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The Effect of Migrant Remittances on Economic Growth through Education: The Case of Tunisia

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ABSTRACT

This paper aims at studying the effect of migrant remittances on economic growth. To this end, we used a modified version of Kragoz [2009] to examine the relationship between economic growth, migrant remittances and education. The application of cointegration on the variables related to Tunisian economy, observed over the period 1976-2006, points to the presence of a long-term relationship between the studied variables. The obtained results also indicate that the direct effect of remittances on economic growth is negative while the indirect effect induced by the inclusion of education is positive.

Keywords: *remittances, economic growth, education, direct effect, indirect effect*

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

1. INTRODUCTION

Remittances to developing countries have always caught the attention of public and academic researchers because of their ever-increasing volume and their impact on recipient countries. According to Ratha, Mohapatra and Silwal [2009], migrant remittances to developing countries through formal channels represent 338 Billion dollars in 2008. After three years, remittances have doubled ($ 167 billion in 2005). If we consider informal remittances, the real value of remittances is certainly much higher. Based on monthly data from three quarters of 2009, Ratha and al [2009] point out that remittances following the subprime crisis decreased to 317 billion in 2009, a drop of 6.1% compared to 2008. In the case of Tunisia, the World Bank considers that remittances from Tunisian migrants followed an upward trend from a year to another to reach 1870 million U.S. dollars in 2008, or 4.7% of GDP. Because of the subprime crisis the World Bank estimates that the amount of these funds will decrease in 2009 and will be 1860 million U.S. dollars. Europe is the main source of these funds.

The important volume of remittances, which is a significant source to finance development, has always attracted the attention of government authorities and has been the academic subject of an abundant literature that examined its effect on economic growth. Indeed, the relationship between emigrants' remittances and economic growth is highly controversial. Some researchers, like Hyun [1984], Lucas and Stark [1988], and Rodrigo Jaytissa [1989], Adelman and Taylor [1990], Taylor [1994], Faini [2005] Acosta and al. [2007] Catrinescu and al. [2009], Gupta and al. [2009] and Ramirez [2010] confirm that this relationship is positive. Others argue about its negative effect like Chami and al. [2005], Azam and Gubert [2006] and Karagoz [2009], while the International Monetary Fund (IMF) [2005] and Wahba [1996] point to the absence of this effect.

To explain these findings, it is necessary to refer to the mode of use of these funds by their recipients. Indeed, a large literature argues that most emigrants' remittances are used for consumption, purchase of housing and land, and not for productive purposes. Under these conditions, the effect of remittances on economic growth would 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], emigrants' remittances increase demand which induces an increase in imports to meet demand. Thus, high imports in the face of low exports lead to slower economic growth. However, Diop [2003] suggests that consumption certainly contributes to the

development of the national economy if the goods purchased are locally produced by firms. However, if these funds are used to consume imported goods, such expenses contribute to degrading payments balance.

According to Khachani [2004] the best savings conditions allow for producing a better labour reproduction and similarly better food and education for children. Then, according to the author funds used in acquiring housing lead to reviving local economies through creating a network of small businesses (construction materials, carpentries, ..). This would favour creating direct and indirect employment. Glytsos [2005] shows that productive use of remittances may take several forms: extending credits investments, following increase in banks liquidity thanks to depositing those remittances, investing in human capital by spending on education and health, and acquiring investment goods abroad.

The second explanatory factor of the impact of remittances on economic growth relates to financial system quality and institutions of country of origin. Indeed, Giuliano and Arranz [2009] found that remittances had a considerable impact on countries with a wekk financial system. In the case of a strong financial system, the authors indicated that the impact is negative. In this case, the financial system plays a significant role in financing investments a,d, in a similar context, remittances will be used for consumption which offsets employment in recipient countries and therefore slows down growth. However, in case of a weak financial system, remittances substitute financial development, which improves capital allocation and then accelerates economic growth. According to Fall [2003], injecting funds in a sector or country is not enough to insure its development. Indeed, productive investments need a positive institutional and economic environment, performing monitoring structures that comply with emigrants' development aspirations. Luna Martinez [2005] and Catrinescu and al. [2009] confirm this finding and they suggest that to increase a positive impact of remittances on economic growth. Institutions quality should be improved as these latter should be able to implement sound policies to encourage investment and savings.

The third explanatory factor relates to recipients' wealth and growth of country of origin. Indeed, Durand, Kandel, Parrado andssey [1996] through a study conducted on 30 communities of Mexico, known for a long emigration history, found that the probability of a recipient to spend a remitted dollar for productive uses increases with their ownerships (land and house). However, the United Nations [2006] suggests that in countries with high incomes and high agricultural production, remittances may be exploited in profitable projects to promote development. However, in countries characterized by a stagnation of their economies (lack of human capital, poor infrastructure, market failures and weak institutions), remittances negatively affect economic growth.

In summary, what should be pointed out at this level is that the relationship between migration and development remains difficult to apprehend. Indeed, many factors, mutually influential, condition this cause-effect relationship between remittances and economic growth.

Most empirical studies have examined the direct effect of remittances on economic growth. Recent studies have focused on the indirect effects of remittances on economic growth. We can mention, for example, Giuliano and Arranz [2009] (through the financial system of the recipient country) and Garcia-Fuentes and Kennedy [2009] (through human capital). In this paper, we propose to study the effect of remittances on economic growth through education.

Then, this paper is organized as follows: the second section describes the econometric model used in our empirical study. The third section is devoted to the used methodology as well as to the interpretation of the results. The fourth section concludes the paper.

1. Description of the used model

In his paper published in 2009 in the *jouranal of yasar university*, Karagoz [2009] tried to apprehend the effect of remittances on economic growth in Turkey. Using data covering the eriod 1970-2005, the author found a negative impact of remittances on economic growth. In addition, the author also found that exports and investment have a positive effect on growth, while foreign direct investments have no effect. Karagoz model [2009] is as follows:

$$GDPPC_t = \beta_0 + \beta_1 GDPPC_{t-1} + \beta_2 RREM_t + \beta_3 REXPO_t + \beta_4 RINV_t + \beta_5 RFDI_t + \varepsilon_t \qquad (1)$$

where
$GDPPC_t$: GDP per capita ;
$GDPPC_{t-1}$: GDP per capita lagged by a period
$RREM_t$: remittances ratio to GDP;

$REXPO_t$: exports ratio to GDP ;
$RINV_t$: ratio of gross domestic investment (public and private sector) to GDP (gross fixed capital formation)
$RFDI_t$: ratio of FDI to GDP
ε_t : an error term.

The variables used by the author are expressed in natural logarithm.

The model adopted in this study is a modified version of Karagoz model [2009] which is as follows:

$$GDPPC_t = \beta_0 + \beta_1 RREM_t + \beta_2 REXPO_t + \beta_3 RINV_t + \beta_4 RFDI_t + \beta_5 EDUC_t + \beta_6 (RREM_t * EDUC_t) + \varepsilon_t \quad (2)$$

where
$(EDUC)$ denotes education as measured by the logarithm of the number of students enrolled in primary and secondary schools.

$(RREM * EDUC)$ is an interaction variable between remittances and education, this variable allows to measure the indirect effect of remittances on economic growth through education.

2. Methodology and Results

In this section, we propose to proceed in two steps. First, we present our sample and the study period. Then, we apply various econometric tests used to identify the impact of remittances on economic growth through education.

2.1. Description of the sample

We will apply the above model, equation (2), on the Tunisian data for the period, which runs from 1976 to 2006. All variables are obtained from the World Bank except education which is obtained from the Ministry of Education and Training of the Tunisian Republic.

TABLE 1 : descriptive statistics of the studied series

	GDPPC	RREM	EDUC	REXPO	RFDI	RINV
Mean	7.395150	1.400027	14.42353	3.687959	0.634534	3.265591
Median	7.332060	1.390128	14.47630	3.738095	0.746392	3.236505
Maximum	7.829236	1.627432	14.66679	3.996054	2.378942	3.527281
Minimum	7.083059	1.116100	13.95779	3.370199	-0.510130	3.022662
Std. Dev.	0.214997	0.151062	0.228971	0.159171	0.672082	0.131429
Skewness	0.512399	-0.072299	-0.707372	-0.559495	0.140231	0.222832
Kurtosis	2.123404	1.965490	2.181005	2.485163	2.899955	2.075187
Jarque-Bera	2.349067	1.409362	3.451660	1.959713	0.114530	1.361282
Probability	0.308963	0.494266	0.178025	0.375365	0.944344	0.506292
Observations	31	31	31	31	31	31

Skewness and Kurtosis indicate that all series are normally distributed. Indeed, Skewness is different from zero and Kurtosis is different from three.

2.2. Application of econometric tests

The aim is to determine the possible existence of a relationship of long-term equilibrium between remittances, education and economic growth. Thus, we consider first of all stationarity of the series, to ultimately proceed to applying the cointegration test in the sense of Johansen [1995].

2.2.1. Stationarity test

Before applying the ADF stationarity test, it is first necessary to determine the appropriate model to be used to assess stationarity of the studied series. To this end, it is necessary to adopt a sequential strategy which includes the following steps:

1. Use the model with constant and trend. If the coefficient of the trend is significantly different from zero, then the model with constant and trend is most appropriate to assess stationarity of the series, if not, we should proceed to step 2.
2. Use the model with constant only. If the constant is significantly different from zero, then the model with constant will be the most appropriate to assess stationarity of the series, if not, i.e. the constant is not significant, then we should move to step three.
3. Run the stationarity test based on the third model, that is to say, without constant or trend.

TABLE 2 : GDP stationarity test (GDPPC)

Test ADF sur GDPPC en niveau		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		5.489218	1.0000
Test critical values:	1% level	-2.644302	
	5% level	-1.952473	
	10% level	-1.610211	
Test ADF sur GDPPC en différence première			
		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.661285	0.0906
Test critical values:	1% level	-2.650145	
	5% level	-1.953381	
	10% level	-1.609798	

*MacKinnon (1996) one-sided p-values.

The results obtained with the ADF test on the GDP series, reveal the existence of a unit root in this series. Indeed, the GDP series is not stationary in level but stationary in first difference at the 10%, level, it is order 1integrated.

TABLE 3 : Remittances stationarity test (RREM)

Test ADF sur RREM en niveau		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.275268	0.1860
Test critical values:	1% level	-3.670170	
	5% level	-2.963972	
	10% level	-2.621007	
Test ADF sur RREM en différence première			
		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.643098	0.0009
Test critical values:	1% level	-3.679322	
	5% level	-2.967767	
	10% level	-2.622989	

Remittances series is not stationary in level but stationary in first difference. It is order 1integrated, that is to say, I (1). The same conclusion is true for gross domestic investment, foreign direct investment and exports (see Appendix 1 for the tables).

However, education series is not stationary in levels or in first differences; it is stationary in the second difference. Therefore, it is order 2 integrated. The cointegration test will be then conducted without regard to this variable. Moreover, applying the ADF test on interaction series reveals an order 1 integration, that is to say, this series is stationary in first difference.

2.2.2. The cointegration test

After completing the stationarity test, we will now apply the cointegration test in the sense of Johansen [1995] on the studied variables. The aim is to determine a possible relationship of a long-run equilibrium between GDP growth and remittances, education, gross domestic investment, foreign direct investment and export. The results are reported in the following table:

TABLE 4: Cointegration test

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.825075	148.6170	103.8473	0.0000
At most 1 *	0.694454	98.05846	76.97277	0.0005
At most 2 *	0.643325	63.67447	54.07904	0.0055
At most 3	0.479930	33.77752	35.19275	0.0705
At most 4	0.310718	14.81757	20.26184	0.2370
At most 5	0.129637	4.026511	9.164546	0.4082

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Analysis of trace statistic and the maximum eigenvalue reveals three cointegrating relationships at the 5% level (see Appendix 2 for the whole table). The standardized regression of the variables is as follows:

GDPPC = 12,19 - 4,18 RREM + 0,25 RFDI - 0,76 REXPO - 0,93 RINV

*+ 0,328 (RREM * EDUC)*

After examining stationarity and cointegration, we estimate the model described above, given by equation (2), on the Tunisian economy for the period covering 1976 and 2006. The results are presented in the following table:

Table 5: Estimation Results

	Coefficient	Std. Error	t-Statistic	Prob.
C	29.50978	6.822530	4.325342	0.0002
RREM	-23.70456	5.281894	-4.487891	0.0002
RINV	0.029020	0.161735	0.179426	0.8591
REXPO	0.230405	0.152733	1.508543	0.1445
RFDI	0.071963	0.028023	2.568027	0.0169
EDUC	-1.622365	0.487641	-3.326966	0.0028
(RREM EDUC)*	1.657155	0.366571	4.520688	0.0001

R-squared	0.916771	Mean dependent var	7.395150
Adjusted R-squared	0.895964	S.D. dependent var	0.214997
S.E. of regression	0.069346	Akaike info criterion	-2.303725
Sum squared resid	0.115414	Schwarz criterion	-1.979921
Log likelihood	42.70773	Hannan-Quinn criter.	-2.198173
F-statistic	44.06011	Durbin-Watson stat	1.002496
Prob(F-statistic)	0.000000		

The obtained results indicate that most coefficients are significantly different from zero at the 5% level. The explanatory power of the model is around 90% with a very good fit. Our variables of interest, namely remittances and education, contribute significantly but negatively to explaining economic growth. This finding corroborates those of Chami and al. [2005], Azam and Gubert [2006], Ratha [2007], Thanh Le [2008] and Karagoz [2009] who attribute the negativity of the impact of remittances on economic growth to increased leisure time at the expense of labor. For Sharma [2006] and Khatiwada [2005] the negative effect of remittances is due to an increase in consumption demand. Regarding the variable education, and contrary to theory assumptions which advocate a positive effect of education on economic growth, Sharma [2006] in his study on the NIPAL attributed the negative effect of this variable to the reduced time allocated to work, especially for children. Indeed, more education, fewer hands to work, reducing productivity resulting in a negative effect on economic growth. This explanation may be valid for Tunisia. However, we should recognize that this negative effect is only short term as long term knowledge acquired from education improves productivity and hence increases economic growth.

Regarding the interaction variable, it contributes significantly and positively to explaining growth of the Tunisian economy. This finding allows us to confirm our theoretical predictions about the positive indirect effect of remittances on economic growth through its positive effect on education. This positive effect of education is confirmed by Hanson and Woodruff [2003], Lu and Treiman [2007], Wets [2004], and Special Dustmann [2006], Yang [2008], Calero and al. [2008], and Dessy Rambeloma [2009] Bredl [2010] and Cattaneo [2010] who point out that remittances are a very important source of financing for households insofar as they are used to finance education and therefore increase investment in human capital, which is the engine of economic growth (Topel [1999], Card [1999], Jorgenson and Stiroh [2000], Krueger and Lindahl [2001] Sianesi and Van Reenen [2003] and Psacharopoulos and Patrinos [2004]).

3. Conclusion

We applied the technique of stationarity and cointegration to detect the possible presence of a long-term relationship between economic growth, remittances and education in the Tunisian context. The results point to, within the meaning of Johansen [1995], the presence of three cointegrating relationships between the studied variables. In addition, we found a direct and negative effect of migrants' remittances on economic growth, This has been shared by several authors like Khatiwada [2005], Chami and al. [2005], Sharma [2006], Azam and Gubert [2006], Ratha [2007], Thanh Le [2008] and Karagoz [2009]. The introduction of the interaction variable between remittances and education ($RREM * EDUC$) has allowed us to detect the presence of an indirect positive effect of remittances on growth through education. Indeed, many authors like Hanson and Woodruff [2003], Lu and Treiman [2007], Wets [2004], and Dustmann Special [2006], Yang [2008], Calero and al. [2008], and Dessy Rambeloma [2009] Bredl [2010] and Cattaneo [2010] consider that remittances help alleviate households' budgetary constraints to provide them resources to keep their children longer in school and to reduce child labor. In as much as education, a human capital proxy, is one of the determinants of economic growth, we pointed to the indirect effect of remittances on Tunisian economic growth through education.

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