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DEVELOPMENT ECONOMICS | RESEARCH ARTICLE

Remittances and economic growth: What lessons for the CEMAC zone?

Louis Bernard Tchekoumi¹ and Patrick Danel Nya^{1*}

Abstract: To the question of what lessons can be drawn from the relationship between migrant remittances and economic growth, this article provides an answer based on econometric evidence, using data from a sample of six countries belonging to the CEMAC zone, over the period 1990–2018. Using the PSTR² and GMM³ models, we obtain two main results. First, there is a non-linear relationship between migrant remittances and economic growth that translates into the existence of two regimes, thus, confirming the existence of a threshold effect. Second, under the first regime, remittances have a positive and significant impact on economic growth, while under the second regime this impact is negative. The results suggest that the non-linear relationship between remittances and economic growth depends mainly on trade openness, private investment and political stability.

Subjects: Development Studies; Economics and Development; Economics

Keywords: Remittances; economic growth; PSTR model

JEL Classification: C33; F24; F43

1. Introduction

¹In recent decades, there has been an increase in international migration, which has led to a considerable rise in financial transfer flows consisting of remittances to the migrants' countries of origin. Considering only officially registered remittances (World Bank, 2019), their amount increased by 8.5% in 2017, reaching \$466 billion in 2018. Overall, remittances increased in 2017 in all regions of the world: 20.9% in Europe and Central Asia; 11.4% in sub-Saharan Africa; by 9.3% in the Middle East and North Africa; by 8.7% in Latin America and the Caribbean; and by 5.8% in East Asia and the Pacific and this trend continued in 2018. Remittances to developing countries increased by 4.1% to reach USD 485 billion and these have become an important source of external financing.

Thus, the relationship between migrant remittances and economic growth has been of considerable and continuing interest over the years. However, in both theoretical and empirical studies, the contradictory conclusions regarding the impact of such a relationship do not allow a real consensus to be reached. For example, Faini (2002) and Ang (2009) find that remittances have a positive effect on economic growth. They interpret this positive coefficient as the result of the policy orientation in place, namely a stable environment. Using bank credit as a regressor, Mundaca (2009) also finds a positive effect of transfers on economic growth. Ziesemer (2012) provides results that suggest remittances' effect on economic growth is stronger in low-income countries. Using the double least squares method in instrumental variables to address possible endogeneity of remittances, El Hamma (2018) establishes that remittances conditionally promote growth in countries with a developed financial system and a sound institutional environment in the case of 14 Middle Eastern and North African countries.

On the other hand, Chami et al. (2005) find a negative correlation between remittances and growth, insofar as remittances contribute to considerably reducing the work effort of the households receiving these transfers; this study is nevertheless criticised because it does not take into account the endogenous nature of remittances (Lucas, 2005). In contrast, S. Singh et al. (2012) and Ahamada and Coulibaly (2013) find that the impact of remittances on economic growth is negative. Moreover, according to Acosta et al. (2007), the inflow of remittances can cause a real appreciation of the exchange rate. This has a negative effect on exports and thus possibly on trade openness, with the consequence that growth is reduced. Far beyond that, for S. Adams and Klobodu (2016) who use the generalized method of moment's estimation technique, there is no evidence that remittances contribute to economic growth.

To further this debate, this article proposes to examine empirically the nature of the real impact of remittances on economic growth. While Giuliano and RuizArranz (2009) argue that the relationship between these two variables is non-linear, Rao and Hassan (2011) suggest it is influenced by financial development or institutional quality as outlined by Catrinescu et al. (2009).

This work aims to make important contributions to the empirical literature on the relationship between migrant remittances and economic growth. Indeed, previous empirical work suggests that this relationship may be uncertain or contradictory. Some of these results could be explained in several ways. First, the omission in the selection of variables (De Haas, 2006). Secondly, the generalist nature of the studies that pool heterogeneous countries, with specificities that may differentiate them from each other (Eggoh et al., 2019); these studies generally disregard robustness tests of the results that may highlight the influence of sub-regional membership for example. Furthermore, it is equally interesting to focus a study on the analysis of the effect of migrant remittances on economic growth in countries that have set themselves the same goal of being emerging; this is justified by the fact that such a goal requires not only common policies, but also politically and economically stable institutions. Finally, the economic theory on economic growth is rather dated, and therefore the empirical studies provide the fruit of this theoretical gap. To this end, this work investigate the non-linear nature of the relationship between migrant remittances and economic growth in the CEMAC zone, using the PSTR model.

Moreover, this work favours the choice of a sample made up of six homogeneous countries from the point of view of their macroeconomic structures, which moreover, all belong to the same economic zone (CEMAC), over the period 1990–2018. The results obtained establish that there is a non-linear relationship between migrant remittances and economic growth in the CEMAC zone; this confirms the existence of a remittance threshold such that, below this threshold, remittances have a positive impact on economic growth and above this threshold, an increase in remittances would be counterproductive.

The rest of this article is organised as follows. Section 2 presents the literature review. Section 3 focuses on the methodological framework. In Section 4, we present and discuss the results. Section 5 is devoted to the conclusion.

2. Literature review

Several studies have examined the effects of migrant remittances. Some of them show that remittances contribute to facilitating human capital accumulation (Calero et al., 2009; Combes & Ebeke, 2011; Rapoport & Docquier, 2005), improving total factor productivity (Abdih et al., 2012), reducing poverty (Akobeng, 2016; Majeed, 2015; Meka'a et al., 2022; Saidane, 2021), or reducing state fragility (Avom et al., 2021).

Other studies show on the contrary that remittances generate adverse economic effects. Indeed remittances are at the origin of the acceleration of inflation (Khan & Islam, 2013), the reduction of work efforts of the households that benefit from them (El Hamma, 2017), and the creation of moral hazards (Gubert, 2002). In addition, beyond the direct effects of migrant remittances, other

studies have looked at the conditional effect of these transfers, by incorporating an interaction term with other variables that could complement the direct effect that stimulates growth. Thus, terms such as financial development (Giuliano & RuizArranz, 2009), institutional quality, or financial development (Catrinescu et al., 2009; El Hamma, 2018) are included.

Similarly, both theoretically and empirically, studies have not provided definitive answers as to the effect of migrant remittances on economic growth. For example, Faini (2002) finds that remittances have a positive effect on economic growth. However, Chami et al. (2005) find a negative correlation; the reason being that remittances cause recipients to no longer put in enough effort, or even reduce their working time. Lucas (2005) believes that such a result can only be reached if the endogenous character of migrant remittances is not taken into account.

Exploring the impact of remittances on poverty in selected emerging markets using panel data analysis, Tsaurai (2018) reveals that, theoretically, proponents of the pessimistic view state that the remittance dependency syndrome contributes to retarded economic growth. Using simple correlation methods and vector autoregression, Burgess and Haksar (2005) argue that the long-term economic effects of remittances are ambiguous in the Philippines from 1985 to 2002. However, Ang (2009) finds that for the same country, remittances have an overall positive impact on growth.

In the specific case of low-income countries, Zieseimer (2012) findings highlight a stronger migrant remittances effect as they suggest that the presence of remittances can increase the growth rate by 2 percentage points. Likewise, Mundaca (2009) establishes a positive effect of migrant remittances on the economic growth of Latin American countries. According to the author, this result is only possible if domestic bank credit acts as a regressor. Using a sample of 49 developing countries analysed over the period 2001–2013, Eggoh et al. (2019) also find that remittances have a significant positive impact on economic growth in developing countries. Moreover, they establish that this impact depends mainly on the level of financial development and investment, and less on the level of consumption and remittances themselves.

According to R. J. Singh et al. (2011), remittances have a negative impact on economic growth in sub-Saharan African countries. However, for those countries where good governance practices are observed, this impact can be positive. Fayissa and Nsiah (2012) have analysed annual panel data for 64 countries in Africa, Asia and Latin America and the Caribbean over the period 1987–2007 and found that, for countries with weak financial systems, remittances stimulate growth to the extent that they provide an alternative means of financing investment, while helping to overcome liquidity constraints. In contrast, Ahamada and Coulibaly (2013) show that remittances do not stimulate growth in 20 sub-Saharan African countries because they do not affect investment in physical capital. Using the generalized system moment's estimation technique, S. Adams and Klobodu (2016) fail to establish that remittances contribute to economic growth in the sub-Saharan African region. However, using the same method, by analysing the impact of remittances on economic growth in African countries over the period 1980–2006, Oumansour et al. (2019) manage to show that in a sample of 34 African countries, remittances have a significant and positive effect on growth.

In Pakistan, R. H. Adams (2003) shows that migrant remittances have a positive effect on economic growth, which can even be amplified if they are channeled through the banking sector. Similarly, in Kyrgyzstan, Aitymbetov (2006) finds that remittances positively influence economic growth.

In this work, we propose to study the sensitivity of migrant remittances to political stability, investment and trade openness. In particular, according to Aisen and Veiga (2013), with regard to the interaction between remittances and political stability, the results show a positive effect: the impact of remittances on growth is more favourable if the political stability of a country is satisfactory. In general, political stability plays a significant and positive role on the effect of remittances in a country (Deisting et al., 2015). Moreover, Leon-ledesma and Piracha (2004) have

shown that remittances have positive direct and indirect effects through investment on productivity and employment, which are also fundamental determinants of growth. Also, Oumansour et al. (2019) argue that trade openness may well be an effective transmission channel for remittances with an effect on economic growth. From the above, it seems quite logical to hypothesize that, through political stability, investment and trade openness, remittances have effects on economic growth.

The analysis of the literature on the impact of migrant remittances on economic growth shows that not only is the debate (be it at the methodological or technical level) on this subject far from over, but also that the quality and magnitude of this impact depend on the observation period, the chosen space, the observed and unobserved characteristics of each country, and the estimation method used. We choose to use the PSTR model to show the possibility of a non-linear relationship between migrant remittances and economic growth.

3. Methodology

This section has three objectives. Firstly, to present the PSTR model, secondly the econometric strategy and thirdly to specify the empirical model and give the data sources.

3.1. PSTR model

Gonzalez et al. (2005) proposed the PSTR model which is an extension of the PTR model of Hansen (1999). In its simplified form, the PSTR model is given by the following relationship:

$$y_{it} = \mu_i + \beta_0' x_{it} + \beta_1' x_{it} g(q_{it}, \gamma, c) + u_{it} \quad (1)$$

In this relationship, $i = 1, \dots, N$ is the number of individuals, $t = 1, \dots, T$ determines the period of the study, and y_{it} is the dependent variable. μ_i is the vector of individual fixed effects, and $g(q_{it}, \gamma, c)$ is the transition function associated not only with a transition variable (q_{it}), but also to a threshold parameter (c) and a smoothing parameter (γ). $x_{it} = (x_{it}^1, \dots, x_{it}^k)$ is the matrix of k explanatory variables containing no lagged endogenous variables, and for which ε_{it} is a random disturbance $iid(0; \sigma_\varepsilon^2)$. β_0 and β_1 are the parameters of the linear and non-linear model respectively. The transition function $g(q_{it}, \gamma, c)$ which represents the indicator function of the PSTR model as continuous and integrable on the interval $[0; 1]$.

Through this representation, this function allows the system to progressively transition from one regime to another. In order to define its functional form, Gonzalez et al. (2005), following the example of Granger and Teräsvirta (1993), Teräsvirta (1994) and then Jansen and Teräsvirta (1996), propose to retain the logistic transition function of order m shown opposite:

$$g(q_{it}, \gamma, c) = \left[1 + \exp\left(-\gamma \prod_{j=1}^m (q_{it} - c_j)\right) \right]^{-1} \text{ with } \gamma > 0, c_1 < \dots < c_m \quad (2)$$

Where, $c_1 < \dots < c_m$ is a vector of dimension $(1, m)$ which groups the threshold parameters and γ is the assumed positive smoothing parameter. When $\gamma \rightarrow 0$, the PSTR model is a linear panel model with homogeneous coefficients and individual fixed effects. If $\gamma \rightarrow \infty$, the transition function tends towards an indicator function. Ibarra and Trupkin (2011) show that if γ is sufficiently high then the PSTR model is reduced to a two-regime threshold model.

The use of a single transition function is not sufficient to take into account all of the non-linearity (Fouquau, 2008). For this reason, Gonzalez et al. (2005) propose the use of an additive PSTR model with m transition functions. In this case, Equation (1) becomes:

$$y_{it} = \mu_i + \beta_0' x_{it} + \sum_{j=1}^m \beta_j' x_{it} g_j(q_{it}, \gamma_j, c_j) + u_{it} \quad (3)$$

3.2. Econometric strategy

In view of the objective of this work, this subsection aims to show how to conduct the linearity and regime number tests. Thus, for the linearity test, there are two possible sets of hypotheses to represent the null hypothesis:

$$H_0 : \beta^1 = 0 \text{ versus } H_1 : \beta^1 \neq 0, \text{ or} \\ H_0 : \gamma = 0 \text{ versus } H_1 : \gamma \neq 0.$$

To address the presence of unidentified nuisance parameters under H_0 , Luukkonen et al. (1988) propose to replace the transition function $g(q_{it}, \gamma, c)$ by the first-order Taylor expansion around the point $\gamma = 0$. This makes it possible to write:

$$y_{it} = \mu_i + \beta_0' x_{it} + \beta_1' x_{it} q_{it} + \dots + \beta_m' x_{it} q_{it}^m + u_{it}^* \quad (4)$$

In relation (4) above, the vectors $\beta_1^*, \dots, \beta_m^*$ are multiples of γ , and $u_{it}^* = u_{it} + R_m \beta_1^* x_{it}$, where R_m is the residual of the Taylor expansion. With this parametrisation, the problem of unidentified nuisance parameters no longer arises in the resulting auxiliary equation. The null hypothesis thus becomes $H_0 : \beta_1^* = \dots = \beta_m^* = 0$. It can be tested using a Lagrange multiplier statistic that has a usual distribution. For this purpose, the Wald statistic is used, which is written as follows:

$$LM_w = \frac{TN(SCR_0 - SCR_1)}{SCR_0} \quad (5)$$

Where, SCR_0 is the sum of the squares of the residuals of a linear model with individual effects, and the sum of the squares of the residuals of the auxiliary equation. If the sample size is small, Gonzalez et al. (2005) propose an alternative statistic of the form:

$$LM_f = \frac{TN(SCR_0 - SCR_1)/mk}{SCR_0/TN - N - mk} \quad (6)$$

This is a Fisher statistic at mk and $TN - N - mk$ degrees of freedom, where TN is the number of explanatory variables. This test makes it possible to reject or not the linearity hypothesis in favour of a PSTR model. Under the null hypothesis, all linearity tests follow a chi-square with k degrees of freedom $[X^2(k)]$.

As for the test of the number of regimes, it is a question of testing the number of transition functions necessary to capture all the heterogeneity. The logic of this test is to test the null hypothesis that the PSTR model has a single transition function ($m = 1$) which is confronted with the alternative hypothesis, for which the PSTR model has at least two transition functions ($m = 2$). This three-regime model is written as follows:

$$y_{it} = \mu_i + \beta_0' x_{it} + \beta_1' x_{it} g_1(q_1', \gamma_1, c_1) + \beta_2' x_{it} g_2(q_2', \gamma_2, c_2) + u_{it} \quad (7)$$

The test decisions are based on Wald statistics (LM_w) and Fisher (LM_f). If the coefficients are statistically significant at the 5% level, the null hypothesis is rejected, assuming that there are at least two transition functions. Otherwise, the null hypothesis is not rejected and it is concluded that the model has two regimes and therefore has a threshold.

3.3. Empirical specification and data source

In this study, the endogenous variable is the growth rate of the economy (y) measured by the growth rate of real GDP. The exogenous variable of interest is the remittance of migrants (tfm). The

vector of other explanatory variables (X_{it}) consists of the variables that can explain the growth rate. Sala-I-Martin (1997) identified 60 variables that have a significant effect on economic growth in at least one regression equation. In their analysis, Levine and Renelt (1992) showed that the share of investment in GDP, GDP per capita, human capital and the population growth rate explain economic growth.

However, in this work, we retain six control variables. The choice of these variables is guided by the literature (Combes & Ebeke, 2011; Imai et al., 2014). The first is the initial output variable, defined by the lagged variable of the growth rate of real GDP (y^r) and which not only acts as an instrumental variable to correct for endogeneity bias (Vinayagathan, 2013), but also controls for conditional convergence in line with neoclassical growth theory. The second, private investment (inv) allows the influence of the private sector on economic activity to be captured (Ndjokou & Tsopmo, 2017). Moreover, the theory predicts that private initiative generally stimulates economic growth. This investment is measured by the share of private sector gross fixed capital formation in GDP. Given the importance of the external sector, the openness of the economy appears as a significant variable in several economic regressions. To this end, trade openness (ouv), taken as the ratio of the measure of exports and imports to GDP, is the third explanatory variable. Its choice is more explained by the fact that, according to liberal theories of international trade and the theory of endogenous growth, it is accepted that the trade openness of a country modifies growth. Our fourth variable concerns public expenditure (dep) which is a variable whose relationship with economic growth has already been assessed several times (Devarajan et al., 1996; Gupta et al., 2005). Political stability ($stab$) usually used to measure economic institutions (Havranek et al., 2016), can also be taken into account as a control variable, as for countries with stable political conditions, a democratic political regime is likely to lead to higher economic growth. Two other control variables were selected, namely, population measured by its rate (pop) and a dummy variable (dum) that captures the effect of the devaluation of the CFA franc in 1994.

All these variables are summarised in Table 1 below, which shows the source and description of the variables used in the work.

Thus, the model to be estimated is as follows:

$$y_{it} = \mu_i + \alpha y_{it-1}^r + \beta_1^0 tfm_{it} + \beta_2^0 ouv_{it} + \beta_3^0 inv_{it} + \beta_4^0 dep_{it} + \beta_5^0 pop_{it} + \beta_6^0 stab_{it} + \beta_7^0 dum_{it} + [\beta_1^1 tfm_{it} + \beta_2^1 ouv_{it} + \beta_3^1 inv_{it} + \beta_4^1 dep_{it} + \beta_5^1 pop_{it} + \beta_6^1 stab_{it} + \beta_7^1 dum_{it}] g_j(q_{it}^j, y_j, c_j) + u_{it} \quad (8)$$

Table 1. Description and sources of variables used

Variables	Descriptions	sources
y	Real GDP growth rate	WDI
y^r	Lagged variable of real GDP growth rate	Authors' calculation from WDI data
tfm	Migrant remittances	IFS
$stab$	Political stability	ICRG
ouv	Ratio of the sum of exports and imports to GDP	WDI
inv	Ratio of private sector gross fixed capital formation to GDP	WDI
dep	Ratio of public expenditure to GDP	WDI
pop	Population growth rate	WDI
dum	Dummy to capture the effect of the 1994 devaluation. It takes the value 0 before 1994, 1 in 1994 and 0 after 1994.	Construction of the authors

Source : authors

Our sample consists of six BEAC (Bank of Central African States) member countries observed over the period 1990–2018. Apart from migrant remittances obtained from the International Financial Statistics (IFS) database, political stability indices from the International Country Risk Guide (ICRG), and self-constructed Dummy values, the values of all other variables are taken from the World Bank's World Development Indicators (WDI) 2021.

4. Results

This section focuses on three points, namely: the integration properties, the presentation of the results of the linearity and number of regimes tests, and the presentation of the results of the non-linear effects of remittances on economic growth.

4.1. Integration properties

The econometric analysis of the relationship between migrant remittances and economic growth requires that the integration properties of the series be determined. The reason is that they avoid the problem of spurious regression. To this end, we use panel unit root tests. Namely, the Im et al. (2003) and the Levin et al. (2002). The results of these tests are reported in Table 2 below.

Table 2. IPS and LLC unit root test results

Variables	y	tfm	ouv	inv	dep	pop	stab
Series in level	−5.413***	−7.127***	0.561	−1.5789***	−6.896***	−2.174***	−2.194
	(0.0000)	(0.0000)	(0.3221)	(0.0000)	(0.0000)	(0.0000)	(0.7851)
IPS							
Series in difference			−10.779**				−11.23**
			(0.0000)				(0.0000)
Series in level	−6.602***	−6.122***	0.462	−4.574***	−5.231***	−5.775***	−1.863
	(0.0000)	(0.0000)	(0.1729)	(0.0000)	(0.0000)	(0.0000)	(0.1566)
LLC							
Series in difference			−9.258**				−10.659**
			(0.0000)				(0.0000)
Conclusion	I(0)	I(0)	I(0)	I(0)	I(0)	I(0)	I(0)

(***) et (**) give the significances at 1 and 5%. The values in brackets are the probabilities.

Source : authors' calculation

The IPS and LLC tests yielded two main results. Firstly, the variables GDP growth rate, remittances, investment, public expenditure and population are stationary in level. To this effect, the test values are above the critical values at 1%. The second result shows that the other variables, trade openness and political stability, are not stationary in level. They become stationary after differentiation with a significance of 5%. As the IPS test takes into account the heterogeneities of the autoregressive root and the unit root in the panel, it is preferred to the LLC test which suffers from the homogeneity of the autoregressive root.

According to Table A1 in appendix, there is a positive correlation between remittances and economic growth. Table A2 in appendix shows the results of descriptive statistics.

4.2. The results of the linearity and regime number tests

The results of the linearity test are contained in Table 3 below. On reading, it is acceptable to conclude that the LMw and LMf tests lead to the rejection of the null hypothesis at the 5% critical threshold. It reflects the fact that there is a non-linear relationship between migrant remittances

Table 3. Linearity test

Tests	Statistics	Probabilities
Wald test (LM_w)	57.615**	0.036
Fisher test (LM_f)	5.221**	0.023

Note : (**) reflects the significance at 5%.

Source : authors' calculation

Table 4. Test of the number of regimes or transition function

Tests	Statistics	Critical probabilities	Number of transition function
Wald test (LM_w)	9.646	0.0273	1
Fisher test (LM_f)	1.058	0.316	1

Note: Source: authors' calculation

and economic growth in the CEMAC zone. To this end, it suggests that the number of regimes in the process be determined.

This number will depend on the results in Table 4. It also shows that the null hypothesis (H_0) is accepted for a threshold of 5%. This allows us to conclude that there is a single transition function and consequently two remittance regimes. This result reflects the idea that the non-linearity of the relationship between migrant remittances and economic growth in the CEMAC zone is favourable to the determination of a threshold for migrant remittances. For this reason, it is logical to think that, up to a certain threshold, migrant remittances would have either no or a positive influence on economic growth in the CEMAC zone. Kumar (2019) explains this result by the fact that, initially, transfer recipients increase their spending on health and education. These are expenditures that contribute to building good quality human capital that can be used to work and thus is integrated into the production process. Once this capital has been acquired, these beneficiaries consider that they should now consume more than invest. Beyond this threshold, the remittances would probably be counterproductive for economic activity.

4.3. The non-linear effects of migrant remittances on economic growth

The estimation of the non-linear equation between migrant remittances and economic growth yield estimated parameters of the PSTR model reported in Table 5 below. The LMf test presented in the PSTR results column rejects the null hypothesis of no non-linear effect for remittances. Specifically, the effect of remittances on economic growth in the CEMAC zone depends on the level of remittances for each member country.

The results show the coefficient β_1^0 positive and significant while the coefficient β_1^1 is negative and significant. Thus, the relationship between migrant remittances and economic growth is initially positive, but may turn around beyond a certain threshold which is 52.31 (see Table A3 in Appendix, PSTR column) as a percentage of GDP. In general, the increase in remittances negatively affects the sensitivity of economic growth to remittances. This sensitivity could be stronger among countries in which remittances are allocated more to consumption than to investment.

In this case, the countries of the CEMAC zone cannot benefit from the growth gains resulting from the increase in remittances. This result corroborates those of Pradham et al. (2008) and Cooray (2012). Thus, above the reversal threshold, the 1% increase in remittances is the cause of a decline in the economic growth of -0.439^* points.

The signs of the control variables are consistent with theoretical predictions. Given the significant positive coefficient of lagged GDP, the convergence hypothesis is not verified, suggesting that the chances of economic catching up among CEMAC countries are decreasing. Moreover, trade

Table 5. Coefficient estimates for the PSTR and GMM system models

Variables	PSTR	GMM system
$tfrm (\beta_1^0)$	1.972*** (0.964)	2.891** (0.682)
$tfrm (\beta_1^1)$	- 2.411*** (0.487)	-1.972*** (0.826)
y^*	0.439* (1.719)	0.732** (1.824)
ouv	1.817** (0.652)	1.928** (0.938)
Inv	2.136** (0.911)	1.521** (0.634)
dep	-2.301*** (0.742)	-1.432** (0.913)
pop	-1.157 (0.133)	-0.329* (0.147)
$stab$	0.048*** (2.349)	0.059** (1.874)
dum	-2.21 (0.175)	-1.621 (0.976)
γ	52.31 1.773	33.14 1.524
C	-	1.272** (0.585)
LM_f nullity	13.49 [0.0000]	-
AR2 (p-value)	-	0.724
Sargan test (p-value)	-	0.618
Observations	174	174

Note : (***), (**) and (*) indicate significance at the 1.5 and 10% levels. Standard deviations are shown in brackets, while the p-value is shown in square brackets.

Source : authors' calculation

openness, investment and political stability have a significant positive impact on economic growth. While public expenditure and population have a negative significant impact. On the other hand, the Dummy variable is insignificant.

By estimating the non-linear economic growth equation as a function of migrant remittances using the generalized method of moments (GMM) on a dynamic panel (Blundell & Bond, 1997), we test the robustness of the previous results (see Table 5, GMM system column). This approach has the advantage of controlling for endogeneity biases that are related to the remittance indicator and other control variables. To this end, the results suggest a positive effect before the threshold of 33.14 as a percentage of GDP, against a negative effect after. They thus justify the existence of a bell-shaped relationship between transfers and growth. These results are in line with those obtained from the estimates made on PSTR. The same is true for lagged GDP as for all the variables. Such a result was obtained by Bettin and Zazzaro (2012).

5. Conclusion

The objective of this paper was to empirically assess the relationship between migrant remittances and economic growth. The proposed theoretical and simple growth model was tested on a panel of six countries belonging to the CEMAC zone, over the period 1990–2018, using the PSTR methodology.

The results of the estimations indicate that there is a non-linear relationship between migrant remittances and economic growth in the CEMAC zone. Thus, at the 5% threshold, there is a transition function and consequently two remittance regimes. This result confirms the existence of a transfer threshold, which is 52.3% of GDP. Thus, below this threshold, migrant remittances positively affect economic growth. Above this threshold, the increase in remittances would be counterproductive.

These results suggest at least two lessons. The first lesson is that they can give empirical content to the evolution of remittance levels. The second lesson relates to the use of remittances by recipient households, i.e. those who receive the remittances. Indeed, these households not only spend less on food and education; but also, above all, more on housing, land or jewellery, which are non-productive investment goods. These are therefore transitional incomes that constitute strategies that help vulnerable households to reach a basic level of consumption.

Given that not all CEMAC countries receive, nor can they benefit from, migrant remittances in the same proportions, this work suggests a number of recommendations. Among them, it is useful to note for CEMAC countries that it is not only important to receive migrants' remittances, but also to provide more incentives for these funds to be spent on productive investments. Furthermore, it is necessary for these countries to strengthen the quality of governance, as good political stability allows for better management of migrant remittances. Finally, it is necessary to create favourable conditions for increasing migrant remittances and redirecting them towards channels and conditions that favour more productive uses that can increase exports from CEMAC countries. To achieve this, the governing authorities in these countries must adopt policies that take into account the realities of each of their countries. Consequently, these policies would consist of defining new strategies for trade and investment openness, and then developing new policies that contribute to greater political stability.

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Notes

1. Central African Economic and Monetary Community.
2. Panel Smooth Threshold Regression.
3. Generalized Method of Moments.
4. The coefficient of the variable of interest above the threshold is equal to that is $1,972-2,411 = -0,439$.

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No potential conflict of interest was reported by the authors.

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Appendix

Table A1. Correlation between remittances and economic growth

	y	Tfm
<i>y</i>	1.0000	0.6334*** (10.17)
<i>Tfm</i>	0.6334*** (10.17)	1.0000

Note : (***)gives the significance at 1%. The variables in brackets are the t-students.

Source : authors' calculation

Table A2. Descriptive statistics

Variables	Mean	Standard deviation	Minimum	Maximum
<i>y</i>	1.88	1.29	−1.481	4.879
<i>Tfm</i>	42.88	23.35	7.84	69.13
<i>Ouv</i>	57.80	26.09	9.71	169.13
<i>Inv</i>	13.32	7.90	−2.83	68.73
<i>Dp</i>	16.78	5.73	6.41	35.84
<i>Pop</i>	1.61	0.92	0.30	3.61
<i>Stab</i>	2.13	1.01	0	6

Source : authors' calculation

Table A3. Threshold values in the PSTR and GMM system models

Models	PSTR	GMM system
Sign reversal thresholds in %.	52.31	33.14

Note: Source : authors' calculation



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