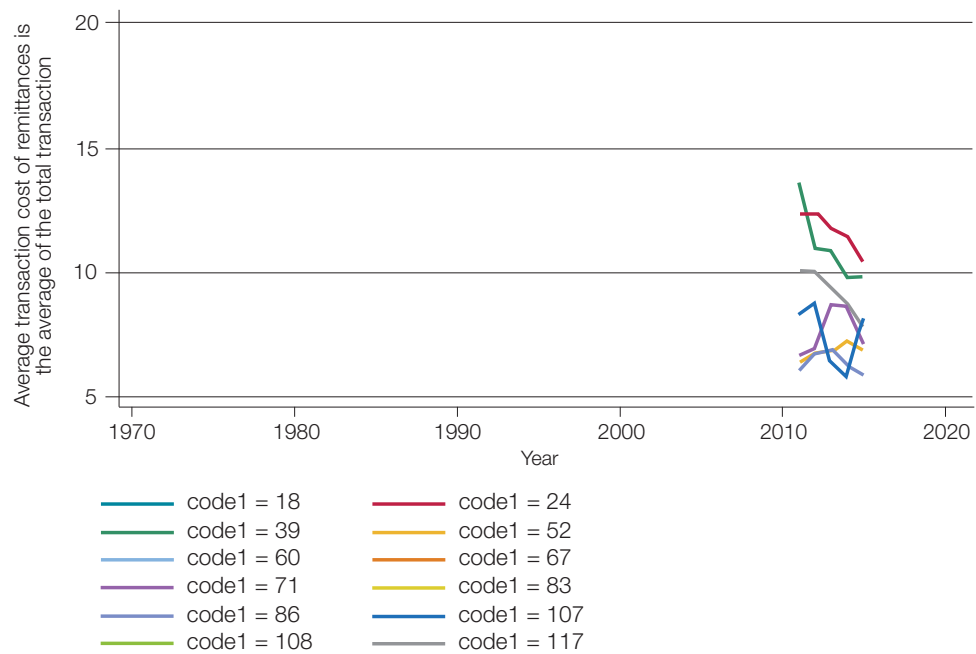

Note: Code1 – 18-Cambodia, 24-China, 39-Fiji, 52-Indonesia, 60-Lao PDR, 67-Malaysia, 71-Micronesia, 83-Papua New Guinea, 86-Philippines, 107-Thailand, 108-Timor-Leste, 117-Viet Nam.

Econometric modelling of the effects of remittances and migration on growth, poverty and inequality

In this subsection, we will estimate the effects of remittances – as well as of migration in one specification – on economic growth, poverty or inequality. We update the cross-country data using *World Development Indicators 2015* (World Bank 2016) and extend the specifications used by Imai et al. (2014). Our sample is dictated by data availability and consists of 21 Asia/Pacific economies over the period 1980-2014.[20] The definitions and sources of the variables are given in the appendix. Unless stated otherwise, the data are drawn from World Bank 2016. Based on the existing literature on remittances and growth, such as Chami, Fullenkamp and Jahjah (2003) and Imai et al. (2014), our baseline specification takes the following form:

$$\Delta \boldsymbol{log}\ y_{it} = \alpha + X'_{it}\beta + \gamma LREM_{it} + \eta_i + \varepsilon_{it} \tag{1}$$

where for country i at time (denoting year) t, $\Delta \log y_{it}$ denotes the rate of growth of real per capita GDP, $LREM_{it}$ is the logarithm of remittances expressed as a percentage of GDP, η_i is unobserved country-specific effect and ε_{it} is the idiosyncratic error term. The vector X'_{it} contains the lag of real per capita GDP, financial-sector development, inflation, investment and the intensity of the conflict.

Given that $\boldsymbol{LREM_{it}}$ may be endogenous, we have used two models to address this issue. First, we have estimated the panel IV (or 2SLS) using the fixed-effects estimator (FE-2SLS), the random-effects estimator (RE-2SLS) and the first-difference estimator (FD-2SLS).[21] In the first stage of 2SLS, we use the two instruments: (i) logarithm of the absolute latitude of the country interacted by the time trend; and (ii) the ethnic fractionalization index multiplied by the time trend. It is assumed that the geographical locations (proxied by the absolute latitude) or the country's ethnic profiles would determine the direct or indirect costs of remittances. If the country's latitude is higher, the distance to developed countries will be less, the transaction costs for international migration or remittances will be smaller and the amount of remittances larger. That is, the expected sign of the coefficient estimate is positive. In developing countries, the network plays an important role in remittances, and the country with a smaller value of ethnic fractionalization will have a higher value of remittances. That is, the expected coefficient estimate is negative. These are expressed as a vector, Z_{it} in the equation (2).[22]

$$(1^{\text{st}}\text{ stage})\ \ \boldsymbol{LREM_{it}} = a' + X'_{it}b + Z_{it}c + \mu_i + e_{it} \tag{2}$$

$$(2^{\text{nd}}\text{ stage})\ \Delta \boldsymbol{log}\ y_{it} = X'_{it}\beta + \gamma LREM_{it} + \eta_i + \varepsilon_{it} \tag{1}'$$

These are not necessarily ideal instruments, because we cannot deny the possibility that – even after controlling for country-fixed effects – the degree of locations and ethnic fractionalization may influence productivity and then GDP per capita growth. However, data restrictions do not allow us to construct a better instrument. Statistical tests (e.g. the over-identification test) validate the instruments, at least statistically. Moreover, FD-2SLS (i.e. taking the first difference) would further mitigate the problem of endogeneity. These are estimated by the equations (1)′ and (2)′.

$$(1^{\text{st}}\text{ stage})\ \ \Delta LREM_{it} = a' + \Delta X'_{it}b' + \Delta Z_{it}c' + \Delta \mu_i + \Delta e_{it} \tag{2}'$$

$$(2^{\text{nd}}\text{ stage})\ \Delta \Delta \boldsymbol{log}\ y_{it} = \alpha' + \Delta X'_{it}\beta' + \gamma' \Delta LREM_{it} + \Delta \eta_i + \Delta \varepsilon_{it} \tag{1}''$$

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20. We have restricted the sample to the period after 2003 and have obtained broadly similar results.

21. An improvement has been made over Imai et al. (2014), which used only FE-2SLS, as we estimated RE-2SLS, FD-2SLS and system GMM to address the endogeneity of remittances.

22. Imai et al. (2014) used the income gap between each remittance-receiving country and the United States as an instrument, but this has been criticized in the literature, as the income gap can be directly related to the dependent variable in the second stage, such as the economic growth. That is, use of the income gap is not much different from use of the income level of the country concerned.

Given the limitations, we estimate the dynamic panel using system GMM (Blundell and Bond 1998; Blundell, Bond and Windmeijer 2000) with Windmeijer's (2005) finite sample correction for the variance, given that our observations are small.

$$\Delta log\ y_{it} = \Sigma^{P}_{j=1}\ \alpha'_j\ \Delta log\ y_{it-j} +\ X'_{it}\beta +\ \gamma LREM_{it} +\ \eta_i +\ \varepsilon_{it} \tag{3}$$

Here, while we include lagged dependent variables ($\Delta log\ y_{it-j}$) we treat $LREM_{it}$ as endogenous by using its own lagged variables as instruments.

Next, we repeat the same estimations for migration. However, as the number of observations is limited for the migration data, we will not estimate FD-2SLS or system GMM.

Moreover, we estimate the effect of remittances on poverty or inequality by taking into account the endogeneity of remittances. This is based on the two-stage estimation described as follows.

$$[\text{1}^{\text{st}}\text{ stage}]\ LREM_{it} =\ \Sigma^{P}_{j=1}\ a'_j\ LREM_{it-j} +\ X'_{it}b + Z_{it}c' +\ \eta'_i +\ \varepsilon'_{it} \tag{4}^{23}$$

Here Z_{it} stands for (i) logarithm of absolute latitude of the country interacted by the time trend and (ii) the ethnic fractionalization index multiplied by the time trend.

$$[\text{2}^{\text{nd}}\text{ stage}]\ POV_{it} = \alpha' + X'_{it}\beta' + \gamma'\widehat{LREM}_{it} + \delta'\widehat{\varepsilon'_{it}} + \mu'_i + e'_{it} \tag{5}$$

Here, in equations (4) and (5), exogenous variables include trade openness, the labour force with secondary education, and the lagged value of GDP per capita. The definition of poverty includes poverty headcount ratio or poverty gap at the national level based on the international poverty thresholds, US$1.25 or US$2.00 per day, and poverty headcount ratio, poverty gap or poverty gap squared for rural areas based on the international poverty thresholds. Here $\widehat{LREM}_{it}$ is the predicted value of the logarithm of remittances based on equation (4). $\widehat{\varepsilon'_{it}}$ is the predicted value of the error term in equation (4). In estimating equation (5), the standard errors are adjusted by bootstrapping. We will then replace poverty by the Gini coefficient at the national level, or in rural or urban areas.

Econometric results

The results for equations (1)-(5) are presented in tables 5-9. To save space, we will report mainly the coefficient estimates associated with remittances or migration.

Table 5 presents the results of estimating the GDP per capita growth rate based on remittances and other covariates. The first two columns show the results of fixed and random effects models. Here, the fixed-effect model is favoured by the result of the Hausman specification test. In column (1), the logarithm of remittances is positive and significant with a coefficient estimate 0.007. This implies that the 10 per cent increase in remittances, on average, is associated with a 0.07 per cent increase in the GDP per capita growth rate, other things being equal. Other coefficient estimates are broadly intuitive.

23. The same notations for coefficients or error terms are repeated for notational convenience, but each case is estimated separately with no constraint for coefficients being equal, stated otherwise. The same caveat is applied to other equations.

Table 5: Effect of remittances on economic growth (dependent variable GDP per capita growth)

VARIABLES	(1) Case 1 FE	(2) Case 2 RE	(3) Case 3 FE-2SLS	(4) Case 4 RE-2SLS	(5) Case 5 FD-2SLS	(6) Case 6 Dynamic system GMM
GDP per capita (-1)	-	-	-	-	-	0.0534 (0.0355)
Log GDP per capita (-1)	**-0.0731***** (0.0220)	**-0.0108***** (0.00376)	**-0.0424*** (0.0229)	0.0119 (0.00758)	**-0.826***** (0.0664)	-0.0115 (0.0106)
Log inflation	**-0.00402***** (0.00142)	**-0.00380***** (0.00119)	**0.00739*** (0.00399)	0.00194 (0.00296)	-0.00011 (0.00281)	-0.00121 (0.00171)
Log financial development	-0.00362 (0.00762)	-0.00393 (0.00581)	**-0.0666***** (0.0165)	**-0.0332***** (0.00904)	**-0.148***** (0.0535)	**-0.0212**** (0.00948)
Log remittance	**0.00687*** (0.00340)	**0.00455*** (0.00253)	**0.0874***** (0.0241)	**0.0392***** (0.00830)	**0.130*** (0.0700)	**0.0150***** (0.00463)
Conflict intensity	-0.00037 (0.00358)	-0.00467 (0.00325)	-0.0086 (0.00991)	-0.0157 (0.00958)	0.001 (0.00911)	**-0.0129***** (0.00380)
Log investment	**0.0664***** (0.0136)	**0.0587***** (0.0136)	**0.103***** (0.0301)	**0.0910***** (0.0208)	**0.145***** (0.0497)	**0.0760***** (0.0181)
Year dummies	yes	yes	yes	yes	yes	yes
Constant	0.301 (0.130)	-0.0616 (0.0406)		-0.227*** (0.0770)	0.0349*** (0.00671)	-0.0375 (0.0733)
R-squared	0.64		-0.385		0.242	
Hausman	chi2(26) = 55.35 p-value = 0.0007 in favour of fe					

First stage	First stage (Dependent variable log (remittances) or Dlog (remittances))					
Log GDP per capita L1.		**-0.5145*** (0.2947)	**-0.7550***** (0.0907)	**-0.6447***** (0.2506)		
Log inflation		-0.0120 (0.0339)	-0.0428 (0.0328)	0.0127 (0.0139)		
Log financial development		0.1146 (0.1212)	**0.3904***** (0.0901)	-0.0018 (0.1635)		
Conflict intensity		**-0.1948***** (0.0712)	**0.2040*** (0.1130)	0.0389 (0.0472)		
Log investment		-0.1275 (0.1956)	**-0.5718**** (0.2343)	-0.1980 (0.1470)		
Absolute latitude X time trend		**0.3396***** (0.0593)	**0.1543***** (0.0220)	**0.4042***** (0.1259)		

Note: Robust standard errors in parentheses. Statistical significant coefficients are shown in bold.
*** p<0.01, ** p<0.05, * p<0.1

Table 5: Effect of remittances on economic growth (dependent variable GDP per capita growth) *(continued)*

VARIABLES	(1) Case 1 FE	(2) Case 2 RE	(3) Case 3 FE-2SLS	(4) Case 4 RE-2SLS	(5) Case 5 FD-2SLS	(6) Case 6 Dynamic system GMM
Ethnic fractionalization X time trend			**0.0102*** **(0.0057)**	**-0.0276***** **(0.0055)**	**0.0412*** **(0.0223)**	
Constant			- -	4.9224 (0.8813)	0.0402 (0.0378)	
R-squared			0.362	-	-	
F test			f(2,519)		f(2,515)	
Test of excluded instruments:			17.49		5.6	
Prob>F			0.0000		0.0039	
Hansen J statistic (over-identification test of all instruments)			0.882		0.0055	
P-val			0.3475		0.8151	

Note: Robust standard errors in parentheses. Statistical significant coefficients are shown in bold.
*** p<0.01, ** p<0.05, * p<0.1

In columns (3), (4) and (5), the logarithm of remittance is treated as endogenous in the models based on FE-2SLS, RE-2SLS and FD-2SLS. First, the instruments are statistically significant, implying that geographical characteristics and the country's ethnic fractionalization influence the transaction costs of remittances and thus their amount. The F test of excluded instruments is significant and greater than 10 (the commonly used threshold value with one endogenous variable) for FE-2SLS and significant for FD-2SLS, with the F statistic being 5.6. Thus some doubt may be cast on the latter in the strength of instruments. However, P-values for over-identification tests are 0.3475 and 0.8151, implying that exclusion restrictions are likely to be valid in both cases. We find in these cases that remittances are positive and significant in the second stage irrespective of the specifications. If we take the case of FE-2SLS, the result suggests that the 10 per cent increase in the remittances share in GDP (e.g. from the current 10 per cent to 11 per cent), on average, is associated with the 0.874 per cent increase in the GDP per capita growth rate, other things being equal. The positive and significant effect of remittances on GDP per capita growth is also confirmed in the final column of table 5, where the dynamic panel-data model is estimated by system GMM.

However, once we replace remittances by net immigration (the number of immigrants minus the number of emigrants), the coefficient estimate is not significant in FE, RE or RE-2SLS, as can be seen in table 6. Only in column (3) based on FE-2SLS, where net immigration is treated as endogenous, is the coefficient estimate negative and significant, consistent with the results in table 5. That is, the increase in emigrants (net of immigrants) is positively associated with the increase in GDP growth. The F test statistic of excluded instruments is 7.67, and though it is statistically significant, the strength of instrument may not be good enough, as it is smaller than the commonly used threshold of 10. The over-identification test for instruments suggests that exclusion restrictions are likely to be valid. Hence, with some caveat, we find some evidence that outmigration (net of immigration) tends to promote economic growth.

Table 6: Effect of migration on economic growth (dependent variable GDP per capita growth)

VARIABLES	(1) Case 1 FE	(2) Case 2 RE	(3) Case 3 FE-2SLS	(4) Case 4 RE-2SLS
Log GDP per capita (-1)	**-0.0449***	**-0.0126***	**-0.0252****	-0.011
	(0.0242)	**(0.00423)**	**(0.0120)**	(0.00751)
Log Inflation	**-0.00674****	**-0.00730****	**-0.0249****	**-0.0231***
	(0.00311)	**(0.00357)**	**(0.00659)**	**(0.00426)**
Log financial development	**0.0232***	**0.0178***	**0.0283****	**0.0200***
	(0.0122)	**(0.00923)**	**(0.0101)**	**(0.00688)**
Net immigration	-0.00378	-0.000623	**-0.0277***	-0.00564
	(0.00482)	(0.00392)	**(0.0143)**	(0.0132)
Conflict intensity	-0.00658	-0.00795	**-0.0211***	**-0.0231***
	(0.00714)	(0.00747)	**(0.0115)**	**(0.00895)**
Log investment	-0.0182	0.0112	-0.0561**	-0.0279
	(0.0276)	(0.0292)	(0.0282)	(0.0172)
Year dummies	Yes	Yes	Yes	Yes
Constant	0.276	0.0138		0.189***
	(0.166)	(0.0711)		(0.0693)
Observations	183	183	111	111
R-squared	0.308		0.44	
Number of code1	30	30	22	22
Hausman	Chi2 = 34.61 P-value = 0.0017 In favour of FE			
First stage			First stage (Dependent variable log (remittances) or Dlog (remittances)	
Log GDP per capita L1.			0.0921	0.0877
			(0.1679)	(0.1023)
Log inflation			-0.0024	-0.0185
			(0.0508)	(0.0489)
Log financial development			0.0733	-0.0237
			(0.0710)	(0.0781)
Conflict intensity			-0.0180	-0.1024
			(0.1483)	(0.1059)
Log investment			-0.0948	-0.1412
			(0.1935)	(0.1937)
Absolute latitude X time trend			0.0319	0.0338
			(0.0372)	(0.0215)
Ethnic fractionalization X time trend			**0.0379***	**0.0347***
			(0.0097)	**(0.0052)**
Constant			-	-0.0129
				(0.8329)

Note: Robust standard errors in parentheses. Statistical significant coefficients are shown in bold.
*** p<0.01, ** p<0.05, * p<0.1

Table 6: Effect of migration on economic growth (dependent variable GDP per capita growth *(continued)*

VARIABLES	(1) Case 1 FE	(2) Case 2 RE	(3) Case 3 FE-2SLS	(4) Case 4 RE-2SLS
Observations			111	111
R-squared			-	-
F test			F(2,82)	
Test of excluded instruments:			7.67	
Prob>F			0.0009	
Hansen J statistic (over-identification test of all instruments)			2.25	
P-val			0.1336	

Note: Robust standard errors in parentheses. Statistical significant coefficients are shown in bold.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 7: Effect of remittances on national poverty (based on international poverty lines)

Second stage Dependent variable VARIABLES	(1) FE Poverty HC US$1.25 Case 1	(2) FE Poverty gap US$1.25 Case 2	(3) FE Poverty HC US$2.00 Case 3	(4) FE Poverty gap US$2.00 Case 4
P log (remittance) $(\widehat{LREM}_{it})$	**-0.397** **(0.194)**	**-1.670*** **(0.511)**	-0.448 (0.296)	**-2.903** **(1.282)**
Openness	0.314 (0.369)	0.393 (0.345)	0.0416 (0.521)	0.803 (0.866)
Labour force with secondary education	-0.0433 (0.197)	-0.33 (0.491)	0.0116 (0.204)	-0.524 (1.298)
GDP per capita (-1)	0.813 (1.414)	-0.76 (5.520)	1.355 (1.888)	-2.313 (12.53)
$\widehat{\varepsilon}^{i}_{it}$	0.00443 (0.459)	**-1.177** **(0.478)**	-0.127 (0.343)	-1.899 (1.339)
Constant	-1.218 (1.905)	2.89 (2.340)	1.742 (3.044)	7.249 (6.217)
Observations	211	200	211	200
R-squared	0.113	0.197	0.14	0.212
First stage	Dependent variable log (remittances)			
Dynamic panel (system GMM) Log (remittance(-1))	**0.826*** **(0.0397)**	**0.826*** **(0.0397)**	**0.826*** **(0.0397)**	**0.826*** **(0.0397)**

Table 7: Effect of remittances on national poverty (based on international poverty lines) *(continued)*

Second stage Dependent variable VARIABLES	(1) FE Poverty HC US$1.25 Case 1	(2) FE Poverty gap US$1.25 Case 2	(3) FE Poverty HC US$2.00 Case 3	(4) FE Poverty gap US$2.00 Case 4
Openness	-0.00259	-0.00259	-0.00259	-0.00259
	(0.0223)	(0.0223)	(0.0223)	(0.0223)
Labour force with secondary education	0.00442	0.00442	0.00442	0.00442
	(0.0155)	(0.0155)	(0.0155)	(0.0155)
GDP per capita (-1)	-0.216	-0.216	-0.216	-0.216
	(0.207)	(0.207)	(0.207)	(0.207)
Absolute latitude X time trend	**0.0283***	**0.0283***	**0.0283***	**0.0283***
	(0.0145)	**(0.0145)**	**(0.0145)**	**(0.0145)**
Ethnic fractionalization X time trend	0.00187	0.00187	0.00187	0.00187
	(0.00364)	(0.00364)	(0.00364)	(0.00364)
Constant	0.04	0.04	0.04	0.04
	(0.166)	(0.166)	(0.166)	(0.166)
Joint significance Wald chi2(6)	2635.91***			
Arellano-Bond test for zero autocorrelation in first-differenced errors (P-value)				
1	0.0003	0.0003	0.0003	0.0003
2	0.2825	0.2825	0.2825	0.2825
Sargan test of over-identifying restrictions				
chi2(426) = P-value	357.34 0.9932	357.34 0.9932	357.34 0.9932	357.34 0.9932

Notes: Robust standard errors in parentheses. Statistical significant coefficients are shown in bold.
Standard errors in the second stage are bootstrapped. *** p<0.01, ** p<0.05, * p<0.1

In table 7 the effect of remittances on poverty at the national level (based on international poverty lines) is estimated where remittances are treated as endogenous. We estimate the poverty headcount ratio and poverty gap based on the US$1.25-per-day poverty threshold (in columns (1) and (2)) and on the US$2.00 poverty threshold by the predicted value of remittances. In all cases, remittances are found to be negative and significant. That is, if the share of remittances in GDP increases by 10 per cent (e.g. from 10 per cent to 11 per cent), the *poverty headcount* based on US$1.25 (US$2.00) per day decreases 3.97 per cent (4.48 per cent) (in comparison with the initial poverty headcount being set at 100 per cent), other things being equal. On the other hand, if the share of remittances increases by 10 per cent, the *poverty gap* at US$1.25 (US$2.00) per day tends to decrease 16.7 per cent (29.3 per cent) (in comparison with the initial poverty gap being set at 100 per cent), other things being equal. It is thus concluded that remittances have a substantial poverty-reducing effect.

We observe in table 8 that the effect of the share of remittances on rural poverty (based on international poverty lines) is negative and significant in all cases – regardless of the choice of poverty lines or definitions of poverty – after the endogeneity of remittances is taken into account. For instance, column (1) shows that a 10 per cent increase in the share of remittances in GDP tends to decrease the poverty headcount ratio based on the US$1.25 threshold by 3.06 per cent on average – with the initial poverty level being set at 100 per cent, other things being equal. The amount of reduction in response to a 10 per cent increase in the share of remittances in GDP will be 5.22 per cent for poverty gap (column (2)) and 7.44 per cent for poverty gap squared (column (3)), both of which are based on the US$1.25 per day poverty threshold. Poverty-reducing effects at the US$2.00 poverty threshold are getting smaller, though the coefficient estimates are statistically significant (columns (4), (5) and (6)). If the share of remittances in GDP increases by 10 per cent, the poverty headcount (gap; gap squared) based on US$2.00 per day will decline by 0.998 per cent (2.62 per cent; 3.46 per cent). Thus remittances have a substantial poverty-reducing effect not only on national poverty, but also on rural poverty. The signs of other coefficient estimates are expected, though the trade openness measure is not statistically significant.

While remittances have a substantial and statistically significant poverty-reducing effect for both rural and urban poverty, our results suggest that they do not have any inequality-reducing effect. Column (1) of table 9 shows that the predicted value of remittances ($\widehat{LREM}_{it}$) is not statistically significant. However, $\widehat{LREM}_{it}$ is significant in columns (2) and (3), implying that the 10 per cent increase in the share of remittances in GDP (e.g. from 10 per cent to 11 per cent) is associated with a 0.399 per cent increase in rural Gini or 0.466 per cent in urban Gini. Given that remittances have increased sharply in recent years and are expected to increase further, the accumulated effect of the inequality increase may be large. This is likely due to the fact that remittances disproportionally benefit relatively rich households. Our findings are in line with Adams (1991) in rural Egypt, Taylor et al. (2005) in rural Mexico, and McKay and Deshingkar (2014) on the cross-country evidence. However, our results are not consistent with Taylor and Wyatt's (1996, p. 910) result for Mexico, where remittances were found to marginally decrease Gini. More research based on household datasets is necessary to investigate the relationship between remittances and inequality.

Table 8: Effect of remittances on rural poverty (based on international poverty lines)

Second stage Dependent variable VARIABLES	(1) FE Rural Poverty HC US$1.25 Case 1	(2) FE Rural Poverty gap US$1.25 Case 2	(3) FE Rural Poverty gap squared US$1.25 Case 3	(4) FE Rural Poverty HC US$2.00 Case 4	(5) FE Rural poverty gap US$2.00 Case 5	(6) FE Rural poverty gap squared US$2.00 Case 6
P log (remittance) ($\widehat{LREM}_{it}$)	**-0.306*** (0.0420)**	**-0.522*** (0.102)**	**-0.744*** (0.196)**	**-0.0998*** (0.0375)**	**-0.262*** (0.0484)**	**-0.346*** (0.0707)**
Openness	0.148 (0.668)	0.217 (1.631)	0.155 (3.111)	0.0334 (0.597)	0.0792 (0.770)	0.0971 (1.125)
Labour force with secondary education	**-0.160*** (0.0257)**	**-0.151** (0.0628)**	-0.0574 (0.120)	**-0.0921*** (0.0230)**	**-0.113*** (0.0297)**	**-0.125*** (0.0433)**
L. GDP per capita growth	**-5.219*** (0.0640)**	**-6.215*** (0.156)**	**-3.960*** (0.298)**	**-2.473*** (0.0572)**	**-3.516*** (0.0738)**	**-3.970*** (0.108)**
$\widehat{\varepsilon^{\tau}}_{it}$	**0.929*** (0.0709)**	**0.950*** (0.173)**	**0.740** (0.331)**	**0.197*** (0.0634)**	**0.250*** (0.0818)**	**0.314*** (0.120)**
Constant	2.324 (4.446)	0.76 (10.78)	0.204 (20.53)	3.623 (3.966)	2.344 (5.111)	1.504 (7.459)
Observations	75	73	69	78	78	77
R-squared	0.402	0.453	0.353	0.393	0.487	0.456
First stage	Dep. var. log (remittances)					
Dynamic panel (system GMM) Log (remittance(-1))	**0.826*** (0.0397)**	**0.826*** (0.0397)**	**0.826*** (0.0397)**	**0.826*** (0.0397)**	**0.826*** (0.0397)**	**0.826*** (0.0397)**
Openness	-0.00259 (0.0223)	-0.00259 (0.0223)	-0.00259 (0.0223)	-0.00259 (0.0223)	-0.00259 (0.0223)	-0.00259 (0.0223)
Labour force with secondary education	0.00442 (0.0155)	0.00442 (0.0155)	0.00442 (0.0155)	0.00442 (0.0155)	0.00442 (0.0155)	0.00442 (0.0155)
L.GDP per capita growth	-0.216 (0.207)	-0.216 (0.207)	-0.216 (0.207)	-0.216 (0.207)	-0.216 (0.207)	-0.216 (0.207)
Absolute latitude X time trend	**0.0283* (0.0145)**	**0.0283* (0.0145)**	**0.0283* (0.0145)**	**0.0283* (0.0145)**	**0.0283* (0.0145)**	**0.0283* (0.0145)**
Ethnic fractionalization X time trend	0.00187 (0.00364)	0.00187 (0.00364)	0.00187 (0.00364)	0.00187 (0.00364)	0.00187 (0.00364)	0.00187 (0.00364)
Constant	0.04 (0.166)	0.04 (0.166)	0.04 (0.166)	0.04 (0.166)	0.04 (0.166)	0.04 (0.166)
Joint significance Wald chi2(6)	2635.91***					
Arellano-Bond test for zero autocorrelation in first-differenced errors (P-value)						
1	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003
2	0.2825	0.2825	0.2825	0.2825	0.2825	0.2825
Sargan test of over-identifying restrictions						
chi2(426) =	357.34	357.34	357.34	357.34	357.34	357.34
P-value	0.9932	0.9932	0.9932	0.9932	0.9932	0.9932

Notes: Robust standard errors in parentheses. Statistical significant coefficients are shown in bold.
Standard errors in the second stage are bootstrapped. *** p<0.01, ** p<0.05, * p<0.1

Table 9: Effect of remittances on inequality (national, rural and urban Gini)

Second stage Dependent variable VARIABLES	(1) FE National Gini Case 1	(2) FE Rural Gini Case 2	(2) FE Rural Gini Case 2
P log (remittance) ($\widehat{LREM}_{it}$)	0.0232 (0.0183)	**0.0399*** **(0.00579)**	**0.0446*** **(0.0125)**
Openness	0.00961 (0.0123)	0.0313 (0.0922)	-0.00273 (0.199)
Labour force with secondary education	-0.0079 (0.0107)	**-0.0178*** **(0.00355)**	**-0.0152** **(0.00766)**
GDP per capita growth (-1)	-0.0195 (0.0648)	**-0.234*** **(0.00883)**	**-0.223*** **(0.0191)**
$\widehat{\varepsilon'}_{it}$	**0.0461*** **(0.00975)**	**0.0164*** **(0.00979)**	0.00951 (0.0211)
Constant	3.470*** (0.0939)	3.298*** (0.610)	3.596*** (1.297)
Observations	215	78	76
R-squared	0.136	0.15	0.165
First stage: Dynamic panel dep. (system GMM) Variable log (remittances)			
Log remittance (-1)	**0.826*** **(0.0397)**	**0.826*** **(0.0397)**	**0.826*** **(0.0397)**
Openness	-0.00259 (0.0223)	-0.00259 (0.0223)	-0.00259 (0.0223)
Labour force with secondary education	0.00442 (0.0155)	0.00442 (0.0155)	0.00442 (0.0155)
GDP per capita growth (-1)	-0.216 (0.207)	-0.216 (0.207)	-0.216 (0.207)
Absolute latitude X time trend	**0.0283*** **(0.0145)**	**0.0283*** **(0.0145)**	**0.0283*** **(0.0145)**
Ethnic fractionalization X time trend	0.00187 (0.00364)	0.00187 (0.00364)	0.00187 (0.00364)
Constant	0.04 (0.166)	0.04 (0.166)	0.04 (0.166)
Joint significance Wald chi2(6)	2635.91***		
Arellano-Bond test for zero autocorrelation in first-differenced errors (P-value)			
1	0.0003	0.0003	0.0003
2	0.2825	0.2825	0.2825
Sargan test of over-identifying restrictions			
chi2(426) = P-value	357.34 0.9932	357.34 0.9932	357.34 0.9932

Notes: Robust standard errors in parentheses. Statistical significant coefficients are shown in bold.
Standard errors in the second stage are bootstrapped. *** p<0.01, ** p<0.05, * p<0.1

Concluding observations

In this study, we first reviewed the literature on remittances with respect to their effect on economic growth, its stability and poverty. Some micro-level studies on remittances were reviewed to better understand the underlying mechanisms through which people in developing countries migrate and remit, with a focus on the income structure of households, their incentives and costs. We then used cross-country panel data to examine, econometrically, the effects of remittances and migration on economic growth, poverty and inequality, after taking into account the endogeneity of remittances. Our conclusions are summarized in the following three points.

First, our econometric results indicate that remittances will promote economic growth and reduce poverty – both national poverty and rural poverty – based on the international poverty lines for the US$1.25 or US$2.00 thresholds, after taking into account the endogeneity of remittances. Consistent with this result, net migration (the number of immigrants minus the number of emigrants), which is treated as endogenous, tends to be negatively associated with economic growth, given that remittances are likely to be positively associated with the number of emigrants. However, we have found that remittances have no inequality-reducing effect. Rather, they will significantly increase rural and urban Gini, the results of which are contradictory to Taylor and Wyatt's (1996) result for Mexico. As discussed by Taylor and Wyatt, in order to analyse the effect of remittances on income distribution, it is necessary to consider: (i) distributions of the amount of remittances across different income groups; (ii) distributions of the sizes of potential benefits/incentives of remittances across different income groups; and (iii) costs and risk associated with migration and remittances. That is, the distributional effect of remittances will have to be investigated over the long term. Our use of rural poverty (based on the international poverty lines) and rural or urban Gini for the cross-country study is nevertheless a departure from the existing literature such as Imai et al. (2014), who used poverty data at the national level only. Our econometric results are broadly consistent with the existing literature on remittances and migration in developing countries. In our review, many studies based on cross-country panel data have shown that: (i) remittances tend to promote economic growth; (ii) remittances tend to stabilize economic growth; and (iii) remittances tend to reduce poverty.

Second, we need to understand the underlying factors and motivations behind migration or remittance behaviour. For instance, our detailed review of the micro-level study in the Philippines (Ramos et al. 2012) has suggested that: (i) development of infrastructure and geographical location (e.g. the distance to town centres) are key to increases in remittances; and (ii) remittances tend to increase when the rural economy undergoes structural transformation such as development of a non-farm rural sector in which infrastructure is deemed important (ibid.) (e.g. access to electricity or improvements in education). These are broadly consistent with our statistical summary of the cross-country data in which lower-middle-income countries

– many of which have experienced structural transformation of rural areas (Imai, Gaiha and Bresciani 2016) – have typically experienced a surge of inward-bound remittances.

Third, it has also been suggested that remittances have risk-coping roles – both at the macro-level to stabilize economic growth and at the micro-level to help households ease credit constraints and smooth consumption. The role of networks is important – kinship or castes in the South Asian context will affect how easily poor households can migrate to urban areas or abroad (e.g. Munshi and Rosenzweig 2016). In this context, remittances will serve a risk insurance role. Thus it is important to consider any effect of the networks available to households in estimating the determinants of remittances. As suggested by Taylor, Rozelle and De Brauw (2003), remittances will allow household members remaining in the rural area to take some risks to stimulate crop yields. This will serve as insurance for the migrants' future income when they return to the home village after a temporary migration. Research on remittances or migration and risk insurance or risk-coping mechanisms is still scarce and should be an important research topic in the future.

It is important, however, to consider the fact that very poor households cannot afford to migrate or send remittances, because they cannot afford the cost of migration (e.g. travel) or may be outside a network that facilitates migration or remittances. Experimental study to evaluate the effect of migration on poverty (e.g. randomized controlled trials) is difficult to conduct, as the opportunity for migration cannot be easily randomized experimentally. Thus the large national household datasets should be used to carry out rigorous examinations of the poverty-reducing effect of migration or remittances at the household level.

This study offers a few useful policy implications. First, given that remittances have increased sharply in recent years and are a substantial share of GDP in many Asian countries, governments should monitor trends in remittances, along with other financial inflows, and consider the possible macroeconomic consequences for the future. For instance, recession in developed countries may result in reduced international remittances at the macro-level, and this may increase fluctuation of future economic growth. On the other hand, as the surge of remittances may risk real exchange-rate appreciation and weaken the competitiveness of exported goods in the international economy, aggregate remittances should be used as one macro-level financial indicator.

Second, policymakers should lower the transaction costs of remittances (the reduction of which have been confirmed by our data) as well as those of migration. The former may include introduction of banking via mobile phones or online banking systems, reduction of fees or relevant taxes related to international and domestic remittances, or introduction of more ATMs or other equivalent systems in village centres. The latter includes not only physical costs, but also those associated with any legal restrictions on domestic and international migration. These measures are not only important in promoting economic growth and reducing poverty at the macro-level, but also helpful in providing agricultural households in rural areas with more options for coping with risk.

Third, it is important that policymakers support the process of rural transformation (e.g. providing village infrastructure and communication networks) and promoting education, because these measures will eventually facilitate household remittance behaviour.

Finally, as migration or remittances are unlikely to benefit all households in the rural economy, it is important that governments provide enough policy support for those that do not have access to the opportunity for migration or remittances (e.g. poor households in backward castes, in ethnic minorities and/or living in remote areas).

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Appendix. Descriptive statistics and definitions of variables

Variables	Definitions of variables and data sources in squared brackets
Log (remittances)	Log (remittances, received (% of GDP) [WDI 2015]
Net immigration	Net migration is the net total of migrants during the period
GDP per capita growth	Real GDP growth rate (2005 PPP, US$) [WDI 2015]
Log GDP per capita	Log real GDP per capita (2005 PPP, US$) [WDI 2015]
Log inflation	Log of inflation measured by CPI (annual %) [WDI 2015]
Log financial development	Captured by deposit money bank assets / (deposit money + central) bank assets [Beck, Demirgüç-Kunt and Levine 2009] expressed in log-form, updated version in 2013 http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTRESEARCH /0,,contentMDK:20696167~pagePK:64214825~piPK:64214943~theSite PK:469382,00.html.
Absolute latitude X time trend	Log of absolute value of latitude multiplied by time trend [WDI 2015]
Ethnic fractionalization X time trend	Ethnic fractionalization index multiplied by time trend [Quality of Government dataset]
Conflict intensity	Intensity of conflict (internal armed conflicts [Uppsala Conflict Data Program (UCDP)/ Peace Research Institute Oslo (PRIO) Conflict Database]
Log investment	Gross capital formation (% of GDP) [WDI 2015] expressed in log-form
Openness	Exports plus imports (% of GDP) [WDI 2015] expressed in log-form
Labour force with secondary education	Share of labour force with secondary education.
povertyhc125	Poverty headcount ratio based on US$1.25 per day, 2005 PPP [WDI 2015]
povertyg125	Poverty gap ratio based on US$1.25 per day, 2005 PPP [WDI 2015]
povertyhc200	Poverty headcount ratio based on US$2.00 per day, 2005 PPP [WDI 2015]
povertyg200	Poverty headcount gap based on US$2.00 per day, 2005 PPP [WDI 2015]
epov_h_rur	Poverty headcount ratio in rural area based on US$1.25 per day, 2005 PPP [based on the data of Strategy and Knowledge Department (SKD), IFAD 2015]
epov_gap_rur	Poverty gap ratio in rural area based on US$1.25 per day, 2005 PPP [SKD, IFAD 2015]
epov_gap2_rur	Poverty gap squared in rural area based on US$1.25 per day, 2005 PPP [SKD, IFAD 2015]
mpov_h_rur	Poverty headcount ratio in rural area based on US$2.00 per day, 2005 PPP [SKD, IFAD 2015]
mpov_gap_rur	Poverty gap ratio in rural area based on US$2.00 per day, 2005 PPP [SKD, IFAD 2015]
mpov_gap2_rur	Poverty gap squared in rural area based on US$2.00 per day, 2005 PPP [SKD, IFAD 2015]
gini	Gini coefficient at the national level [WDI 2015]
gini_rur	Gini coefficient in rural areas [WDI 2015]
gini_urb	Gini coefficient in urban areas [WDI 2015]

Note: We include the countries in South Asia (Bangladesh, Bhutan, India, Nepal, Pakistan, Sri Lanka); East Asia and the Pacific (Cambodia, China, Fiji, Indonesia, Lao PDR, Malaysia, Micronesia, Fed. Sts., Papua New Guinea, Philippines, Thailand, Timor-Leste, Viet Nam); and Central Asia (Kazakhstan, Tajikistan, Turkmenistan). Selection of countries is guided by the availability of data in WDI 2015 (World Bank 2016).

Obs	Mean	Std. Dev.	Min	Max
882	0.2689615	1.679814	-7.673314	3.903869
324	-0.182445	0.5692244	-3.570954	2.118323
1 648	0.032527	0.0846911	-0.3736391	1.256495
1 448	6.914186	1.096407	4.281169	9.535043
1 651	1.579604	2.199332	-13.36887	8.112167
1 440	3.157944	0.7902612	-0.5845596	5.110294
1 211	0.3468181	0.1845544	0.0555556	0.6555555
1 151	-1.146982	0.6382936	-3.091495	-0.3077025
2 440	0.172541	0.4732969	0	2
1 630	3.149867	0.3247958	1.547072	4.090516
2 184	3.573144	3.126785	0	7.145985
2 184	0.6101827	1.572984	0	5.384495
347	0.2895066	2.723209	-4.60517	4.431055
327	4.043402	6.950575	0	39.26
347	1.699737	2.517087	-4.60517	4.583027
327	9.882015	13.9548	0	59.27
105	2.31634	2.047917	-4.60517	4.424847
103	0.9847825	2.042092	-4.60517	4.053523
97	0.2660669	1.71577	-4.60517	3.81903
110	3.215607	1.657771	-1.660731	4.53303
110	2.021771	1.978429	-4.60517	4.234541
108	1.266505	2.005066	-3.912023	4.043402
683	3.481273	0.1600894	2.965273	4.112512
110	3.472021	0.1668328	3.171784	4.158258
107	3.569651	0.1582924	3.202746	4.272491

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