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Key words: Migrant remittances; deforestation; Congo basin

JEL Classification: Q23, QO1, O13

1. Introduction

Although international migration and its associated money transfers are old phenomena, they have grown in interest recently not only because of the amount of income transferred, but also because of the eventual impact on the countries of origin of the migrants. Migrant remittances are the main channel through which migration affects the development of these countries (Adams, 2011; Gubert, 2005). The volume of official international money transfers has not ceased to increase recently, going from 31.1 billion dollars in 1990 to 76.8 billion dollars in the year 2000, and finally reached 583 billion dollars in 2014 (World Bank, 2018), showing that its size is three times greater than official development assistance (ODA) and two thirds of the total amount of foreign direct investment (FDI).
Although the effects of migrant remittances on the development pillars like education and health have been studied intensively[1]. To our knowledge, only Duval and Wolff (2009) are interested in the impact of international monetary transfers on the environment, through deforestation in developing countries. Using data from 102 countries over a period from 1990 to 2005, these authors find that the share of migration transfers received in GDP reduces the rate of deforestation for all the countries considered.

From a theoretical point of view, migration transfers can have two main effects on the deforestation process. On the one hand, as a source of external financing for developing countries, migration transfers increase the national income of these countries and thus contribute significantly to economic growth. At the same time, the phases of economic development are accompanied by increased industrialization and urbanization that weigh on forest resources. In this context, income from international emigration to developing countries can contribute to accelerate deforestation and forest degradation. On the other hand, migratory transfers considered as a share of GDP are particularly high for low-income countries and are recognized as an instrument to combat the poverty of the populations who benefit from them. However, as the World Bank (2006) reminds us, deforestation is made by both large forestry companies and poor people. In this perspective, by reducing the poverty of local populations, migration transfers can help reduce deforestation and should have a beneficial impact on the environment.

In this study, we analyse the effects of migrant remittances on the environment, using the example of deforestation in the Congo basin. The importance of this study is justified by many factors. Firstly, the share of migrant remittances to developing countries has increased regularly, going from 45.2% in 1990 to 75.7% in 2007 (World Bank, 2008). Secondly, tropical forests are at the center of international challenges on the conservation of biodiversity. Finally, at the level of our methodology, we use deforestation data from the Food and Agricultural Organisation (FAO) (from 1990 to 2010) which is used by many empirical studies (Bakehe, 2018a; Bakehe, 2018b; Wang and Qiu, 2017; Combes et al., 2017; Azomahou and Nguyen Van, 2007; Koop and Tole, 1999; Shafik, 1994), and check the robustness of our results using deforestation data from the satellite image analysis by Hansen (Global Forest Cover) which is usually considered to be more reliable than the FAO data, but available only over the period 2000-2014.

The results of our econometric analysis show that the increase in international remittances increases the rate of deforestation in the Congo basin countries. The rest of this study is organized as follows: section two presents the data used and the econometric model retained; section three presents and discusses the empirical results and the last section presents the conclusion.

[1] See for example Barham and Boucher (1998).

2. Data and methodology

2.1. Presentation of data and descriptive statistics

Our sample covers 9 of the 10 countries of the Central African Inter-ministerial Forestry Commission (COMIFAC) (Burundi, Cameroon, Gabon, Equatorial Guinea, Central African Republic, Democratic Republic of Congo, Republic of Congo, Rwanda and Chad. São Tomé and Príncipe is excluded due to lack of data). This choice is justified on several levels: on the one hand, COMIFAC contains the Congo Basin the second largest contiguous block of tropical forest in the world behind the Amazon. It comprises more than 70% of Africa's forest cover: of the 530 million hectares of the Congo Basin, 300 million are covered by the forest. More than 99 percent of the forest area consists of primary or naturally regenerated forests, as opposed to plantations, and 46% are lowland dense forests (FAO, 2010). On the other hand, these forests provide valuable ecological services at the local, regional and global levels. Local and regional ecosystem services in the Congo Basin include maintaining the hydrological cycle (quantity and quality of water) and controlling floods in a region of high rainfall. Congo's forest biodiversity provides millions of people with wood, non-wood forest products, food and medicine. Additional regional benefits include climate regulation at the regional level, which increases resilience to climate change. Healthy forest ecosystems can facilitate regional cooling through evapotranspiration and provide natural buffers against variability in regional climate (Chapin et al., 2008).

The dependent variable in this study is the rate of deforestation, determined based on the annual rate of change of the forest cover between 1990 and 2010. The change in the forest cover is net change in the total forest area, including natural forest zones and forest plantations. This shows that deforestation can be compensated by reforestation. This definition is given by the FAO and is used in many empirical studies (Bakehe, 2018a; Bakehe, 2018b; Azomahou and Nguyen Van, 2007; Koop and Tole, 1999; Shafik, 1994). The data is from the FAO. However, to check for the robustness of the results, we also use deforestation data from Hansen (Global Forest Cover) to carry out the empirical analysis. This data is only available for the 2000-2014 period but is necessary to confirm the results with the FAO data.

Our main independent variable is migrant remittances. We capture remittances using the share of migrant remittances as a percentage of GDP. We use data from the World Bank (2016). This Word Bank data refers to official migrant remittances, i.e. money that international migrants send to their relatives back in their home countries through official channels banks, postal services or international money transfer agencies. This does not therefore include money that passes through private and unofficial networks. The World Bank (2008) holds that remittances are underestimated given the size of transfers made through private networks[2]. Despite this drawback, this is the only available data that give a global view on remittances on a world scale.

We adopt the most widely used control variables in studies on the evolution of the rate of deforestation. In order to capture the effects of economic factors, we use the GDP per capita expressed in constant 2005 dollars. This data comes from *World Development Indicators* (WDI, 2016). The debate on the relationship between per capita income and deforestation is summarised in an inverted-U shaped curve known as the Environmental Kuznets Curve (EKC). According to this curve, at the macroeconomic level, environmental degradation increases for low levels of income and decreases after a given income threshold (turning point). The Environmental Kuznets Curve has been confirmed for certain indicators like the

[2]According to Freund and Spatafora (2005), informal flows represent between 35 to 75% of the funds sent through official channels in developing countries.

quality of air or water (Selden and Song, 1994; Shafik, 1994; Grossman and Krueger, 1995). The results obtained for deforestation are contradictory. Studies by Combes et al., (2009), Duval and Wolff (2009), Culas (2007), Bhattarai and Hammig (2001) and Cropper and Griffiths (1994) reveal an Environmental Kuznets Curve linking per capita income and deforestation. On the other hand, Shafik (1994) and Koop and Tole (1999) do not find an inverted-U shaped relationship between per capita income and deforestation.

Other economic variables like international trade are likely to affect deforestation. In fact, the hypothesis of «*pollution havens*» suggests that the existence of the Environmental Kuznets Curve stems from the specialisation of developed and developing countries following the process of globalisation of exchange (Barbier, 2001). We thus retain the variable trade openness which is captured by the exports of goods and services as a percentage of GDP. This variable is obtained from WDI (2016).

Demographic variables are also of particular importance since human activity appears to be one of the main causes of environmental degradation. Kaimowitz and Angelsen (1998) describe the manner in which population affects the rate of environmental degradation. They show that theoretically, the population can affect the rate of deforestation through an increase in the number of rural households that use the forest in their quest for arable land, and wood for heating or construction. In this study, potential effect of demographic forces on deforestation is measured using the population density expressed as the number of people per hectare and the annual population growth rate in percentage. These two variables are also extracted from WDI (2016).

Some authors hold that the rate of deforestation is higher in countries where the level of democracy is low and the institutions of poor quality (Bhattarai and Hammig, 2001; Didia, 1997; Deacon, 1994). In fact, the poor quality of institutions can lead to a poor management of land resources. There therefore exists an opportunity for investors to acquire land at reduced costs which can easily increase the rate of deforestation. To capture this variable, we use the most common indicators of democracy (*Freedom House* and *Polity IV*) because of their long time series and their use in many empirical studies. Since 1970, *Freedom House* publishes an indicator of democracy (going from expert opinions) which combines measures of the level of political rights (electoral competition, the right to vote, free election of representatives who determine public policy) and civil liberty (freedom of association, opinion, individual autonomy without state intervention). We build an indicator of democracy using two variables based on political rights and civil liberties (« *political rights* » and « *civil liberties* »). These two dimensions are measured on a scale from 1 to 7, 1 corresponding to a high quality of democracy and 7 to a low quality. Following Bhattarai and Hammig (2001), we sum these two variables to obtain a single indicator (going from 2 to 14)[3]. The Polity IV indicator of democracy measures constraints on the executive, competition and transparency in the recruitment of the executive, and the regulation of competition in participation in political life. This is measured on a scale from -10 (highly autocratic) to 10 (highly democratic). Comparing these two indicators is quite difficult but given that they both measure the level of democracy, it is quite interesting to compare the two ratings.

Table 1 shows the descriptive statistics of the variables. We find that for all the datasets considered, the average rate of deforestation is positive (0.408% for the FAO data and 0.206% for the data from Hansen), thus indicating a global deforestation. These rates are 2.6% and 0.24% for Burundi, 1% and 0.2% for Cameroon, 0.1% and 0.08% for the Central African Republic, 0.6% and 0% respectively. 0.4% for Chad, 0.2% and 0.3% for the Democratic

[3]The separate use of these two indicators can lead to a problem of colinearity. In fact, a low level of political rights is usually associated with low levels of civil liberty (Nguyen Van and Azomahou, 2007).

Republic of Congo, 0.07% and 0.1% for the Republic of Congo, 0% and 0.08% for Gabon, and - 1.6% and 0.3% for Rwanda, respectively for FAO data and Hansen data. The average value of the GDP per capita is 1 192.81 constant 2005 dollars. Its lowest and highest values are respectively 82.662 and 8 750.18 dollars. As for the demographic variables, the data shows that the rate of growth of the population stands at 2.53% per year in the whole sample. Rwanda is the country with the largest fall in the population growth rate most likely because of the effects of the genocide in the nineties. The distribution of the population density varies largely. The minimum and maximum values are respectively equal to 3.696 and 417.255. The quality of institutions of the sub-region stands at 11.19 for Freedom House and -2.26 for Polity IV and the average level of trade openness is 83.0268. Finally, the average level of migrant remittances stands at 4.9% of the GDP. The data are available for all countries and for all variables (sample size).

Table 1 : Description statistics

Variables	Mean	Standard error	Min	max
Deforestation (FAO) (in %)	0.408	0.011	-0.0260	0.0439
Deforestation (Hansen) (in %)	0.206	0.002	0.0002	0.0085
GDP per capita (/1000)	1.193	1.871	0.0827	8.7502
Trade (in % of GDP)	83.027	82.864	19.6842	531.7374
Population density (per hectare)	77.863	121.983	3.6957	417.2545
Population growth (in %)	2.525%	1.660	-7.533	9.770
Freedom House	11.190	1.870	6	14
Polity4	-2.259	3.803	-8	6
Remittances (in % of GDP)	4.933	9.337	0.0020	46.610

All values are expressed in constant 2005 dollars. The means of all variables are calculated for the 1990-2010 period, except the Hansen's rate of deforestation.

Source : author using data from the FAO, Hansen, World Bank, Docquier and Marfouk (2006), CHELEM-CEPII (2006), Penn World Table 4.0 and Polity IV.

2.2. Econometric Specification

In this study, we seek to estimate the parameters of the following econometric specification:

$$DF_{it} = \alpha_i + \beta_1 I_{it} + \beta_2 Y_{it} + \beta_3 Y_{it}^2 + \beta_4 popd_{it} + \beta_5 popg_{it} + \beta_6 trad_{it} + \beta_7 rtce_{it} + \varepsilon_{it} \quad (1)$$

where $DF_{it}=$ rate of deforestation of country i in year t, $Y =$ GDP per capita, $I =$ Democracy variable (*freehouse* or *polity4*), $popd$ = population density, $popg =$ growth rate of the population; $rtce = migrant\ remittances$ et $\varepsilon =$ error term.

The different β are the parameters to be estimated, the indices i and t respectively stand for the country considered and the year of observation. We adopt a quadratic profile for the GDP per capita to test for the existence of an Environmental Kuznets Curve.

Following Koop and Tole (1999), we estimate a fixed and a random effects model. The hypothesis underlying the random effects model is that the random effects are not correlated with the a_i terms specific to each country. It is however possible that there may be characteristics specific to each country and correlated with the explanatory variables retained but not taken into account by the regression. Examples of these characteristics are environmental regulations, historical practices, culture, etc. In this case, the appropriate model is the fixed effects model. We use the Hausman (1978) test to determine which specification is more adapted to our data.

2.3. Migrant remittances and endogeneity

We examine if there is a problem of endogeneity between deforestation and remittances. This endogeneity can be caused by a simultaneity bias, omitted variables, or measurement errors on the explanatory variables. In this case, we use the instrumental variables method to address the issue. The main difficulty in this method is the quest for instrumental variables that are highly correlated with the dependent variable and satisfy the exclusion restriction. (i.e. that have no direct effect on deforestation). As instruments, we retain variables that are considered to be (highly) correlated with the error term of the main equation. Like Duval and Wolff (2009), we retain the level of emmigration, the existence of a common language between source country *i* and destination country *j* and the GDP per capita of the destination country *j*.

Data on the rate of emmigration comes from the database prepared by Docquier and Marfouk (2006) that provides rates of emmigration according to qualifications for the years 1990 and 2000. We use the total emigration rate in the year 2000. It has been established that a high rate of emmigration from one country to another positively and significantly affects remittances from the destination to the source country (Lianos, 1997).

Concerning the existence of a common language between the source country i and the destination country j, we first rely on data on the migration and transfer of funds from the World Bank (2010) which identifies for each country in the world, its major destination. We then use data from CHELEM-CEPII (2006) on distance, which gives a bilateral variable on a common language. This is a dummy variable which indicates if the source and destination countries share a common language. The existence of a common language is expected to be highly correlated with remittances since it facilitates the building of networks of migrants (Duval and Wolff, 2009).

Finally, for the GDP per capita of the destination country j which enables the taking into account of the economic situation of the destination countries of the migrants, we once more rely on data on migration and remittances from the World Bank (2010). This enables us to identify the main destination country for each country in our sample. After this, we use data on GDP per capita from WDI (2016). This instrument is a good approximation of the level of potential wellbeing of the destination country. According to Duval and Wolff (2009), the level of GDP per capita in the country of emission of transfers determines the size of these transfers towards source countries.

3. Estimation Results

The estimation results are presented in table 2. The Hausman test rejects the hypothesis of the existence of a correlation between the random error term ε_{it} and the explanatory variables of the model (P-value ≤ 5% for both sets of data). The estimators of the model with composite random errors are biased. We therefore retain those of the fixed effects model which are unbiased. Concerning the method of instrumental variables, the Sargan test leads us not to reject the hypothesis of instrument validity and overidentification restriction for all models (p-value sufficiently high). This test shows that the instruments chosen are correlated with the endogenous variable on the right, but not correlated with the residuals of the structural model.

Table 2: Estimation results

	Fixed effects model				2sls			
	FAO data		Hansen data		FAO data		Hansen data	
Remittances	0.015528**	0.017835**	0.000635	0.000179	0.000254*	0.00024**	0.000010	0.00002*
	(0.00689)	(0.00694)	(0.00178)	(0.00201)	(0.00013)	(0.0001)	(0.00001)	(0.0000)
GDP per capita/1000	0.000579	0.000345	0.001090	0.002363	-0.000312	-0.00072	0.000557	0.00161
	(0.00056)	(0.00057)	(0.00089)	(0.00092)	(0.00121)	(0.0024)	(0.00094)	(0.0011)
(GDP per capita/1000)²	-0.000028	-0.000013	-0.000036	-0.000101**	0.000007	0.00003	-0.000015	-0.00007
	(0.00004)	(0.00004)	(0.00004)	(0.00004)	(0.00008)	(0.0001)	(0.00004)	(0.0000)
Population density (per hectare)	0.000170*	0.000178	0.000016**	0.000014*	0.000264*	-0.00035***	0.000004	-2.16e-06
	(0.00001)	(0.00001)	(0.00001)	(0.00001)	(0.00006)	(0.0001)	(0.00001)	(0.0000)
Population growth (in %)	0.000177	0.000247	-0.000186	-0.000269	0.000638	-0.0006	-0.000056	0.00001
	(0.00018)	(0.00018)	(0.00041)	(0.00046)	(0.00046)	(0.0008)	(0.00041)	(0.0005)
Freedom House	0.000684**		0.000234*		0.000059		0.000194*	
	(0.00022)		(0.00013)		(0.00056)		(0.00013)	
Polity4		-0.000208**		0.000026		-8.24e-07		8.84e-08
		(0.00009)		(0.00007)		(0.0000)		(0.0000)
Trade	-0.000005	-0.000002	0.000011	0.000001	-0.000007	-6.00e-06	0.000007	-3.82e-06
	(0.00001)	(0.00001)	(0.00001)	(0.00001)	(0.00001)	(0.0000)	(0.00001)	(0.0000)
Constant	0.009746**	0.017405***	-0.004836**	-0.003090	0.021413**	0.03529***	-0.002717	-0.00108
	(0.00310)	(0.00135)	(0.00244)	(0.00242)	(0.00922)	(0.0083)	(0.00260)	(0.0028)
F-statistics	77.21	87.34	4.77	4.35	4.23	4.26	4.61	3.95
Hausman test χ2 (7)	170.35***	196.95***	12.41**	19.6**				
Exclusion restriction test F; prob.					8.52 ; 0.002	7.97 ; 0.001	6.80 ; 0.033	5.34 ; 0.007
Sargan test Chi-2; prob.					3,12 ; 0.683	3.785 0.150	2.14 ; 0.342	2.89 ; 0.442
Observations	160		106		160		112	

Source : author using data from the FAO, Hansen, World Bank, Docquier and Marfouk (2006), CHELEM-CEPII (2006), Penn World Table 4.0 and Polity IV.

The dependent variable is the rate of deforestation. *significant at 10%; ** significant at 5%; *** significant at 1%. Standard error in brackets.

The results on the economic variables show that irrespective of the data used and model retained, the effect of trade openness is insignificant. This t is also the case for the per capita GDP. The results therefore show that there is no evidence of the existence of an Environmental Kuznets Curve for deforestation in our sample, thus being in line with Bakehe (2018a, 2018b), Tanner and Johnston (2017), Nguyen Van and Azomahou (2007) and Koop and Tole (1999). The Environmental Kuznets Curve therefore seems to be observed more for qualitative environmental indicators like the quality of air or water (Shafik, 1994; Selden and Song, 1994) than for the forest cover.

The population density has a positive and significant effect on deforestation while the effect of the rate of population growth is insignificant for both sets of data. From the results on the two population variables, we can conclude that population density is the main demographic factor that affects deforestation in the Congo basin. The population density pressure on the forests of the Congo basin can be explained by the demand for wood energy and agriculture. According to Megevand et al., (2013), the expansion of subsistence activities (agriculture and fetching of firewood) due to the increase in population density is one of the causes of deforestation in the Congo basin.

The results on the quality of institutions show that a poor quality of institutions increases deforestation. This is in line with the results of Duval and Wolff (2009), Bhattarai and Hammig (2001), Didia (1997) and Deacon (1994). Given that land management is poor in all countries of the Congo basin, some investors buy land at reduced costs and extend their activities on large surfaces ignoring their corporate social and environmental responsibilities. (Megevand et al., 2013). Governments should therefore put in place robust policies as concerns future large scale investments in land. Also, promoting the involvement of the communities through the granting of rights and capacity building can have a positive effect on the conservation of forests. We also believe that good governance can encourage investment in the region, especially in the agricultural sector. In this case, increased investments in the improvement of the quality of institutions can lead to a rise in deforestation.

Concerning the role of remittances, for both datasets we find a positive coefficient that is significant at the 10% level. This result is contrary to that of Duval and Wolff (2009) obtained using data on 102 developing countries. In the Congo basin, the process of deforestation therefore increases when the amount of transfers relative to the GDP increases. The use that is made of remittances by the recipients varies (Gubert, 2005; Osili, 2004). In the majority of cases, it enables them to acquire basic necessities and improve the housing conditions. Another part is used for investments in human capital that affect development in the long run (McKenzie and Rapoport, 2007). Remittances also enable recipients to invest in agricultural machines (Gubert, 2005). Due to a more intensive form of agriculture on the land, pressure on agricultural land increases. This is mainly explained by the «rebound effect», according to which an increase in productivity can render agricultural activity more attractive and lead to an increase in the demand of arable land which is generally « new land that is easily accessible» for the farmers (Kaimowitz and Angelsen, 1998). Finally, households that receive remittances can gain access to land illegally since property rights are poorly defined in the Congo basin. They can thus extend their activities on large surfaces while ignoring their social and environmental responsibilities.

Analysis of the robustness of the results

To ascertain the robustness of our results, we have an additional table comparing the results of the FAO and Hansen data keeping the constant period in the two datasets (2000 - 2010).

Table 3. The effects of migrant remittances on deforestation in the Congo basin: robust results

	Fixed effects model				2sls			
	FAO data		Hansen data		FAO data		Hansen data	
Remittances	0.00003**	0.00003**	3.24e-06	3.77e-06	0.00016**	0.00015*	0.00001	0.00001*
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0001)	(0.0001)	(0.0000)	(0.0000)
GDP per capita/1000	0.00060	0.00009	-0.00070	-0.00082	-0.00018	-0.00039	-0.00079	-0.00088
	(0.0018)	(0.0017)	(0.0006)	(0.0007)	(0.0026)	(0.0025)	(0.0007)	(0.0007)
(GDP per capita/1000)^2	-0.00002	0.00001	0.00004	0.00004	0.00001	0.00002	0.00004	0.00005
	(0.0001)	(0.0001)	(0.0000)	(0.0000)	(0.0001)	(0.0001)	(0.0000)	(0.0000)
Population density (per hectare)	0.00016**	0.00016	0.00002**	0.00001**	0.00026***	0.00025***	0.00001	0.00001
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0001)	(0.0001)	(0.0000)	(0.0000)
Population growth (in %)	0.00018	0.00052	0.00009	0.00026	0.00055	0.00071	0.00013	0.00026
	(0.0008)	(0.0008)	(0.0003)	(0.0003)	(0.0011)	(0.0011)	(0.0003)	(0.0003)
Freedom House	0.00055*		0.00020*		0.00024		0.00016*	
	(0.0004)		(0.0001)		(0.0007)		(0.0001)	
Polity4		-0.00030*		-0.00005		-0.00016*		-0.00004
		(0.0002)		(0.0000)		(0.0003)		(0.0000)
Trade	4.03e-06	0.00001	4.13e-06	3.95e-06	2.60e-06	0.00000	3.97e-06	0.00000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Constant	0.00919	0.01452**	-0.00205	0.00013	0.01905	0.02091**	-0.00106	0.00062
	(0.0078)	(0.0047)	(0.0019)	(0.0014)	(0.0126)	(0.0077)	(0.0024)	(0.0017)
F-statistics	125.79	115.95	4.79	4.35	61.73	58.71	4.23	4.26
Test de Hausman χ2 (7)	125.79***	115.95***	4.79***	4.57**				
Exclusion restriction test F; prob.					6.42 ; 0.002	5.87 ; 0.003	5.40 ; 0.043	4.24 ; 0.017
Sargan test Chi-2; prob.					4,32 ; 0.423	4.58 0.127	3.24 ; 0.452	3.39 ; 0.322
Observations	80		80		80		80	

Source : author using data from the FAO, Hansen, World Bank, Docquier and Marfouk (2006), CHELEM-CEPII (2006), Penn World Table 4.0 and Polity IV.

The dependent variable is the rate of deforestation. *significant at 10%; ** significant at 5%; *** significant at 1%. Standard error in brackets

The results of the estimates compiled in Table 3 show a stability of the coefficients. Migratory transfers always have a positive effect on deforestation. Likewise, population growth remains positive. Institutional variables retain their signs and significance, except for the polity4 variable that was significant in the base model.

4. Conclusion

In this study, we examine the effects of migrant remittances on deforestation. If it is well established that remittances have positive effects on health and education for the receivers, its possible environmental effects are still under-studied. Given that this income flow contributes to the economic development of countries and reduces household poverty, it is logical to believe that they affect the environment.
Using data on 9 countries of the Central African Forestry Commission (COMIFAC), we examine the effects of remittances on deforestation. Our econometric analysis reveals some main results. Firstly, our results show that no Environmental Kuznets Curve is observed for deforestation. Secondly, we find that the population density has a negative effect on forest conservation in the Congo basin. We also find that weak democracies increase the level of deforestation. Finally, the rate of deforestation in the Congo basin increases with an increase in the share of remittances in the GDP. This result shows that although remittances have a positive effect on development pillars like education and health, they are not always good for sustainable development.

These results give a double teaching for the action of the public authorities. On the one hand, it is appropriate to take measures to encourage households to channel more transfers received to human capital investments that affect long-term development rather than investments in farm equipment. On the other hand, governments should take steps to improve property rights and prevent households from illegally accessing land and expanding into large areas.

To conclude, we highlight some of the limitations of this study. Firstly, the country level data on deforestation with a global coverage comes from the evaluation of forest resources by the FAO. Given that this database is based on information provided by the governments to the FAO, they may not be precise, especially for countries that do not make use of satellite images for their forestry inventory. Furthermore, this data is only related to the net change in the forest cover and does not distinguish between gross deforestation and reforestation. Secondly, the number of countries in our sample is small (9 countries) and this can throw some doubt on the results and make them non generalisable. Finally, the study period (1990 to 2010 for the FAO data and 2000 to 2014 for the Hansen data) does not enable the taking into account of the long-run dynamics in the analysis. More recent data will therefore improve the quality of the analysis in future studies.

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