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Jean-Louis Combes, Christian Hubert Ebeke, Mathilde Maurel, Urbain  
Thierry Yogo

► **To cite this version:**

Jean-Louis Combes, Christian Hubert Ebeke, Mathilde Maurel, Urbain Thierry Yogo. Remittances and the Prevalence of Working Poor. 2011. halshs-00585004

**HAL Id: halshs-00585004**

**<https://shs.hal.science/halshs-00585004>**

Preprint submitted on 11 Apr 2011

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CENTRE D'ETUDES  
ET DE RECHERCHES  
SUR LE DEVELOPPEMENT  
INTERNATIONAL

CERDI, *Etudes et Documents*, E 2011.09

Document de travail de la série

***Etudes et Documents***

E 2011.09

## **Remittances and the Prevalence of Working Poor**

Jean-Louis COMBES

Christian EBEKE

Mathilde MAUREL

Thierry YOGO

*March, 2011*

CERDI  
65 BD. F. MITTERRAND  
63000 CLERMONT FERRAND – FRANCE  
TEL. 04 73 71 74 20  
FAX 04 73 17 74 28  
[www.cerdi.org](http://www.cerdi.org)

Les auteurs

Jean-Louis Combes

Clermont Université, Université d'Auvergne, Centre d'Etudes et de Recherches sur le Développement International (Cerdi), BP 10448, F-63000 Clermont-Ferrand. CNRS, UMR 6587, CERDI, F-63009 Clermont-Ferrand.– France,

E-mail : [J-L.Combes@u-clermont1.fr](mailto:J-L.Combes@u-clermont1.fr)

Christian Ebeke

Clermont Université, Université d'Auvergne, Centre d'Etudes et de Recherches sur le Développement International (Cerdi), BP 10448, F-63000 Clermont-Ferrand. CNRS, UMR 6587, CERDI, F-63009 Clermont-Ferrand – France,

E-mail : [Christian\\_Hubert.Ebeke@u-clermont1.fr](mailto:Christian_Hubert.Ebeke@u-clermont1.fr)

Mathilde Maurel

Centre d'Economie de la Sorbonne, 106-112 Bd de l'Hôpital, 75647 Paris Cedex 13,

E-mail : [maurelm@univ-paris1.fr](mailto:maurelm@univ-paris1.fr)

Thierry Yogo

FSEG, CERE, Université de Yaoundé II-Soa, BP 1365 Yaoundé,– Cameroon,

E-mail : [yogout@gmail.com](mailto:yogout@gmail.com)

La série des *Etudes et Documents* du CERDI est consultable sur le site :

<http://www.cerdi.org/ed>

Directeur de la publication : Patrick Plane  
Directeur de la rédaction : Catherine Araujo Bonjean  
Responsable d'édition : Annie Cohade

ISSN : en demande d'attribution

Dépôt légal :

Avertissement :

Les commentaires et analyses développés n'engagent que leurs auteurs qui restent seuls responsables des erreurs et insuffisances.

## Abstract

This paper focuses on the relationships between remittances and the share of individuals working for less than 2\$ US per day. It is based on an original panel dataset containing information related to remittances in about 80 developing countries and to the number of workers being paid less than 2 dollars per day as well. Even after factoring in the endogeneity of remittance inflows the results suggest that remittances lead to a decrease in the prevalence of working poor in receiving economies. This effect is stronger in a context of high macroeconomic volatility but is mitigated by the unpredictability of remittances: remittances are more effective to decreasing the share of working poor when they are easily predictable. Moreover, domestic finance and remittances appear as substitutes: remittances are less efficient in reducing the prevalence of working poor whenever finance is available.

Mots clés /Key words: Working poor, Remittances, Shocks, Financial development  
Codes JEL / JEL codes : F22, F43, O16

## Introduction

According to the recent World Bank Report (World Bank “Migration and Remittances Factbook”, 2011), the worldwide remittance flows are estimated to have exceeded \$440 billion in 2010. From that amount, developing countries received \$325 billion. The Report also highlights that recorded remittances were nearly three times the amount of official aid (ODA) and almost as large as foreign direct investment (FDI) flows to developing countries. For instance in Sub-Saharan Africa, remittances range from less than 1% of GDP to 25% in Lesotho, and they exceed by large both FDI and aid in countries like Mauritius, Nigeria, Egypt, Morocco, Senegal and Lesotho. Ratha (2009) summarized all existing empirical evidence and conclude that for a large fraction of the poorest nations, remittances exceed both ODA and FDI.

Given this increasing evidence, it is not surprising that the last decade was marked by an increasing attention paid to the role played by remittances on development goals. At the macro level, the emphasis has been stressed on poverty, investment, growth, consumption, competitiveness and macroeconomic stability (Adams and Page, 2005; Woodruff and Zenteno, 2007; Chami et al., 2003; Giuliano and Ruiz-Arranz, 2009; Catrinescu et al., 2009; Barajas et al., 2009; Bugamelli and Paterno, 2009; Chami, Hakura and Montiel., 2009; Combes and Ebeke, 2010; Amuedo-Dorantes and Pozo, 2004; Barajas et al., 2010). At the micro level, a lot of research has been carried out on the relationships between labor supply and the income earned abroad and sent back by migrants (Funkhouser, 2006; Cox-Edwards and Rodriguez-Oreggia, 2009).

This paper contributes to the debate over the impact of remittances on labor market outcomes in receiving countries in three ways. It is based upon a large dataset covering about 80 developing and emerging countries over a large time span (1990-2008). This dataset contains

systematic information about remittances and the proportion of poor workers, which is defined as the proportion of individuals earning less than 2\$ US per day. This allows a precise econometric estimate of the impact of remittances in reducing the number of poor workers. The results support the assumption that both the level and regularity of remittances reduce poverty, mitigate the sensitivity of the share of working poor with respect to macroeconomic shocks and finally, act as a substitute for shallowness financial markets.

The paper contributes to two strands of the literature. One is related to the macroeconomic impact of remittances on growth and poverty. The impact of remittances on economic growth in receiving countries is *a priori* ambiguous. Remittances can be essentially spent on consumption and generate moral hazard, which is detrimental to growth (Chami et al., 2003). But they can also promote investment: in a world characterized by market imperfections and liquidity constraints, potential investors and micro entrepreneurs cannot raise the funds which would allow them to launch profitable activities (Giuliano and Ruiz-Arranz, 2009). In this context, remittances provide households with available funds, which alleviate credit rationing and allow those investments to take place. As a result, the demand for non qualified labor and wages increase. It follows that the share of poor workers decreases and growth is promoted. The pro-poor effects of remittances have been demonstrated at the cross-country level by Adams and Page (2005) on a large sample of developing countries and recently by Acosta et al. (2008) in the case of Latin American countries.

The second strand of the literature is linked to the impact of remittances on labor supply, which has been extensively studied at the micro-level. In an outstanding work which based on Indian micro data, Jayachandran (2006) demonstrates that the labor supply of the poorest individuals is inelastic if workers are closer to subsistence, more credit constrained and, less

able to migrate.<sup>1</sup> As a result, the working poor wages are continually low. Any smoothing mechanism which enhances the labor supply elasticity – when market conditions are not favorable – is expected to reduce poverty. For instance, migration could affect the level of wage through two channels: the effect of migration itself and an effect via remittance inflows. In the first case, migration outflows affect the labor market outcomes by reducing the number of available workers in the region of origin. This would imply a higher equilibrium wage all else equal. For the second case, remittance inflows are supposed to increase the reservation wage of workers and may also increase the demand for labor when they are invested. Altogether, it results an upward pressure on the wage what would reduce the share of working poor.

Be it driven by the demand or supply side, the effect of remittances is to reduce the number of poor workers. Our results suggest that the reasoning conducted mostly at micro levels can be generalized with macro-data. Remittances decrease in a substantial way the share of workers below 2 dollars per day, suggesting either that labor market adjustments take place allowing poor workers to supply labor in a more elastic way, or that more funds are spent on investment which in turns increases the demand for labor. Moreover, while the level of remittances helps alleviating the number of poor workers, their predictability matters. From the supply side and in a context of risk adverse households, unpredictable remittances would not reduce household labor supply and hence the prevalence of working poor.<sup>2</sup> From the demand side, unpredictable remittances could reduce the share of poor workers when it is

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<sup>1</sup> Several papers have analyzed the labor supply elasticity in developing countries. The seminal work of Lewis (1954) assumes an horizontal labor supply function at the minimum subsistence level. This form has been tackled in three broad directions: negative slope function (Berg, 1961; Huang, 1976), positive slope function (Bardhan, 1979) and S-shaped labor supply curve (Dessing, 2002). Recent work highlights that the labor supply curve becomes more inelastic in a context of poverty, credit-constraints and high migration costs (Jayachandran, 2006). This result suggests that for poor constrained workers, the income effect exactly compensates for the substitution effect.

<sup>2</sup> However, a recent paper by Cox-Edwards and Rodriguez-Oreggia (2009) found limited evidence of labor force participation effects of persistent remittances. This result challenges the previous finding of Amuedo-Dorantes and Pozo (2010b) that workers increase labor supply when remittance inflows are less predictable.

admitted that unpredictable remittances are more likely to be invested rather than to be fully consumed (Amuedo-Dorantes and Pozo, 2010a). This suggests that there are two opposite forces in the relationship between the unpredictability of remittances and the prevalence of working poor.

The structure of the paper is as follows. Section II reviews the literature and gives preliminary evidence on the relationships between remittances and working poor at the macroeconomic level. Section III identifies the impact of remittances on the prevalence of working poor while controlling for the remittances endogeneity. Section IV tests the hypothesis that the impact of remittances on the prevalence of working poor depends on several factors: the income volatility, the remittances unpredictability and the financial development. Section V concludes.

## **Section II. Preliminary evidence and overview of the existing literature**

Figure 1 presents the distribution of the regional averages of the percentage of working poor. As expected, the figure shows that the regions characterized by the highest prevalence of working poor are Sub-Saharan Africa, South Asia and East Asia and Pacific, with more than 60% of people remunerated at less than 2\$US per day. The Middle East and North Africa (MENA), Europe and Central Asia, and Latin America and Caribbean regions exhibit the lowest median values.

**Figure 1 about here.**

Figure 2 presents preliminary evidence suggesting a negative correlation between the dependency on remittance inflows and the prevalence of working poor in developing countries.

**Figure 2 about here.**



There are two main channels through which remittances can exert an impact on low wages. One channel is related to the labor demand side, through the increase in investment, which is covered by remittances. This happens when remittances are used for financing small business projects (Woodruff and Zenteno, 2007; Chiodi et al., 2010; Adams and Cuecuecha, 2010). They allow the development of small entrepreneurships, which requires low qualified labor force. The demand for unskilled labor increases and wages at the bottom of the distribution should increase. To our knowledge, very few papers have investigated the impact of remittances on investment at the macro level (one exception is Giuliano and Ruiz-Arranz, 2009, and is based upon a dataset of 70 developing countries). More evidence is provided at the micro level. Dustman and Kirchkamp (2002) and Massey and Parado (1998) analyzed respectively the Turkish and Mexican cases. Woodruff and Zenteno (2007) reported that remittances are behind 20% of the capital invested in micro firms throughout urban Mexico. Chiodi et al. (2010) showed that in rural Mexico, poor rural families resort to remittances as a way to mitigate constraints that prevent them from investing in productive assets. Adams and Cuecuacha (2010) found that remittance-receiving households in Guatemala spend less at the margin on consumption (food) but more at the margin on investment (education and housing).

The second channel relates to the labor supply side. In the standard neoclassical model of labor supply, workers optimize the allocation of their time to work and other activities, including leisure. Labor supply depends upon the reservation wage, which relates to how much extra earning an individual requires to be induced to give up one unit of leisure.

The reservation wage is higher when individuals exposed to shocks can save and borrow, instead of continuing to work if market conditions deteriorate. Whenever individuals have access to formal and informal credit, their labor supply becomes more elastic. Remittances constitute one such informal mechanism and their availability reduces the vulnerability of workers, who are closer to subsistence. Another mechanism is the possibility of borrowing or

drawing on savings, but in developing countries credit markets are underdeveloped and characterized by imperfections. As emphasized in Jayachandran (2006), the equilibrium wage is lower in an economy without smoothing mechanisms, because more people are obliged to work at a lower rate.

One key notion is the distance of workers to the minimum level of subsistence. The closer to this minimum level are workers, the less elastic their labor supply is. Remittances help the poorest and more vulnerable categories of workers by enabling them to quit jobs, which are paid at low rates.

Micro-evidence supports this assumption. While the impact of remittances on the overall labor force participation is mixed,<sup>3</sup> there is strong evidence that remittances decrease the participation of children, female adults and teenagers (Funkhouser, 2006; Calero et al., 2009; Bansak and Chezum, 2009; Ebeke, 2010). Children and women accept jobs at low wages, and they constitute in most developing countries the most vulnerable segment of the active population. This implies that remittances decrease the share of the most vulnerable workers paid at below 2 dollars per day.

To our knowledge there are very few studies focusing directly on the impact of migration and remittances on the share of workers selling low wages. Jayachandran (2006) highlights two crucial results concerning landless. On the one hand, landless, who are the poorest, and hence the most liquidity constrained agents, tend to have an inelastic labor supply. But, on the other hand, they are also more likely to migrate in response to bad shocks what contributes to

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<sup>3</sup> This may arise from the fact that the impact is ambiguous if the revenue from the migrant replaces the revenue he would have procured without migrating. It may be due also to the difficult task of comparing strictly identical individuals and households. For addressing this identification problem, alternative econometric strategies have been proposed. Canales (2007) and Amuedo-Dorantes and Pozo (2006) using different sources find no change for Mexican workers, while Rodriguez and Tiongson (2001) and Funkhouser (1992) provide evidence of a slight change in the labor force participation using data for Manila and Managa respectively. Gubert (2002) suggests that remittances act as an insurance and allow Malian workers to reduce their work. Cox-Edwards and Rodriguez-Oreggia (2009) using score matching techniques find little evidence of permanent remittances effect on labor force participation.

reduce the elasticity of wages to labor demand shocks. Most studies focus on the impact of remittances on the overall supply of labor, but disregard the distinction between poor workers and the others. This paper aims at filling the gap, by using macro data.

The relationship between remittances, the share of working poor and, financial development is *a priori* ambiguous. Well-functioning financial markets, by lowering transaction costs, may help use remittances as a way either to better allocate time to work and leisure, or to finance projects that yield the highest returns and foster economic growth. Mundaca (2009) using a panel of Latin American and Caribbean countries showed that financial intermediation tends to increase the responsiveness of growth to remittances. One can thus expect a complementary relationship between remittances and the financial development in the reduction of the prevalence of working poor in receiving countries. Alternatively, remittances can compensate for the lack of finance, be it for accommodating bad shocks or for starting productive activities. In this case, remittances act as a substitute for the banking system. Giuliano and Ruiz-Arranz (2009) using a broad panel of developing countries found that formal credit and remittances are substitute rather than complement; remittances substitute for the lack of finance, which implies that their impact on growth is more pronounced whenever finance is missing. Following their line of argument, we will test the hypothesis that remittances are more efficient in reducing the number of poor workers whenever alternative funds are not available.

### **Section III. Do remittances reduce the prevalence of working poor? Empirical investigation.**

To explore the link between remittances and working poor, we use a large dataset, which covers 85 countries over the period 1990-2007. As a starting exercise, we estimate the

interaction between remittances and the percentage of working poor by running simple OLS.

We estimate the following model:

$$w_{i,t} = \theta_1 R_{i,t} + X'_{i,t} \beta + \alpha_i + \eta_t + \varepsilon_{i,t} \quad (1)$$

where  $w$  is the percentage of working poor in the total active population in each country  $i$  at year  $t$ .  $R$  is the remittance-to-GDP ratio,  $\mathbf{X}$  is the matrix of control variables and  $\alpha_i$  and  $\eta_t$  represent the country fixed-effects and the time dummies, respectively.  $\varepsilon_{i,t}$  is the idiosyncratic error term. Our basic hypothesis is that  $\theta_1 < 0$ , in other terms remittance inflows reduce the prevalence of working poor.

Equation (1) includes the following control variables:

*Income volatility* (measured as the standard deviation of the real GDP per capita growth rate over the last five years) is a proxy for shocks. Following Jayachandran (2006), we expect a positive impact of income shocks on the prevalence of working poor since macroeconomic volatility decrease the reservation wage (workers are more likely to accept low wages in time of negative shocks).

*Initial GDP per capita* enters the set of control variables. We expect a negative correlation between the level of development and the prevalence of working poor. For instance, it could be a proxy for the existence and the compliance toward minimum wages legislation.

*Net emigration rate* (measured as the difference between migration outflows and migration inflows over the total population) is an indicator of pressure on the labor market. An increase in net emigration rate increases the reservation wage, which in turns decreases the prevalence of working poor. The inclusion of this variable ensures that the effect of remittances is not confounded with the effect due to migration. Moreover, net migration changes both the

distribution of worker characteristics and the returns to these characteristics. Hanson (2007) has shown that labor force participation in high migration Mexican States decreases and that average wages in those States are higher in a range between 6% and 9%.

*Financial development* (measured by the private credit-to-GDP ratio) reduces the prevalence of low wages via both the labor demand and the labor supply channel. The demand channel is promoted by the firms' access to credit and private investment. The supply channel is based upon a wider possibility of drawing on savings and of borrowing, which renders labor supply more elastic (Jayachandran, 2006). As for remittances, more access to credit allows poor workers to adjust in a more optimal way. If there is a lack of finance, poor workers are blocked in poverty traps, as they have no choice but to work for low wages.

*Trade openness* in developing countries could decrease the prevalence of working poor by increasing the labor demand in the agricultural sector and hence the agricultural wage. The same effect exists in the natural resources sector and altogether, the working poor rate is lower. The international competition induced by trade openness leads to productivity gains in the tradable sector and shifts the level of wage above its previous value.<sup>4</sup> Developing countries export commodities whose production requires unskilled labor, and unskilled workers' wages in sending developing countries tend to increase.

*Government consumption-to-GDP ratio* is a proxy for the share of public employment in which the number of working poor is much lower.

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<sup>4</sup> It is worth noting that a high level of trade openness means a higher exposition to external risks which could translate into a lower reservation wage. However, since we already control for macroeconomic instability, this effect is drained-off.

*Foreign direct investment net inflows-to-GDP ratio* controls for the fact that foreign direct investment inflows increase the domestic demand for labor and hence reduce the prevalence of working poor.<sup>5</sup>

*Education level* (measured as the percentage of people having completed the secondary cycle) enters the set of control variables. A higher education level increase the reservation wage, and decrease the prevalence of working poor.

*Income inequality* (approximated by the Gini coefficient of income distribution) is introduced to ensure that the estimated effect of remittances on the prevalence of working poor is net of the effect of remittances on income inequality.<sup>6</sup>

*Inflation rate* controls for the fact that low-wage earners suffer more from the loss of real wage induced by inflation. They have to increase their labor supply in order to compensate for this loss of revenue, even more for working poor, who do not have other way of smoothing consumption but to supply more work.

*Rural population rate* is negatively correlated with the productivity of workers in rural area. Hence a positive association between the rural population and the prevalence of working poor is expected.

The dependent variable is measured as the share of active people who receive as wage less than 2 \$US and comes from the ILO-KILM dataset.<sup>7</sup> Remittances record the money sent by

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<sup>5</sup> Chen et al. (2011) showed that FDI inflows increase inter-enterprise wage inequality in China. Their results highlighted that FDI lead to a negative spillover in terms of the wage in domestic firms. This arises when competition from multinationals may reduce the market share of local firms, which drives such firms under the minimum efficiency or even crowds them out. Nunnenkamp et al. (2007) showed that even if FDI inflows enhance economic growth and reduce poverty, they also widen income disparities between urban and rural areas in Bolivia. This suggests that FDI inflows can exert a pro-poor effect in receiving countries but at the same time, they can induce regional disparities.

<sup>6</sup> Some recent macroeconomic papers have tested the impact of remittance inflows on the income inequality in the receiving countries (Koechlin and Leon, 2007; Acosta et al., 2008; Ebeke and Le Goff, 2010).

<sup>7</sup> See appendix for a detailed presentation of this variable.

workers who live abroad for at least one year.<sup>8</sup> Remittance data are drawn from the World Bank Tables. Except trade openness, government consumption and per capita income (which come from the Penn World Table 6.3. dataset), all remaining control variables are drawn from the World Bank Tables. The sample covers at most 85 countries over the period 1990-2007. Countries list and descriptive statistics are provided in appendix at the end of the paper (Tables A1 and A2).

Table 1 displays the results obtained by running OLS. Whatever the specification, be it with a smaller number of controls in the first columns or a larger one in the subsequent columns, all variables have the expected sign. When all controls are included, higher income volatility, larger income inequality and higher rural population rate are associated with a higher number of poor workers. Furthermore, the initial level of economic development, the degree of trade openness and the level of education (except when the income per capita is excluded from the specification) tend to reduce the prevalence of workers paid at below two dollars per day. Convergence, competition, and income distribution do influence the share of poor workers in the active population. Some coefficients, although non-significant, have the right sign: net emigration rate, private credit to GDP ratio, government consumption over GDP, FDI over GDP, inflation rate. Those variables might suffer from colinearity when estimated jointly with other variables.

**Table 1 about here.**

It is worth noting that whatever the specification, remittance inflows reduce the prevalence of working poor and this effect is highly significant. The estimated coefficient ranges from -0.885 (first column) to -0.507 (column 10).

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<sup>8</sup> We use the narrower definition of remittances by squeezing the compensations of employees and migrant transfers. This procedure follows Chami, Fullenkamp and Gapen (2009).

The main drawback behind these preliminary results is the simultaneity bias resulting from the two ways causality running from the prevalence of working poor to remittances and *vice et versa*. If remittances reduce the number of poor workers, it is likely that poverty does induce both migration and remittances to compensate for low wages at home. OLS results might be therefore biased toward zero and they can underestimate the ‘true’ impact.

To deal with the endogeneity bias, we use an instrumental variable approach. The instrument is the potential earning in the migrants’ host countries, which is proxied by real GDP per capita weighted by the share of each destination country for each sending country.<sup>9</sup> This procedure follows recent macroeconomic works on remittances which have used the per capita income in migrant host countries as the exclusion restriction (Acosta et al., 2008; Acosta et al., 2009; Aggarwal et al., 2010). There is now an accepted result showing that remittances are positively associated with the economic conditions abroad in the host countries (Freund and Spatafora, 2008; Aggarwal et al., 2010). Meanwhile, there is no reason to suspect for a direct link between the economic conditions abroad and the prevalence of working poor when trade openness and FDI are already controlled for.

Table 2 presents the results of the first-stage equations of remittances. In column 1, the real GDP per capita in host countries is used as the instrument. Its coefficient (6.34) turns out to be highly significant and positive (the *F*-test of the instrumentation equation for remittances is higher compared to the Stock et al., 2002 rule of thumb of 10), which means that the sum of GDP per capita weighted by the shares of destination countries in each origin country is a good proxy for remittances. In columns 2 and 4, the results of the second stage equation suggest that the effect of remittances on the prevalence of working poor is negative and highly

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<sup>9</sup> The bilateral migration matrix comes from the World Bank web site:  
<http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTDECPROSPECTS/0,,contentMDK:21154867~pagePK:64165401~piPK:64165026~theSitePK:476883,00.html>



significant. The coefficients stand at  $-1.2$  and  $-1.5$ , respectively. These values are higher (in absolute term) than previous OLS coefficients (Table 1) given the positive OLS bias.

**Table 2 about here.**

Using estimates in Table 2, we can compute the change in the prevalence of working poor induced by a one standard deviation increase in the remittance-to-GDP ratio (set equal to 4.6%). The decrease in poor workers yields 6 percentage points (column 2), for an average prevalence of working poor standing at 48%. This impact is quite substantial.

Our results provide strong preliminary evidence that the level of remittances leads to a substantial decrease in poverty (see Jadotte, 2009; Justino and Shemyakina, 2010). We turn now to the influence of income volatility, be it wage or remittances unpredictability.

**Section IV. Testing for heterogeneity in the working poor-remittance nexus.**

As shown in the previous section, remittances reduce the prevalence of working poor. The model is based upon the evidence that poor workers cannot adjust their labor supply, because they are close to the subsistence level. When labor market conditions deteriorate, they cannot substitute more leisure to labor. Having no access to credit – evidence about the lack of formal credit in developing countries is widely acknowledged – they cannot borrow the funds which would enable them to survive. Remittances act as insurance and allow workers to adjust their labor supply. Remittances are often seen as source of stable and regular income. What also happens if remittances are unpredictable? Indeed, household's decision-making (labor supply or investment motive) may be impacted by the unpredictability of income including remittances.

We make three conjectures. We assume first that remittances should be more efficient in fighting against selling low wages whenever income volatility is higher; second remittances

should be more efficient if they are provided in a predictable way; lastly, remittances as a mechanism to cope with external shocks should be less efficient when formal credit is available.

#### 4.1 Remittances and income volatility

If remittances act as an insurance for accommodating shocks, they should be more efficient when income volatility is higher. Put differently, remittances can reduce the sensitivity of low wages with respect to the income volatility. This assumption is tested with the following model:

$$w_{i,t} = \theta_2 V_{i,t} + \theta_3 V_{i,t} * R_{i,t} + \theta_4 R_{i,t} + X'_{i,t} \beta + \alpha_i + \eta_t + \varepsilon_{i,t} \quad (2)$$

where  $V$  stands for income-volatility in each country  $i$  at year  $t$  and is measured by the rolling standard deviation of the real GDP per capita growth rate over the last five years.

If the marginal impact of income volatility on the prevalence of working poor decreases with the level of remittances one would get,  $\theta_2 > 0$  and  $\theta_3 < 0$ . Moreover, above a given threshold denoted  $R^*$ , remittances are fully stabilizing:

$$\frac{\partial w_{i,t}}{\partial V_{i,t}} = \theta_2 + \theta_3 R_{i,t} = 0 \Rightarrow R^* = -\frac{\theta_2}{\theta_3}.$$

Table 3 presents the results derived from the instrumental variable strategy.<sup>10</sup> The diagnostic tests in the first-stage regressions do not reject the validity of the IV approach. As expected, the interactive term is negative and significant whereas the additive term of GDP per capita growth volatility is positive but weakly significant. The threshold level for the remittance

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<sup>10</sup> We use the same instrument as in Table 2 and the interactive term of remittances crossed with the macroeconomic volatility is instrumented by the interactive term of the excluded instrument for remittances crossed with the GDP per capita growth volatility.

ratio stands at 7% which implies that for 21% countries in the sample, macroeconomic volatility does not increase any more the prevalence of working poor. Remittance inflows are large enough to fully absorb the shocks.

**Table 3 about here.**

## 4.2 Volatility of remittances

The impact of both the level of remittances and the unpredictability surrounding those flows has already been studied at the micro level by Amuedo-Dorantes and Pozo (2010b) and Cox-Edwards and Rodriguez-Oreggia (2009). The authors investigate how different remittances patterns influence the labor supply of recipient household. Our study aims at testing the effect of the unpredictability of remittance inflows on the share of working poor and therefore seeks to generalize the previous microeconomic findings established for some Latin American countries. In this paper, the proxy of the remittances unpredictability is their volatility.<sup>11</sup>

The following model is estimated:

$$w_{i,t} = \theta_5 RV_{i,t} + \theta_6 R_{i,t} + X'_{i,t} \beta + \alpha_i + \eta_t + \varepsilon_{i,t} \quad (3)$$

where  $RV$  stands for the volatility of remittances in each country  $i$  at year  $t$ .<sup>12</sup> While  $\theta_6$  is expected to be negative, the sign of  $\theta_5$  is *a priori* unknown. From one hand, according to the permanent income hypothesis, unpredictable remittances should be invested more than predictable remittances, the latter being mostly used for consumption. Through the induced additional demand for labor, the impact on workers paid at below 2\$ US should be to reduce

<sup>11</sup> This choice does not mean that all the volatility of remittances is unpredictable. We assume only that the degree of unpredictability tends to increase when remittances become less stable. A more accurate measure of the unpredictability involves constructing a model of expectations (or time series models designed for high frequency data such as GARCH models) that goes beyond the objectives of the paper

<sup>12</sup> The volatility of remittances is computed as the five-year rolling window standard error of the residual component of the log of remittances explained by its one-year lagged value and a quadratic time trend. The remittance model is estimated for each country separately.

their number, and  $\theta_5$  should be negative. From the other hand, if remittances are not a way to smooth consumption of workers when they are unpredictable,  $\theta_5$  could be positive (households do not reduce their labor supply). The sign of this coefficient is therefore a matter of empirics.

Results in table 4 (first column) are obtained by running our instrumental variable strategy. The coefficient associated with the volatility of remittances is positive at the low level of significance of 10%. They suggest that the second effect through the labor supply is more important than the effect through private investment.

In a slightly modified version of equation (3), we consider that the volatility of remittances enters the equation in a multiplicative way:

$$w_{i,t} = \theta_7 R_{i,t} + \theta_8 R_{i,t} * RV_{i,t} + X'_{i,t} \beta + \alpha_i + \eta_t + \varepsilon_{i,t} \quad (4)$$

We test now the hypothesis that  $\theta_7 < 0$  and  $\theta_8 > 0$ . In that setting,  $\theta_7$  measures the effect of the level of remittances when the volatility of remittances is set at 0 whereas  $\theta_7 + \theta_8 RV_{i,t}$  identifies the marginal effect of remittances for a given level of remittance volatility.<sup>13</sup>

Column 2 in table 4 presents the results obtained through our instrumental variable strategy.<sup>14</sup>

We find that  $\theta_7 < 0$  and  $\theta_8 > 0$ .

Combining the results of both columns indicate that the volatility of remittances contributes not only to increase the prevalence of working poor, but do increase also the marginal impact of the level of remittance inflows on the prevalence of poor workers. In other words,

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<sup>13</sup> In the model (4), the remittance volatility is not introduced additively among the set of control variables because its coefficient would identify the effect of remittance volatility without remittances. What seems difficult to assess.

<sup>14</sup> Remittances volatility is considered as strictly exogenous.

remittance inflows alleviate the prevalence of poverty but to a lesser extent under a higher unpredictability surrounding those inflows.

**Table 4 about here.**

### 4.3 Remittances versus Finance

We now investigate whether the effectiveness of remittances in reducing the prevalence of poor workers increases with the shallowness nature of the domestic financial system. We adopt a threshold model, which determines endogenously the private credit-to-GDP ratio above which the relationship between poverty and remittances inflows vanishes.

The test for non-linearity is implemented with rolling estimations for different values taken by the ratio of private credit. A dummy variable  $d_{FD}$  interacted with the remittance variable is specified.  $d_{FD}$  is equal to 1 if the country has a value of the private credit ratio greater than  $FD^*$  and 0 otherwise.<sup>15</sup> The underlying methodology in the case of endogenous regressors has been implemented by Masten et al. (2008), Chami and Hakura al. (2009) and Combes and Ebeke (2010).

We therefore estimate the following equation:

$$w_{i,t} = \theta_9 R_{i,t} + \theta_{10} R_{i,t} * d_{FD} + \theta_{11} FD_{i,t} + X'_{i,t} \beta + \alpha_i + \eta_t + \varepsilon_{i,t} \quad (5)$$

$$\text{with } d_{FD} = \mathbf{1}[FD_{i,t} \geq FD^*]$$

where  $FD$  is the private credit-to-GDP ratio in each country  $i$  at year  $t$ . The hypothesis tested is that  $\theta_9 < 0$  and  $\theta_{10} > 0$ , in other terms the absolute value of the marginal impact of remittances on the share of poor workers decreases with the level of financial development.

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<sup>15</sup> We also performed simple estimations by including an interactive term of remittances crossed with the private credit ratio. Unfortunately, the coefficient associated with the interactive term was never statistically significant different from zero.

The top 5% and bottom 5% of the observations of the private credit ratio are dropped to ensure a feasible identification of the threshold. Private credit-to-GDP thresholds by increments of 0.5 percent are explored. Each equation corresponding to a different threshold is estimated by the instrumental variable method. The optimal threshold is the one which maximizes the F-tests of the remittance and remittances\* $d_{FD}$  instrumentation equations for all the models in which  $\theta_9$  and  $\theta_{10}$  are individually significant.<sup>16</sup> Testing nonlinear effect refers simply to the test of the null hypothesis that the coefficient on the interactive variable  $\theta_{10}$  is equal to zero.

The optimal cutoff which maximizes the  $F$ -tests statistics is set at a private credit over GDP ratio equal to 20%. This is very close to the thresholds values in Giuliano and Ruiz-Arranz (2009) in their study using the level of economic growth as the dependent variable. More than 60% of the countries are concerned here by this threshold, and the median value of the private credit-to-GDP ratio in the sample stands at 19%.

Table 5 displays the results, which are based upon the two regimes. The first regime includes countries in which the level of financial development is under 20%. For countries belonging to this regime the marginal impact of remittances is the highest (in absolute value). The second regime consists in more financially developed countries (the ratio of private credit over GDP is over 20%). In the latter the impact of remittances, although still negative,<sup>17</sup> is significantly lower in absolute value. This finding supports and extends the thesis, according to which there is a substitution effect between remittances and financial development in developing countries (see Giuliano and Ruiz-Arranz, 2009).

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<sup>16</sup> According to the criterion of the significance of the second stage coefficients ( $\theta_9$  and  $\theta_{10}$ ), only two thresholds emerged (private credit ratio of 20% and 48%). The threshold of 20% of GDP beats the second one for all the values of the  $F$ -test couple.

<sup>17</sup> Indeed, the sum of the two coefficients associated with the remittance variable remains negative ( $- 3.04 + 1.44 = - 1.6$ ) and statistically different from 0 (the corresponding  $P$ -value of the restriction stands at 0.07).

**Table 5 about here.**

## **Section V. Conclusion**

Our findings are based upon a large data set which covers a wide range of developing countries over an extended period of time, namely 85 countries over 1990-2007. We generalize the existing literature which is mainly based on micro studies, and we demonstrate that remittances are key for reducing the number of working poor. For an average prevalence of working poor set equal to 48%, a one standard deviation increase in the remittance-to-GDP ratio decreases the number of poor workers by a substantial 6 percentage points.

The efficiency of remittances depends upon the level of income volatility characterizing the economy. For a remittance ratio equal to 7% of GDP any increase in the macro-volatility is fully compensated, which means that income volatility does not impact any more the vulnerability of the poorest in the labor market. The degree of remittance predictability also matters. Remittance inflows alleviate the prevalence of poor workers but to a lesser extent under a higher unpredictability surrounding those inflows. Finally, we found that remittances and the domestic financial system are substitutes. For less financially developed countries the marginal impact of remittances in reducing the prevalence of working poor is the highest in absolute value. In contrast, in more financially developed countries, where the ratio of private credit over GDP is above 20% of GDP, this marginal impact is still negative, but significantly lower in absolute value.

Remittances appear as a strategy for fighting against poverty (see for instance the G8 summit declaration of 2009 at Aquila). Their pro poor effects through the reduction of low wages could be enhanced by acting on two fronts: the level of remittances and their productive uses. In the first case, it would be useful to reduce the transaction costs associated with remitting

(especially in less financially developed countries where the marginal impact of remittances on low wages was found in this paper to be stronger and where the transfer costs are higher). In the second case, it is crucial to promote the reinvestment of remittances. Indeed, the reinvestment of remittances helps prevent from a sub-optimal equilibrium characterized by higher wages and weaker labor participation. The reinvestment of remittances could lead to a better equilibrium with higher wage, more labor and capital, triggered by the diffusion effects of remittances in the economy.



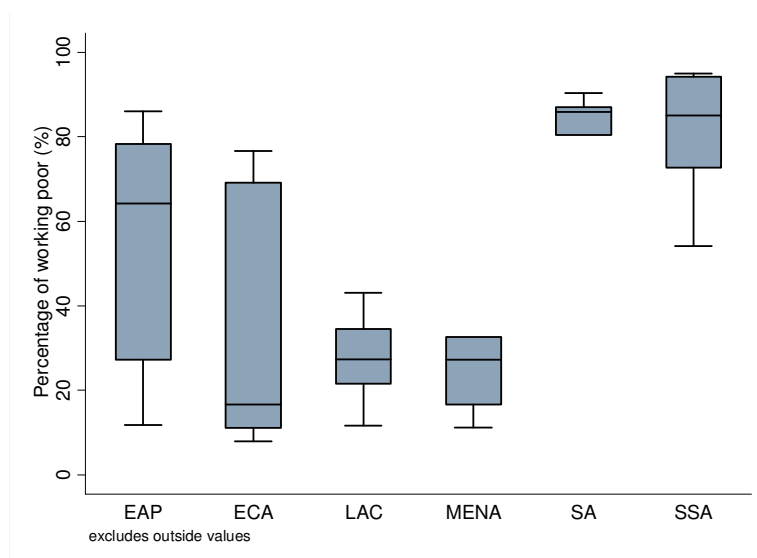
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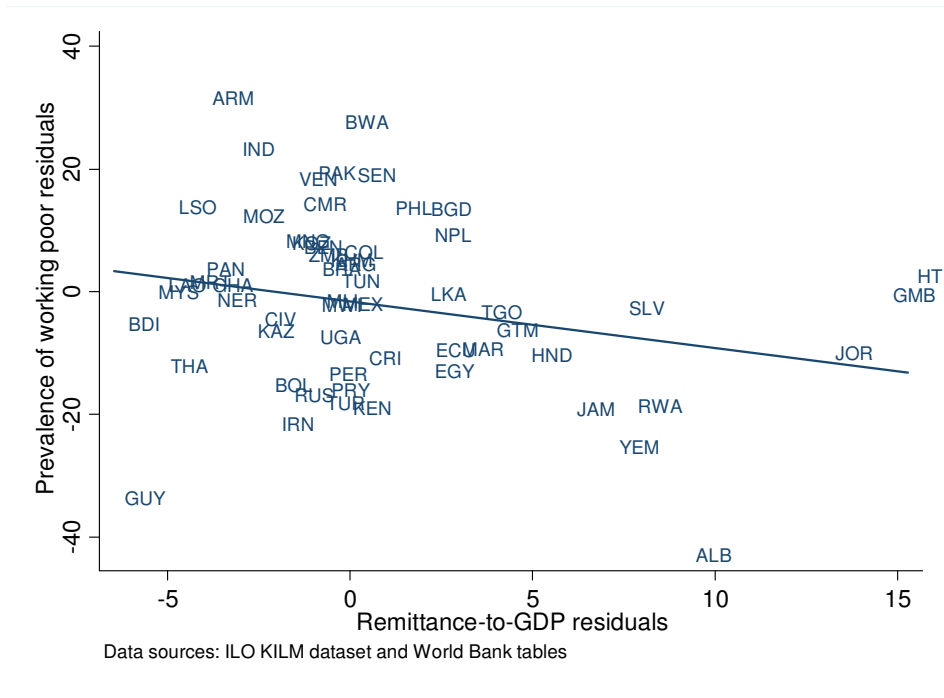
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**Figure 1:** Distribution of the prevalence of working poor in the developing regions (1990 – 2007)

*Note:* In box plots, the lower and upper hinges of each box show the 25th and 75th percentiles of the samples, the line in the box indicates the respective medians, and the end-points of whiskers mark next adjacent values. EAP: East Asia and Pacific, ECA: Europe and Central Asia, LAC: Latin America and Caribbean, MENA: Middle East and North Africa, SA: South Asia, SSA: Sub-Saharan Africa.

Source: ILO KILM 6<sup>th</sup> edition dataset.

**Figure 2:** Correlation between the prevalence of working poor and remittance inflows (1990-2007).



*Note:* Data are averaged over the period 1990-2007. Working poor rate and remittance-to-GDP ratio are residuals derived from pooled regressions using annual data of these variables regressed on the same set of control variables (as in Tables 1 – 5). This gives adjusted measures of the prevalence of working poor rate and remittance-to-GDP ratio that are purged from any colinearity with the determinants of the prevalence of working poor.

**Table 1: Remittances and Percentage of Working Poor, OLS-FE results**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
<b>Remittance-to-GDP ratio</b>	<b>-0.885***</b>	<b>-0.816***</b>	<b>-0.731***</b>	<b>-0.720***</b>	<b>-0.662***</b>	<b>-0.607***</b>	<b>-0.587***</b>	<b>-0.613***</b>	<b>-0.616***</b>	<b>-0.507***</b>	<b>-0.519***</b>
	<b>(-4.711)</b>	<b>(-3.624)</b>	<b>(-3.708)</b>	<b>(-3.713)</b>	<b>(-3.702)</b>	<b>(-4.176)</b>	<b>(-4.193)</b>	<b>(-4.451)</b>	<b>(-4.407)</b>	<b>(-3.153)</b>	<b>(-3.444)</b>
Real GDP per capita growth volatility	0.0275		0.0332	0.0337	0.0347	0.100	0.0940	0.143**	0.144**	0.147**	0.143**
	(0.754)		(0.997)	(0.999)	(0.861)	(1.425)	(1.274)	(2.008)	(2.002)	(2.314)	(2.104)
Initial real GDP per capita		-16.23*	-17.54**	-17.65**	-5.382		-9.497*	-14.12***	-14.13***		-11.59**
		(-1.970)	(-2.117)	(-2.125)	(-0.812)		(-1.823)	(-2.918)	(-2.891)		(-2.203)
<i>Net</i> Emigration rate				-0.166	-0.334	-0.171	-0.264	-0.448	-0.449	-0.345	-0.454
				(-0.493)	(-1.404)	(-0.651)	(-1.036)	(-1.291)	(-1.320)	(-1.053)	(-1.447)
Private credit-to-GDP ratio					-0.0425	-0.0726	-0.0340	-0.0696	-0.0707	-0.0841	-0.0500
					(-0.537)	(-1.026)	(-0.435)	(-1.067)	(-1.081)	(-1.218)	(-0.721)
Trade openness					-0.0771*	-0.0532	-0.0431	-0.0482*	-0.0465	-0.0617***	-0.0498**
					(-1.781)	(-1.435)	(-1.230)	(-1.743)	(-1.670)	(-2.884)	(-2.190)
Government consumption-to-GDP ratio					4.970	4.657	3.856	0.499	0.309	0.776	-0.0490
					(1.029)	(0.670)	(0.548)	(0.0774)	(0.0474)	(0.125)	(-0.00780)
Foreign direct investment-to-GDP ratio					-0.0979	-0.0503	-0.0700	-0.0690	-0.0664	-0.0464	-0.0681
					(-0.513)	(-0.264)	(-0.367)	(-0.500)	(-0.469)	(-0.330)	(-0.493)
Education level						-0.343**	-0.251	-0.197	-0.170	-0.102	-0.0411
						(-2.074)	(-1.488)	(-1.457)	(-1.166)	(-0.582)	(-0.250)
Income inequality								0.798***	0.796***	0.764***	0.799***
								(4.602)	(4.583)	(4.156)	(4.541)
Inflation rate									0.909	0.310	0.473
									(0.954)	(0.356)	(0.537)
Rural population rate										0.559**	0.416*
										(2.485)	(1.768)
Intercept	49.02***	182.1***	192.7***	193.8***	84.69	44.20**	122.1**	133.6***	133.7***	-9.848	91.17
	(69.77)	(2.695)	(2.840)	(2.845)	(1.437)	(2.071)	(2.552)	(2.736)	(2.707)	(-0.444)	(1.598)
Observations	305	314	305	305	270	231	231	229	227	227	227
R-squared	0.073	0.140	0.149	0.150	0.123	0.154	0.167	0.310	0.311	0.305	0.323
Number of countries	83	85	83	83	73	61	61	61	59	59	59

*Notes:* Robust *T*-statistics in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 2: Remittances and Working Poor rate, IV-FE results**

	First-stage	IV-FE	First-stage	IV-FE
	(1)	(2)	(3)	(4)
<b>Remittance-to-GDP ratio</b>		<b>-1.499**</b> <b>(-2.089)</b>		<b>-1.258**</b> <b>(-2.159)</b>
Real GDP per capita growth volatility	0.00566 (0.272)	0.157** (2.420)	0.00441 (0.221)	0.151*** (2.836)
Initial real GDP per capita			-2.841 (-1.272)	-12.27** (-2.105)
<i>Net</i> Emigration rate	0.101 (0.626)	-0.239 (-0.515)	0.0739 (0.567)	-0.381 (-1.091)
Private credit-to-GDP ratio	-0.0273 (-1.231)	-0.0969 (-1.397)	-0.0197 (-0.826)	-0.0575 (-0.909)
Trade openness	4.80e-05 (0.00337)	-0.0385 (-0.991)	0.00159 (0.108)	-0.0318 (-0.807)
Government consumption-to-GDP ratio	3.868** (2.084)	3.706 (0.669)	3.708** (2.167)	2.081 (0.433)
Foreign direct investment-to-GDP ratio	0.0101 (0.200)	-0.00773 (-0.0492)	0.00303 (0.0505)	-0.0406 (-0.255)
Education level	-0.0789 (-1.188)	-0.108 (-0.540)	-0.0680 (-0.948)	-0.0423 (-0.227)
Inflation rate	0.615* (1.879)	0.942 (0.832)	0.652 (0.960)	0.953 (0.519)
Income inequality	0.0149 (0.344)	0.774*** (5.191)	0.0235 (0.438)	0.808*** (5.683)
Rural population rate	-0.138 (-1.177)	0.173 (0.447)	-0.158 (-1.464)	0.120 (0.352)
<i>Exclusion restriction</i>				
<i>log</i> Real GDP per capita in <i>host</i> countries		6.340*** (4.022)		6.695*** (4.542)
Observations	216	216	216	216
R-squared	0.263	0.196	0.271	0.262
<i>F</i> -test of remittance instrumentation equation	16.18		20.63	
Number of countries	48	48	48	48

Notes: Robust *T* statistics in parentheses.

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1



**Table 3: Remittances, income shocks and Working poor rate**

	IV-FE
<b>GDP per capita growth volatility</b>	<b>0.688***</b> <b>(4.243)</b>
<b>Remittance * GDP per capita growth volatility</b>	<b>-0.0974***</b> <b>(-2.645)</b>
Remittance-to-GDP ratio	-0.398 (-0.537)
Initial GDP per capita	-6.285 (-1.155)
<i>Net</i> Emigration rate	-0.501* (-1.657)
Private credit-to-GDP ratio	-0.0392 (-0.500)
Trade openness	-0.0527* (-1.648)
Government consumption-to-GDP ratio	0.956 (0.138)
Foreign direct investment-to-GDP ratio	0.0435 (0.226)
Education level	-0.0177 (-0.0942)
Inflation rate	1.962 (1.252)
Income inequality	0.756*** (4.537)
Rural population rate	0.419 (1.048)
Observations	216
R-squared	0.167
<i>F</i> -stat of Remittance instrumentation: <i>P</i> -value	0.002
<i>F</i> -stat of Remittance*Growth volatility instrumentation: <i>P</i> -value	0.030
Joint significance of GDP volatility coefficients: <i>P</i> -value	0.000
Remittance threshold for full stabilization	7%
Number of countries above the threshold	10
Percentage of countries above the threshold (%)	21%
Number of countries	48

*Notes:* Robust *T*-statistics in parentheses

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

**Table 4: Remittances, remittance unpredictability-and Working poor rate**

	IV-FE (1)	IV-FE (2)
<b>Remittance-to-GDP ratio</b>	<b>-2.128**</b> (-2.171)	<b>-2.211**</b> (-2.138)
<b>Remittance unpredictability</b>	<b>6.636*</b> (1.762)	
<b>Remittance * Remittance unpredictability</b>		<b>2.195*</b> (1.680)
GDP per capita growth volatility	0.0940 (1.280)	0.0830 (0.884)
Initial real GDP per capita	-18.05** (-2.037)	-15.06 (-1.540)
<i>Net</i> Emigration rate	0.614 (0.888)	0.823 (1.164)
Private credit-to-GDP ratio	-0.130 (-1.295)	-0.0827 (-0.951)
Trade openness	0.00290 (0.0416)	-0.00742 (-0.116)
Government consumption-to-GDP ratio	18.92* (1.847)	16.13** (2.048)
Foreign direct investment-to-GDP ratio	-0.192 (-0.852)	-0.142 (-0.628)
Education level	-0.233 (-0.967)	-0.178 (-0.754)
Inflation rate	-0.00610 (-0.00552)	0.649 (0.321)
Income inequality	0.844*** (3.862)	0.790*** (3.818)
Rural population rate	-0.686 (-1.035)	-0.362 (-0.606)
Observations	152	152
R-squared	0.119	0.110
<i>F</i> -stat remittance instrumentation: <i>P</i> -value	0.034	0.009
<i>F</i> -stat Remittance* Remittance unpredictability instrumentation: <i>P</i> -value		0.000
Joint significance of remittance coefficients: <i>P</i> -value		0.081
Number of countries	33	33

*Notes:* Robust *T*-statistics in parentheses

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

**Table 5: Remittances, financial development and Working Poor rate, IV-FE results**

<b>Remittance-to-GDP ratio</b>	<b>-3.035**</b> <b>(-2.514)</b>
<b>Remittances * 1[Credit <math>\geq</math> 20%]</b>	<b>1.439**</b> <b>(2.019)</b>
Remittance unpredictability	6.794* (1.910)
Private credit-to-GDP ratio	-0.169* (-1.798)
Initial real GDP per capita	-19.77** (-2.226)
Real GDP per capita growth volatility	0.162** (2.165)
Income inequality	0.839*** (3.619)
<i>Net</i> Emigration rate	0.631 (1.117)
Government consumption-to-GDP ratio	15.20** (2.089)
Foreign direct investment-to-GDP ratio	-0.161 (-0.816)
Inflation rate	-0.0131 (-0.0127)
Education level	-0.132 (-0.661)
Trade openness	-0.0339 (-0.535)
Rural population rate	-0.432 (-0.766)
Observations	152
R-squared	0.248
<i>F</i> -stat Remittance instrumentation: <i>P</i> -value	0.046
<i>F</i> -stat Remittances * 1[Credit $\geq$ 20%]: <i>P</i> -value	0.000
Joint significance of remittance coefficients: <i>P</i> -value	0.038
Number of countries above the threshold	21
Percentage of countries above the threshold (%)	64%
Number of countries	33

*Notes:* Robust *T*-statistics in parentheses.

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

## APPENDIX

### Measuring Working poor

#### 1. Working poor definition

Working poor are defined as employed persons living in households in which per-capita income/expenditure is below the poverty line (Majid, 2001; Kapsos, 2005). The poverty is defined at the household level while employment status is defined at the individual level. In order to maximize comparability across countries, international poverty lines are used, whereby prices in local currencies are converted using purchasing power parity exchange rates and adjusting for inflation. Employment status is determined at the individual level.

#### 2. How to compute working poverty estimates

If we had direct measures such as the poverty rate of working age population, labor force participation rate of poor, unemployment rate of poor, the estimate of the number of working poor would be:

$$w_p = pop_{poor} * LFPR_{poor} * (1 - U_{poor}) \quad (1)$$

Where  $w_p$ ,  $pop_{poor}$ ,  $LFPR_{poor}$  and  $U_{poor}$  are respectively the number of working poor, the working age population of poor, the labor force participation of poor and the unemployment rate of poor. However, due to the fact that the joint distribution with population share, labor force and unemployment rate of poor are not known, the following three assumptions are made:

- The poverty rate of working age population is equal to that of the population as a whole
- Labor force participation rate of poor is equal to that of population as a whole
- Unemployment rate of poor is negligible

This latter assumption is fully discussed in Majid (2001).

According to the above assumption, the formula used to compute working poverty is:

$$w_p = povertyrate * employed$$

#### 3- Selected resources

Majid, N. (2001), The size of the working poor population in Developing Countries, Employment Paper, 2001/16, Geneva, ILO

Kapsos, S. (2004), Estimating Growth Requirements for Reducing Working Poverty: Can the World Halve Working Poverty by 2015, Employment Strategy Papers, 2004/14

ILO (2009) Key Indicators of the Labour Market (KILM), 6<sup>th</sup> Edition, International Labour Organization, [www.ilo.org/KILM](http://www.ilo.org/KILM)

**Table A1: Descriptive statistics**

Variable	Obs	Mean	Std. Dev.	Min	Max
Percentage of working poor	385	48.06	31.02	0	95
Remittance-to-GDP ratio	364	3.22	4.60	0	22.84
Remittance unpredictability	237	0.28	0.32	0.01	1.55
<i>log</i> Real GDP per capita in host countries	433	9.65	0.95	6.45	10.71
<i>log</i> Real GDP per capita	432	8.21	0.83	5.89	9.69
Real GDP per capita growth volatility	417	6.01	13.09	0.07	115.11
<i>Net</i> emigration rate	440	1.03	3.15	-24.02	28.39
Private credit-to-GDP ratio	373	25.64	24.15	1.14	165.96
Trade openness	431	73.19	38.12	14.78	222.29
Government consumption-to-GDP	437	19.47	8.74	3.73	57.41
<i>Net</i> FDI inflows-to-GDP	434	3.08	3.61	-6.95	30.93
Education level (% of people having completed the secondary level)	359	16.86	12.07	0.62	62.93
Income inequality (Gini)	397	43.84	9.46	16.80	74.30
<i>log</i> (1 + inflation/100)	403	0.16	0.32	-0.05	3.01
Rural population (% total population)	440	50.43	21.66	7.36	93.34

**Table A2.** Countries in the sample (85)

Albania	China	Honduras	Mongolia	Suriname
Angola	Colombia	India	Morocco	Tajikistan
Argentina	Costa Rica	Iran	Mozambique	Thailand
Armenia	Cote d'Ivoire	Jordan	Namibia	Togo
Azerbaijan	Croatia	Kazakhstan	Nepal	Trinidad and Tobago
Bangladesh	Dominican Rep.	Kenya	Nicaragua	Tunisia
Belarus	Ecuador	Kyrgyz Rep.	Niger	Turkey
Benin	Egypt	Lao PDR	Nigeria	Uganda
Bolivia	El Salvador	Lesotho	Pakistan	Ukraine
Bosnia and Herz.	Ethiopia	Liberia	Panama	Venezuela
Botswana	Gambia	Macedonia	Paraguay	Yemen
Brazil	Georgia	Madagascar	Peru	Zambia
Burkina Faso	Ghana	Malawi	Philippines	
Burundi	Guatemala	Malaysia	Russian Fed.	
Cambodia	Guinea	Mali	Rwanda	
Cameroon	Guinea-Bissau	Mauritania	Senegal	
Cape Verde	Guyana	Mexico	Sierra Leone	
Chile	Haiti	Moldova	Sri Lanka	