



## Remittances, Education and Economic Growth A Panel Data Analysis

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### Abstract

*This paper aims at examining the effect of remittances on economic growth. To this effect, we used a modified version of Giulliano and Arranz's model (2009) to determine the relationship between economic growth, remittances and education. A panel-based data analysis of two groups of countries over the 1990-2006 period seems to point to the existence of a relationship between the studied variables. The first group of countries consists of the largest remittances-recipient countries in GDP percentage. The second group includes countries recipient of the largest remittances in amounts/value. The obtained results indicate that remittances have direct and indirect effects, only for the first group of countries. However, these effects disappear for the second group of countries.*

**Key words:** *remittances, economic growth, education, direct effect, indirect effect.*

**JEL Classification:** *F2, F24, J61F22, F43, O16*

### 1. Introduction

Remittances towards developing countries attract more and more attention of governments and researchers and this because of their increasing volume and impact on the recipient countries. According to Ratha and al. (2009), official remittances towards developing countries amounted to 338 billion dollars in 2008. Clearly, these transfers have doubled the 167 billion-dollar figure of 2005<sup>1</sup>. However the real value of remittances certainly will be more important if we take into account informal transfers. Ratha and al.(2009) add that, because of the subprime crisis, remittances fell to reach 317 billion dollars in 2009, i.e. a 6.1% decline compared to 2008.

The importance of remittances as a development financing source has always attracted the attention of governments and has been a subject of an abundant academic literature. Indeed, the relationship between remittances and economic growth is very controversial. Some researchers pledge that this relationship is positive. Others consider it weak and even negative. The meaning of this relationship differs according to several explanatory factors.

The first factor relates to the remittances-recipient households. Indeed, substantial literature affirms that the majority of these remittances are used for consumption, real estate acquisitions and not for productive activities. In these conditions, remittances' effect on economic growth

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<sup>1</sup> World Bank, 2005, « Implications économiques des envois des émigrés et de la migration, prise de position « envois des émigrés et développement », World Bank publication, 2005

will be negative (Lipton (1980), Reichert (1981), Grindle (1988), Massey and al. (1987), Ahlburg (1991) and Brown and Ahlburg (1999)). According to Sharma (2006) and Khatiwada, (2005), remittances do increase demand which in turn induces increase in importations to satisfy demand; thus, a high level of importation against a low level of exportation leads to a slow economic growth. However, Diop (2003) suggests that consumption does contribute in domestic economic development if the acquired goods are domestically produced by local companies. As for housing, Khachani (2004) believes that the best housing conditions allow producing better reproduction of labour, better food and better education for children. According to the author, this type of investment induces a dynamic outfit for domestic economies through knitting a nest of small companies (construction materials, carpenters, etc.). This pours into direct and indirect employment boost. Glytsos (2005) contests several authors on the idea that excessive use of remittances aimed at consumption and not at productive activities. The author proves that productive use of remittances may take several forms: extending investments in credits following the increase in banks' liquidity thanks to remittances deposits, investments in human capital by expending on education and health, acquisitions of investment goods abroad.

The second explanatory factor of variability of remittances effect on economic growth is the quality of the financial system and institutions of the home country. Indeed, Giuliano and Arranz (2009) and Fayissa and Nsiah (2010) underline that remittances have a positive effect on economic growth of countries where the financial system are less developed. They suggest that these funds offer an alternative to finance investment and helping overcome liquidity constraints. According to Fall (2003), in order to boost development, injecting funds in a sector or a country is not enough. Indeed, productive investments require an encouraging institutional and economic environment and efficient supervising structures in line with migrants' development perspectives. Luna Martinez (2005) and Catrinescu and al. (2009) confirm these assumptions and they suggest that in order to increase the positive impact of remittances on economic growth, the quality of institutions should be improved. These latter should be able to implement sound policies to encourage investments and savings.

The third explanatory factor relates to the wealth of receivers and the growth of the home country. Durand and al. (1996), studying 30 Mexican communities characterized by a long migration tradition, note that the probability of spending a remittances dollar on productive activities rises with the communities' properties (land and house). However, the United Nations (2006) suggests that for high-income and agricultural countries, remittances may be invested in profitable projects to boost development. Nevertheless, countries with stagnating economies (human capital shortage, lack of infrastructures, market deficiencies and inefficient institutions), remittances negatively affect economic growth.

In sum, what must be signalled at this level of the review is that the relationship between migration and development remains difficult to grasp. Indeed, a number of mutually influencing factors condition this cause-effect relationship between remittances and economic growth.

The majority of the conducted empirical studies have focused on the direct impact of remittances on economic growth. Recently, research has refocused attention on remittances' indirect impacts on economic growth. We can mention for instance Giuliano and Arranz (2009) (host countries' financial system) and Garcia-Fuentes and Kennedy (2009) (human capital).

Our study comes within this perspective. We propose to examine remittances' effects on economic growth through education. Thus, our paper is structured as follows. The second section reports on the econometric models used in our study. The third section presents our methodology. Interpretation of the obtained results is presented in the fourth section. The fifth section presents the conclusions.

## 2. Description of the Model

Giuliano and Arranz (2009) tried to show that the effect of remittances on economic growth depends on the level of the country's financial system's development. They proved that a well functioning financial system increases remittances amounts (thanks to the reduction in transfer costs and lowering of payment restrictions), yet these remittances have no effect on economic growth. However, in an underdeveloped financial system, remittances are considered as substitutes for credits market inefficiency or absence, through financing investments and lowering budget constraints. This has the consequence of a positive impact on economic growth. For analysis purposes, Giuliano and Arranz (2009) used a panel-based data analysis technique applied on 73 countries, observed over the 1975-2002 period and this using two econometric models presented below:

### 2.1. Model 1: Direct Effects of Remittances on Economic growth

First, Giuliano and Arranz (2009) illustrated the direct effects of remittances on economic growth using the following estimation;

$$GDP_{it} = \beta_0 + \beta_1 GDP_{it-1} + \beta_2 Rem_{it} + \beta_3 X_{it} + \mu_t + \eta_i + \varepsilon_{it}$$

(1)

Where:

- $GDP$  is the growth rate of output, measured as the growth of the real per capita GDP in constant dollars
- $GDP_{it-1}$  denotes the (logarithm of) initial level of GDP per capita
- $Rem$  is equal to remittances over GDP
- $X_{it}$  is the matrix of control variables, set of controls includes:
  - ✓ Inflation, measured as the annual percentage change in the consumption price index.
  - ✓ Openness to international trade, defined as the ratio of the sum of exports plus imports of goods to total output.
  - ✓ Human capital, measured as the average number of years of secondary schooling.
  - ✓ Government fiscal balance, defined as the ratio of central government fiscal balance to GDP.
  - ✓ Investment ratio, measured as the gross fixed capital formation to GDP
  - ✓ Population growth.
- $\mu_t$  is a time specific effect,
- $\eta_i$  is an unobserved country-specific fixed effect
- $\varepsilon_{it}$  is the error term

All control variables, except inflation and fiscal balance, are specified in natural logs.

### 2.2. Model 2: Indirect Effects of Remittances on Economic Growth

These authors believe that remittances affect economic growth through several channels, yet in the second regression they try to examine effect of the financial market's development level on economic growth. They introduced an interaction term between remittances and financial development in the recipient country. The estimated model is:

$$GDP_{it} = \beta_0 + \beta_1 GDP_{it-1} + \beta_2 Rem_{it} + \beta_3 FinDev_{it} + \beta_4 (Env_{it} \cdot FinDev_{it}) + \beta_5 X_{it} + \mu_t + \eta_i + \varepsilon_{it} \quad (2)$$

Where:

$FinDev_{it}$  is the financial development in the recipient country

$(Env_{it} \cdot FinDev_{it})$  is an interaction term between remittances and financial development in the recipient country

The models adopted for our study is a modified version of Giuliano and Arranz's models, by introducing some modifications on the exogenous variables.

The modifications on the first model consisted in eliminating two variables; the government fiscal balance and the investment ratio which are not significant. The first model is written as follows:

$$GDP_{it} = \beta_0 + \beta_1 GDP_{it-1} + \beta_2 Env_{it} + \beta_3 Infl_{it} + \beta_4 Pop_{it} + \beta_5 Educ_{it} + \beta_6 Ouvert_{it} + \beta_7 phc_{it} + \varepsilon_{it} \quad (3)$$

The variables of this econometric model are

- $GDP$  is the growth rate of output, measured as the growth of the real per capita GDP in constant dollars
- $GDP_{it-1}$  denotes the (logarithm of) initial level of GDP per capita
- $Rem$  : Remittances, is equal to remittances over GDP
- $Educ$ : Education, measured as the average number of years of secondary schooling.
- $Infl$  : Inflation, measured as the annual percentage change in the consumption price index.
- $Pop$  : Population growth.
- $Phc$  : physical capital;
- $Open$  : Openness to international trade, defined as the ratio of the sum of exports plus imports of goods to total output.
- $\varepsilon_{it}$  : is the error term

The modifications on the second model consisted in eliminating three variables; the government fiscal balance, the investment ratio and the financial development. Yet, we substituted the interaction term between remittances and financial development ( $Env_{it} \cdot FinDev_{it}$ ) by the interaction term between remittances and education ( $Rem * Educ$ ). The aim of this new variable is to detect the indirect effect of remittances on economic growth through education. The model is written:

$$GDP_{it} = \beta_0 + \beta_1 GDP_{it-1} + \beta_2 Env_{it} + \beta_3 Infl_{it} + \beta_4 Pop_{it} + \beta_5 Educ_{it} + \beta_6 Ouvert_{it} + \beta_7 phc_{it} + \beta_8 (Env_{it} * Educ_{it}) + \varepsilon_{it} \quad (4)$$

### 3. Methodology

The two models above are a dynamic panel data model, in the sense that they contain lagged dependent variables. Thus, Arellano and Bond (1991) suggest a generalized method of moments (GMM) estimator. We aim at estimating the above-mentioned two models (3) and (4), using a panel-based data analysis of two groups of countries, observed over the 1990-2006 period. All variables are taken from the World Bank.

- The first group consists of ten countries known as the largest-remittances-recipient countries in GDP percentage. These are: Lesotho, Haiti, Jordan, Jamaica, El Salvador, Honduras, Philippines, Dominican Republic, Albany and Nepal.
- The second group consists of eighteen countries known as the largest remittances-recipient countries in terms of amounts. These are: India, China, Mexico, Philippines, France, Spain, Germany, Nigeria, Belgium, Bangladesh, Egypt, United Kingdom, Pakistan, Morocco, Brazil, Portugal, Colombia and United States.

**TABLE 1: Descriptive Statistics for the first group of countries' series**

	ENV	POP	EDUC	PIB	OVERT	PHC	INFL
Mean	14.04199	1.739973	5.952941	1307.996	84.67478	24.71807	13.89103
Median	11.75270	1.883061	6.000000	1003.293	79.46227	23.18640	8.237753
Maximum	69.54563	11.18066	8.000000	3357.098	174.9600	65.45370	226.0054
Minimum	0.000000	-1.356492	4.000000	175.8682	17.09227	5.190573	-9.616154
Std. Dev.	11.19601	1.188757	1.108396	884.2184	33.95755	10.33578	21.14640
Skewness	1.967743	2.651043	0.092958	0.678293	0.392904	1.834948	6.548690
Kurtosis	8.896406	25.80394	2.434225	2.503746	2.353083	7.411729	61.88168
Jarque-Bera	355.9775	3882.601	2.512220	14.78004	7.338308	233.2647	25773.37
Probability	0.000000	0.000000	0.284760	0.000617	0.025498	0.000000	0.000000

The series are not symmetrical since skewness coefficients are not null, except education, and Kurtosis coefficients are all different from three. Consequently, it is tempting to conclude that the series are not normally distributed. However, Jarque-Bera statistic confirms the non-normality of the distribution for all series.

**TABLE 2: Descriptive Statistics for the second group of countries' series**

	PIB	REM	POP	EDUC?	PHC	OVERT	INFL
Mean	8961.708	2.493299	1.309300	6.418301	21.08474	54.61981	26.17155
Median	2800.683	1.704190	1.418090	6.000000	20.16309	50.15489	4.271330
Maximum	37791.43	14.58351	2.934913	9.000000	42.81371	172.7741	2075.887
Minimum	260.7057	0.020322	-0.413453	4.000000	12.55117	14.93270	-1.407892
Std. Dev.	10305.54	2.800971	0.792720	0.955497	4.846576	30.37711	173.0975
Skewness	0.938034	1.810837	-0.052704	0.234033	1.655643	1.685192	10.39375
Kurtosis	2.543504	6.615287	1.950460	5.344542	6.941163	6.384873	115.4954
Jarque-Bera	47.53226	333.8819	14.18623	72.87852	337.8417	290.9148	166863.5
Probability	0.000000	0.000000	0.000831	0.000000	0.000000	0.000000	0.000000

Similarly, the series are not symmetrical since skewness coefficients are not null and Kurtosis coefficients are all different from three. Consequently, it is tempting to conclude that the series are not normally distributed. However, Jaque-Bera statistic confirms the non-normality of the distribution for all series.

#### 4. Interpretation of the Results

In this section, we propose to test the modified versions of Giuliano and Arranz's econometric models on two groups of countries, observed over the 1990-2006 period.

##### 4.1. The Results for the First Sample

In this paper we set to estimate model (3) for the largest remittances-recipient countries in GDP percentage. The obtained results are reported in Table 4 below.

**TABLE 4: Model (3) Estimation Results for the largest remittances-recipient countries in GDP percentage**

<i>GDP</i>	Coef.	Std. Err.	Z	P>z	[95% Conf. Interval]
<i>GDP</i> L1.	0.9330758	0.0319769	29.18	0.000	.8704023 .9957494
phc	0.0027812	0.000787	3.53	0.000	.0012387 .0043238
infl	-0.000402	0.0001996	-2.01	0.044	-.0007932 -.0000108
open	0.0006255	0.0002971	2.11	0.035	.0000431 .0012078
educ	0.001023	0.0079094	0.13	0.897	-.0144792 .0165252
env	-0.0018105	0.0006736	-2.69	0.007	-.0031308 -.0004903
pop	-0.0354421	0.0051588	-6.87	0.000	-.0455531 -.0253311
cons	0.4408755	0.2174032	2.03	0.043	.0147731 .8669779

With reference to these results, it seems that economic growth is explained by six variables; education, inflation, openness to international trade (significant at a 5% level), delayed growth, remittances and population growth.

On the economic level, the obtained results point to a positive, but not significant, correlation between education and economic growth. Indeed, several authors like Nelson and Phelps (1966), Barro (1991), Benhabib and Spiegel (1994), Barro and Sala-i-Martin (1995), Sala-i-Martin (1997), Bils and Klenow (2000) and Pritchett (2001) assume that education positively contribute to economic growth. Our results illustrate as well a negative correlation between remittances and economic growth. These results do not corroborate the conclusions advanced by Giuliano and Arranz (2009). According to the literature, remittances may have a negative effect on economic growth. Chami and al. (2005), Azam and Gubert (2006), Ratha (2007), Thanh Le (2008) and Karagoz (2009) claim that remittances may negatively affect economic growth when recipients, as a consequence of income boost, tend to favour entertainment at the expense of investment. Sharma (2006) and Khatiwada, (2005) explain the negative effects of remittances on economic growth through the positive relationship between these funds and consumption. More specifically, according to these authors, remittances tend to increase consumption, which in turn induces an increase in importation to satisfy demand. Then, increase in importations against weak exportations leads to a slow-paced economic growth. To conclude, it is convenient to point

out that remittances have a direct negative effect on the ten largest recipient countries in GDP percentage.

In the following, we will estimate model (4), which uses the same variables previously defined in model (3), yet we introduce an interaction term between remittances and education ( $Rem * Educ$ ). The aim of this new variable is to detect the indirect effect of remittances on economic growth through education. The obtained results are reported in Table (5) below.

**TABLE 5: Model (4) Estimation Results for the First Sample**

GDP	Coef.	Std. Err.	Z	P>z	[95% Conf. Interval]
GDP L1.	1.020736	0.0181217	56.33	0.000	.9852176 1.056253
inter ( $Env * Educ$ )	0.002177	0.0008228	2.65	0.008	.0005643 .0037897
phc	0.0024989	0.0009	2.78	0.005	.000735 .0042628
infl	-0.0002025	0.000182	-1.11	0.266	-.0005593 .0001542
Open	0.0003546	0.0003535	1.00	0.316	-.0003382 .0010474
educ	-0.0272931	0.0136704	-2.00	0.046	-.0540866 -.0004997
rem	-0.0149024	0.0051489	-2.89	0.004	-.0249939 -.0048108
pop	-0.0363888	0.0055431	-6.56	0.000	-.047253 -.0255247
cons	0.0378337	0.1373029	0.28	0.783	-.231275 .3069424

The obtained results point out to six economic variables likely to explain economic growth. These are remittances, education, physical capital, population growth, delayed growth and the interaction term ( $Rem * Educ$ ) (significant coefficients at a 1% level)

As for the economic aspect, the obtained results point to a positive correlation between economic growth and the interaction term between remittances and education. In other words, remittances positively affect economic growth through their positive effect on education. In this regard, Hanson and Woodruff (2003), Lu and Treiman (2007), Wets (2004), Dustmann and Speciale (2006), Yang (2008), Calero and al. (2008), Dessy and Rambeloma (2009), Bredl (2010) and Cattaneo (2010) underline the positive effect of remittances on education. These funds do contribute to mitigate family budgets, provide resources to keep their children at school and away from child labour. Given that education is one of the determining factors of economic growth, as aptly reported by several authors like Topel, (1999), Card (1999), Jorgenson and Stiroh (2000), Krueger and Lindahl (2001), Sianesi and Van Reenen (2003) and Psacharopoulos and Patrinos (2004), remittances indirectly contribute to economic growth through education. This assumption is confirmed by Hanson and Woodruff (2003), Wets (2004), Cardona and Medina (2005) and Moran (2007).

It is now convenient to proceed to the estimation of model (4). As a reminder, we use a panel-based data analysis of the eighteen largest remittances-recipient countries in terms of amounts, observed over the 1990-2006 period. The results are reported in table 7 below.

**TABLE 7: Model (4) Estimation Results for the second sample: the largest remittances-recipient countries in amounts**

Croiss	Coef.	Std. Err.	Z	P>z	[95% Conf.	Interval]
GDP L1.	0.9819663	0.0059348	165.46	0.000	.9703344	.9935982
inter ( <i>Env * Educ</i> )	-0.001735	0.0022434	-0.77	0.439	-.0061319	.002662
Env	0.0085428	0.0134051	0.64	0.524	-.0177307	.0348162
Educ	0.0147538	0.01427	1.03	0.301	-.0132148	.0427225
open	0.0006326	0.0002435	2.60	0.009	.0001553	.0011098
infl	5.01e-06	0.0000119	0.42	0.674	-.0000183	.0000283
pop	-0.0109218	0.0088329	-1.24	0.216	-.028234	.0063904
phc	0.0024945	0.0007458	3.34	0.001	.0010328	.0039563
cons	0.0045183	0.1083849	0.04	0.967	-.2079123	.2169489

With reference to these results, it seems that economic growth is explained by three variables which are delayed growth, openness to international trade and physical capital. The coefficients of these variables are all significant at a 5% level. However, remittances and the interaction term between remittances and education, contrary to the previous estimations, are not significant. Economically speaking, the non-significance of the remittances and the interaction term illustrates that remittances do not either directly nor indirectly affect economic growth. These results do confirm theoretical predictions advanced by Wahba (1996) and the International Monetary Fund (IMF) (2005) that remittances have no effect on countries' economic growth.

As a preliminary conclusion, remittances have direct and indirect effects on the largest remittances-recipient countries in GDP percentage. However, this effect disappears for the largest remittances-recipient countries in amounts. In other words, remittances have no effect on economic growth unless they represent a significant proportion of the recipient country's GDP.

## 5. Conclusion

We have used a dynamic panel data model on a panoply of countries to capture in time and space the effects of remittances on economic growth. More specifically, we used a modified version of Giuliano and Arranz's models on two different samples to detect both direct and indirect effects of remittances on economic growth.

The first sample consists of the 10 largest remittances-recipient countries in GDP percentage. The obtained results point to a positive correlation, but not significant, between education and economic growth. Several authors like Nelson and Phelps (1966), Barro (1991), Benhabib and Spiegel (1994), Barro and Sala-i-Martin (1995), Sala-i-Martin (1997), Bils and Klenow (2000) and Pritchett (2001) believe that education positively contributes to economic growth. However, we noted that remittances negatively act on economic growth, which contradicts the conclusions advanced by Giuliano and Arranz (2009), yet it confirms results obtained by Chami and al. (2005), Azam and Gubert (2006), Ratha (2007), Thanh Le (2008) and Karagoz (2009) Sharma (2006) and Khatiwada, (2005).

The introduction of the interaction term between remittances and education (*Rem\*Educ*) in the model allowed us to deduce that remittances positively affect economic growth through their positive effect on education. This finding corroborates those advanced by authors like Hanson

and Woodruff (2003), Lu and Treiman (2007), Wets (2004), Dustmann and Speciale (2006), Yang (2008), Calero and al. (2008), Dessy and Rambeloma (2009), Bredl (2010) and Cattaneo (2010) who assume that remittances are a very important financial resource for households when they help finance education and accordingly help increase human capital accumulation, which is considered as an economic growth engine (Topel, (1999), Card (1999), Jorgenson and Stiroh (2000), Krueger and Lindahl (2001), Sianesi and Van Reenen (2003) and Psacharopoulos and Patrinos (2004)).

The second sample consists of the largest remittances-recipient countries in amounts. The obtained results point to the presence of three variables likely to explain economic growth; delayed growth and openness to international trade and physical capital. However, remittances and the interaction term between remittances and education, contrary to the previous estimations, are not significant. Accordingly, for the largest remittances-recipient countries in amounts we noted the absence of the concomitant direct and indirect effects of these funds on economic growth. This conclusion is in line with the theoretical predictions made by Wahba (1996) and the IMF (2005).

As a matter of concluding, we note that remittances have direct and indirect effects only on the largest remittances-recipient countries in GDP percentage, yet these effects disappear for the largest remittances-recipient countries in amounts.

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