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28 October 2018

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Abstract

This paper investigates the long-run and short-run effects of foreign direct investment (FDI), foreign aid and migrant remittances on economic growth in 36 African countries over the period 1980–2016. Empirical evidence is based on Pooled Mean Group (PMG) approach. The following findings are established. First, while there is a positive and significant long-run relationship between foreign direct investment and economic growth in Africa as a whole, the effect of remittances and foreign aid is insignificant. Second, in the short-run there is no evidence of any significant impact of FDI, remittances and foreign aid on economic growth. Third, results are still robust in the short-run when the panel is divided in three subsamples. However, in the long-run the effects of FDI, remittances and foreign aid on economic growth depend on the income level.

Keywords FDI; Remittances; Foreign Aid; economic growth; PMG

JEL Classification F23; F24; F35; F43; O55

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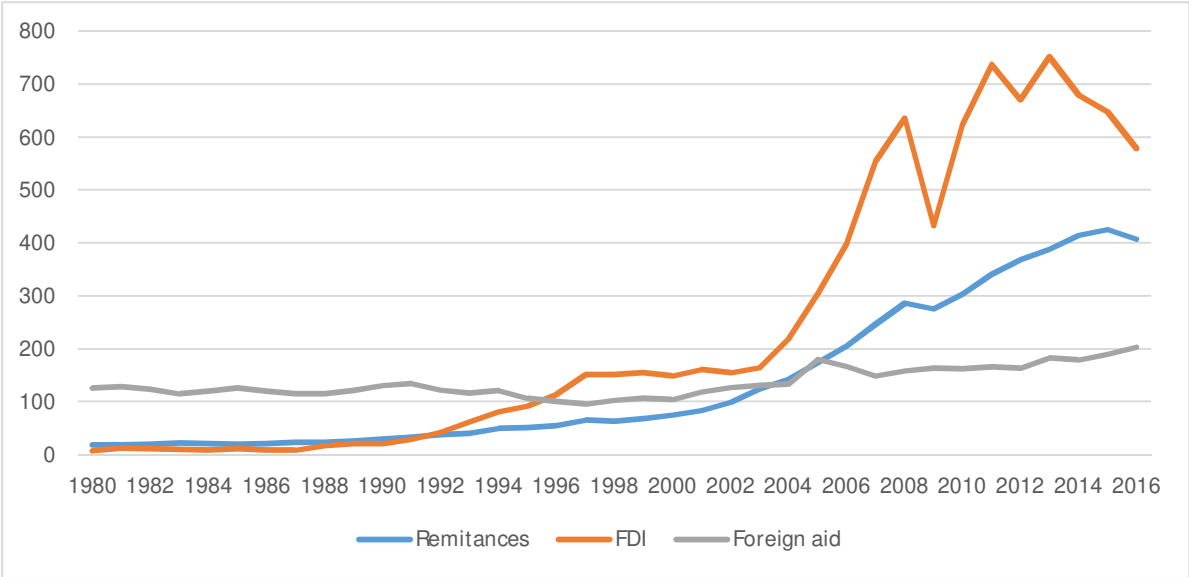Email: ndieupahenri@gmail.com

1. Introduction

In recent decades, several African countries have achieved higher economic growth rates. However, the challenge for these countries lies in their ability to sustain this growth in the long run. With a very low level of savings compared to other regions and declining tax revenues, African governments are banking on external sources of finance. Among the sources of funding sought are foreign direct investment (FDI), migrant remittances and official development assistance (ODA) in that order of importance and volume.

These external sources of finance have been proved to play an important role in boosting economic growth and development (Almfraji et al. 2014). Indeed, FDI, Remittances and ODA to developing countries were respectively estimated to be roughly US$ 810 billion in 2016 (UNCTAD 2017), US$ 429 billion in 2015 (World Bank 2017) and US$ 142.6 in 2016 (OCDE 2017) (see Figure 1 which despites the trend of the average level of the external financial flows for 140 developing countries from 1980 to 2016). However, despite their increased importance and volume, the combined impact of FDI, remittances and foreign aid on economic growth is not considered sufficiently studied, particularly for African countries. To fill this gap, this paper investigates the dynamic effect of FDI, migrant remittances and foreign aid on economic growth in African countries.

This paper makes important contributions to the empirical literature on the link between FDI, remittances, foreign aid and economic growth by answering the following questions: Do FDI, remittances and foreign aid really spur more economic growth in African countries? Is there a temporary or permanent effects of FDI, remittances and foreign aid on economic growth? Some past studies have tried to answer the first question (Nwaogu and Ryan 2015; Driffield and Jones 2013). However, our work differs from those previous studies in two respects. First, we contribute to the debate by modelling the possibly long-run and short-run relationship between FDI, remittances, foreign aid and economic growth in Africa. We use a methodology that, to the best of our knowledge, has not yet been used before for the combine effect of FDI, remittances and foreign aid on economic growth in African countries. We employ the Pooled Mean group (PMG) estimator. This method allow us to control for panel heterogeneity and to distinguish between long-run and short-run effect. Second, we investigate whether the relationship between FDI, remittances, foreign aid and economic growth varies with the level of economic development. For this purpose, we divide our sample in three panel data, namely: Low income countries, lower-middle-income and upper middle income for the period 1980-2016. Results show that while in the long-run foreign direct investment promote economic

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growth, the effect in non-significant in the short-run. Additionally, results suggest that the effects of foreign aid and remittances is non-significant both in the long-run and short-run.

Figure 1. Average level of remittances, foreign aid and FDI to developing countries, 1980-2016 (billions of dollars)

Source: World Development Indicator (2017)

The remainder of the paper is organized as follows. Section 2 reviews the related literature. Section 3 introduces the methodology and data. Section 4 presents the empirical results and analysis. Finally, the conclusion and policy recommendations are presented in Section 5.

2. Literature review

The literature review shows that the relationships among FDI, foreign aid, remittances and economic growth can be broadly classified into three research clusters. First, the empirical works focusing on the relationship between FDI inflows and economic growth. Second, analyses focusing on the Aid–growth nexus, and third, analyses focusing on the Remittances–growth nexus. Nevertheless, for African countries, few number of studies have analysed the combined effects of FDI, remittances and foreign aid on economic growth, particularly in the context of the long-run and short-run relationship.

2.1. FDI- growth nexus

Because of the potential economic benefits of foreign direct investment, such as increases competitiveness, Job creation, transfer of technology and most importantly economic growth

earnings (Borensztein et al. 1998; Karlsson et al. 2007; Omri and Sassi-Tmar 2015; Sothan, 2017; Makiela and Ouattara 2018), many African governments have implemented various policies incentives to attract more foreign direct investment. Analysing the relationship between FDI and economic growth has been one of hotly debated topic. However, researchers have reached mixed results.

Empirical studies have shown inconsistent or even contradictory results in terms of a FDI-led economic growth hypothesis. For example, Borensztein et al. (1998) analyses the effect of FDI on growth. From a sample of 69 developing countries over the period 1970-1989 and based on the Romer model, the authors seek to account for the mechanisms underlying technology transfer. They conclude that FDI is an important channel for technology transfer. Moreover, they show empirically that FDI has a positive impact on economic growth only if the level of education of the population exceeds a given threshold. Borensztein et al. (1998) estimate that it is from the threshold 0.52 year for high school that FDI begins to drive economic growth gains in the host country. As a result, the positive influence of FDI on host economies would depend on their interactions with human capital. Bengoa and Sanchez-Robles (2003) show that the benefits of FDI for host countries require adequate human capital, political and economic stability, and a liberalized market environment. Lumbila (2005); Li and Liu (2005) go in the same direction and give prominence to human capital as prerequisite for positive and significant impact of FDI on the economic growth of host countries.

Gui-Diby (2014) investigates the impact of FDI on the growth rate of 50 African countries over the period 1980-2009 and finds that FDI has a direct positive and significant impact on the growth rate. On the other hand, he does not find the links highlighted by Borensztein et al. (1998) between FDI, human capital and economic growth. Alfaro et al. (2009) show that human capital is not an important channel for technology transfer. The direct effects of FDI on economic growth are supported by the work of Ram and Zhang (2002); Campos and Kinoshita (2002); Hoang et al (2010); Kotrajaras (2010) and Gumby et al. (2017). These authors, while using different methods and samples, come to a similar conclusion: FDI contributes to economic growth, regardless of any prior level of human capital.

Others studies claim that the impacts of FDI on economic growth depend on its interaction with financial market development (Alfaro et al. 2004; Choong et al. 2004; Hermes and Lensink 2003), governance quality (Agbloyor et al. 2016), institution quality (Jude and Levieuge 2017; Bouchoucha and Benammou 2018) and economic freedom (Azman-Saini et al. 2010).

2.2. Remittances – growth nexus

In terms of remittances - growth nexus, many studies have investigated the effects of remittances on economic growth with mixed results. These studies can be divided in two stands. Positive effects and negative effects.

With regard to positive growth effects of remittances, several studies have reported evidence on the positive impact of remittances on economic growth through their positive impact on consumption, savings, or investment. Meyer and Shera (2017) and Goschin (2013) show that remittances contribute positively to economic growth. Based on a sample of six high remittances receiving countries, namely, Albania, Bulgaria, Macedonia, Moldava, Romania and Bosnia Herzegovina, Meyer and Shera (2017) estimate a standard growth model and find that remittances have a positive impact on economic growth and that this impact increases at higher levels of remittances relative to GDP. Similarly, Nsiah and Fayissa (2013) investigate the relationship between remittances and economic growth in a panel of 64 different countries of Africa, Asian and Latin American- Caribbean from 1987-2007. By using panel full modified least square estimator, they found that there is positive and significant relationship between remittances and economic growth throughout the whole group. Nyamongo et al. (2012) investigate the role of remittances and financial development on economic growth in a panel of 36 countries in Africa over the period 1980 –2009. They found that remittances are an important source of growth for these countries during the study period. Moreover, remittances represent a source of savings and thus provide additional capital for investment in Health, education and entrepreneurship (Rao and Hassan 2012; Anton 2010; Yang 2008; Woodruff & Zenteno 2007), all of which have an effect on productivity, employment and finally on economic growth. Recently, Williams (2018) investigates the effect of remittances on a large panel of 109 developing countries and found that remittances promote growth in countries with good quality democratic institutions. The role of institutions on the relationship between remittances and economic growth is confirmed by Zghid et al. (2016) in the case of North African countries. The positive growth effect of remittances is confirmed in several other studies (Olubiyi 2014; Imai et al. 2014; Salahuddin and Gow 2015).

Conversely, other studies have pointed out negative or insignificant effects of remittances on economic growth. According to Gupta et al. (2007), remittances are neither a panacea nor a substitute for a sustained and domestically engineered development endeavour for curing the problem of low- income countries. Based on that, remittances can appreciate the real exchange

rate in the host economies and therefore generate a resource allocation from the tradable to the non-tradable sector (Acosta et al. 2009; Amuedo-Dorantes and Pozo 2004). Moreover, a large part of remittances received in less developed countries are spent on consumption likely to be dominated by foreign goods than on productive investment. Therefore these remittances undermine productivity and growth (Ahlburg 1991). Additionally, some authors argue that remittances may reduce recipients' motivation to work, creating permanent financial dependency, and slowing down economic growth (Chami et al. 2003). For Elu and Price (2012), remittances can be used to finance terrorism, therefore inhibiting economic growth. Other studies have found a non-significant effects of remittances on economic growth. Ahamada and Coulibaly (2013) applied a panel Granger causality testing approach that is based on seemingly unrelated regressions systems and Wald tests with country-specific bootstrap critical values on 20 Sub-Saharan African countries over the period 1980–2007. They found that in any Sub-Saharan African country, there is no causality between remittances and growth. The reasons is that remittances do not increase physical capital investment. Several others studies have reported a negative or insignificant effects of remittances on economic growth (Roa and Hassan 2011; Le 2009).

2.3. Foreign aid – growth nexus

Foreign aid is a major source of economic growth to developing countries, especially in Africa. However, empirical evidences are still inconclusive and somewhat conflicting about the economic role of foreign aid. There are two strands of the literature on the role of foreign aid on economic growth. The first stand claim that foreign capital inflow is necessary and sufficient to sustain economic growth in the less developed countries. Example of studies in line with positive effects of foreign aid are Irandoust and Ericson (2005); Chatterjee et al. (2003). Irandoust and Ericson (2005) investigate the relationship between foreign aid, domestic saving and economic growth in a panel of African countries over the period 1965-2000. They find that foreign aid and domestic saving enhance economic growth for all countries in the sample. Chatterjee et al. (2003) indicate that foreign aid can contribute to economic growth only if it is used to finance public productive services. Liu et al. (2014) investigate the growth effect of foreign aid using an endogenous growth model. They found that a rise in the allocation of aid can increase the growth rate of the economy. Recently, Kargo and Sen (2014) suggests that foreign aid have positive effects on pro-poor growth in Sierra Leone. Based on a regional

spatial panel vector-autoregressive model, Civelli et al. (2018) found that foreign aid has a significant positive and persistent effects on economic growth in Uganda.

The second group of studies argue that foreign aid has negative effects on the economic growth of recipient countries. Mallik (2008) examines the effectiveness of foreign aid for economic growth in the six poorest and highly aid dependent African countries, namely the Central African Republic, Malawi, Mali, Niger, Sierra Leone and Togo. Using cointegration analysis, he demonstrates that in five out of the six countries, the natural log of foreign aid as a percentage of real GDP has a significant negative long run effect on the natural log of real GDP per capita. In the short run aid growth has no significant effect on economic growth per capita for most of the countries except for Niger. Sothan (2018) investigates the effect of foreign aid on economic growth in Cambodia over the period 1980-2014, using the autoregressive distributive lag (ARDL). He found that foreign aid has negative and significant impact on economic growth in the long-run. These negative results are consistent with several past and recent studies (Ang 2010; Rajan and Subramanian 2008; Ali and Isse 2005).

After this literature review, it is clear that there are some inconclusive and mixed results concerning the relationships among FDI, foreign Aid, remittances and economic growth. This paper contributes to the literature by assessing the short-run and long-run relationship between FDI, remittances, foreign aid and economic growth in African countries.

3. Data and methodology
3.1. Data

The dataset used in this paper includes 38 African countries and comprises annual information covering the 1980-2016 period. The choice of time period and countries is dictated by data availability. Complete list of countries as well as variables definitions and sources are provided in the appendices. In this paper we use GDP per capita to proxy economic growth. Our independent variables are foreign direct investment flows as a percentage of GDP (FDI), remittances as percentage of GDP and Official development assistance as percentage of GNI (ODA). To ensure that our results are not bias, two control variables are included in the relationship between foreign direct investment, remittances, foreign aid and economic growth namely: financial development measured by the ratio of broad money to GDP (M2) and trade openness, measured by the sum of export and import as a percentage of GDP (Openness). All variables are in log transformed. Thus coefficients are interpreted as elasticity.

Table 1. Summary statistics

Variable	Mean	Standard Deviation	Minimum	Maximum	Observations
GDP per capita	7.010982	1.005254	4.751814	9.544209	1025
FDI	4.44389	.5281003	-12.28028	5.149632	1026
Remittances	.3298011	1.734004	-5.638107	5.120576	980
ODA	1.711541	1.3749	-17.0066	5.258985	1026
M2	3.399999	.6108481	.7856608	4.773511	1013
Openness	4.170762	.454521	2.405814	5.740935	955

Note: All variable are log transformed

Table 1 presents the summary statistics, while Table 2 provides correlation matrix between all variables. It is apparent from the summary statistics that the variables are comparable from the perspective of mean values. Corresponding standard deviations show substantial variations. Therefore, we can be confident that reasonable estimated nexuses would be obtained from the regressions. We notice from correlation matrix that foreign direct investment is positively correlated with GDP per capita, while remittances and foreign aid are negatively correlated to GDP per capita. Moreover, the correlation between FDI, Remittances and foreign aid is positive.

Table 2. Correlation matrix

	GDP per cap	FDI	Remittances	ODA	M2	Openness
GDP per cap	1.0000	0.0669*	-0.1463*	-0.6481*	0.6110*	0.4487*
FDI		1.0000	0.1392*	0.0804*	-0.0508	0.3495*
Remittances			1.0000	0.1630*	0.1227*	0.0699
ODA				1.0000	-0.4256*	-0.1609*
M2					1.0000	0.4231*
Openness						1.0000

Note: *, indicates significance at 10%

3.2. Methodology

To investigate the long-run effects of foreign direct investment, remittances and foreign aid on economic growth, it is common to estimate the following basic regression:

$$Growth_{it} = \beta_1 + \beta_2 FDI_{it} + \beta_3 \operatorname{Re}m_{it} + \beta_4 ODA_{it} + \beta_5 X_{it} + \varepsilon_{it} \qquad (1)$$

Where $Growth_{it}$ equals the growth rate of real GDP per capita (constant 2010 US$) of country i at time t, FDI_{it} is foreign direct investment, $\text{Re}m_{it}$ is equal to remittances over GDP, ODA_{it} is equal to official development assistance over GNI, X_{it} stand for a set of control variables, and ε_{it} is the error term.

Traditional estimations methods used to estimate equation (1) does not allow us to capture potential rich economic growth adjustment dynamic. For this reason, this paper investigates the dynamic link between FDI, remittances, foreign aid and economic growth by using a panel ARDL specification. This method is interesting for several reasons. First, it allows us to control for heterogeneity in the relationship between these variables across countries by including individual-specific effects. Second, it allows us to control for endogeneity. Third, this model facilitates estimation of long-run and short-run effects of FDI, remittances, foreign aid and economic growth

According to the study of Pesaran and Shin (1996), the following basic ARDL (p;q) model will be considered as the main equation;

$$y_{it} = \sum_{j=1}^{p} \lambda_{i,j} y_{i,t-j} + \sum_{j=0}^{q} \delta_{i,j}^{'} x_{i,t-j} + v_i + \varepsilon_{it} \qquad (2)$$

Where $i = 1, 2, ..., N$ is country index, $t = 1, 2, ..., T$ is a time index, j is the number of time lags, y_{it} = economic growth, $x_{i,t}$ is a vector of foreign direct investment, remittances and foreign aid, and v_i denotes country specific fixed effects.

In order to consider the long run coefficient and the adjustment coefficient, equation (2) is re-parameterized as follow:

$$\Delta y_{it} = \phi_i \left(y_{it-1} - \theta_i^{'} x_{i,t} \right) + \sum_{j=1}^{p-1} \lambda_{i,j}^{*} \Delta y_{i,t-j} + \sum_{j=0}^{q-1} \delta_{i,j}^{*'} \Delta x_{i,t-j} + v_i + \varepsilon_{it} \qquad (3)$$

Where θ_i represents the long-run or equilibrium relationship between y_{it} and $x_{i,t}$. $\lambda_{i,j}^{*}$ and $\delta_{i,j}^{*'}$ represent the short-run coefficients relating to economic growth to its past values and other determinants $x_{i,t}$. The error correction coefficient is given by ϕ_i and measures the speed of adjustment of economic growth toward its long-run equilibrium following a change in FDI, remittances and foreign aid. A long-run relationship between independent variables and

economic growth exists if $\phi_i < 0$. Consequently, a significant and negative value of ϕ_i confirm the existence of co-integration between y_{it} and $x_{i,t}$.

To estimate Equation (3), three different dynamic panel methods are usually used, namely: the mean group (MG) estimator developed by Pesaran and smith (1995), the pooled mean-group (PMG) estimator developed by Pesaran et al. (1999) and the dynamic fixed effects (DFE) estimator. Nevertheless, with the dynamic fixed-effect estimator, there is a difference in intercepts across groups, but all slope coefficients and error variances are homogeneous. According to Pesaran and smith (1995), estimated coefficients in DFE are affected by a potential serious heterogeneity bias, especially in small country sample, under slope homogeneity. To resolve this problem, Pesaran et al. (1999) propose the Pooled Mean Group (PMG) estimator as an alternative to DFE. PMG restricts the long-run parameters to be identical over the cross section, but allows the intercepts, short-run coefficients and error variances to differ across groups on the cross section. If the long-run homogeneity restrictions are valid, MG estimates will be inefficient. Then, the maximum likelihood-based PMG approach proposed by Pesaran et al. (1999) will yield a more efficient estimator.

4. Empirical results

This section presents the results of panel unit root test and Pooled Mean Group estimations.

4.1. Unit root test

Before applying ARDL estimation, we must determine the order of integration. For this aim; we used the Augmented Dickey-Fuller Fisher Chi-square (ADF Fisher), Phillips- Perron Fisher (PP) and Im, Pesaran and Shin (IPS) unit root tests. Results are presented in Table 3.

Table 3. Panel Units test

	ADF-test		PP-test		IPS-test	
	Level	First difference	Level	First difference	Level	First differences
GDP	68.259	298.188***	115.587	767.268***	3.874	-18.973***
FDI	145.245***	422.439***	87.378	711.900***	-0.179	-15.348***
REMIT	172.590***	539.184***	283.039***	1053.23***	-5.6303***	-33.573***
ODA	58.773	228.783***	81.456	458.389***	9.469	-18.942***
M2	54.528	128.896***	71.335	358.379***	7.984	-19.258***
Trade	87.639	383.495***	125.862***	792.725***	-2.2369	-19.412***

It is obvious from the ADF test results that, some of our variables are integrated of I(0) or I(1). Thus, the unit root test results of individual effect show that FDI and Remittances are I(0), while GDP, ODA, M2 and Trade are I(1).

4.2. Baseline estimations

Empirical results are presented in Tables 4, 5 and 6. Table 4 presents the results of the estimations of long-run and short-run effects of FDI, remittances and foreign aid on economic growth by using successively PMG, MG and DFE. Table 5 displays the robustness by including two control variables. In Table 6, we split the sample into low-income, lower-middle-income and upper-middle- income subsamples according to 2017 World Bank Classification, and redo the estimation procedures for each income group.

Table 4. The effect of FDI, Remittances and ODA on economic growth

	Dependent variable : Log of GDP per capita			
	PMG	MG	Hausman test	DFE
Long-run coefficients				
FDI	0.748***	0.466	0.99	0.175**
	(0.078)	(0.146)	[0.1258]	(0.108)
Remittances	0.00815	0.0637		0.215**
	(0.0112)	(0.0602)		(0.0947)
ODA	-0.349	-0.207		-0.212
	(0.139)	(0.224)		(0.102)
Error correction term				
Phi	-0.0348***	-0.151***		-0.0259***
	(0.00927)	(0.0356)		(0.00819)
Short-run coefficients				
D.FDI	0.0757	0.111		0.00714
	(0.0797)	(0.113)		(0.0386)
D.Remittances	-0.0134	-0.0135		-0.0134
	(0.00633)	(0.00571)		(0.00260)
D.ODA	-0.00263	-0.00121		0.00129
	(0.00759)	(0.00684)		(0.00206)
Constant	-0.754***	-0.546		-0.160
	(0.206)	(0.740)		(0.161)
Observations	941	941		941

Note: The values in the parentheses are the standard error [p-value] of corresponding coefficients estimates. ***, **, and * denote a significance of 1%, 5%, and 10%, respectively.

As we said above, Table 4 displays the short-run and long-run effect of FDI, remittances and foreign aid on economic growth. For this purpose, three alternative dynamic methods are

used, PMG, MG and FDE. However, according to Hausman test and its consistency and efficiency over MG and DFE when the long-run homogeneity restriction holds and the short-run adjustments are expected to vary across countries (Kim et al. 2010), our analysis is based on PMG. Globally, in the long-run, foreign direct investment positively affect economic growth in Africa. However, the coefficient of FDI is significant for PMG and DFE estimators and non-significant for MG. The long-run coefficients of FDI in the PMG and DFE estimators are 0.748 and 0.175 respectively. This result implies that a 1 percent increase in FDI leads to a 0.748% and 0.175% increase in economic growth, meaning that FDI inflows in African countries spur economic growth. This result can be explained by the fact that FDI inflows is seen as an important sources of savings and capital accumulation for African countries, creating positive spillovers, improving human capital, providing African countries access to advanced technologies and thus lead more economic growth (Iamsiraroj and Ulubaşoğlu 2015). This result is consistent with several past studies on FDI - growth nexus (Malikane and Chitambara 2017; Gui-Diby 2014; Driffield and Jones 2013).

With regard to remittances, the coefficients are positive and non-significant for PMG and MG, but positive and significant in DFE. This results implies that in long-run, remittances receive do not have any significant effect on economic growth. According to Chami et al. (2010) the impact of remittances on economic is non-significant in the long-run because remittances are often transferred through informal channels such as friends and family members travelling abroad, or informal money-transfer networks such as the "hawala" system. According to the World Bank (2011) more than 50 percent of the remittances to Sub-Saharan Africa is through the informal channels. Therefore this poses a major challenge in getting a near accurate estimate of the magnitude of remittances. Our result is consistent with Rao and Hassan (2011); Alkhathlan (2013); Fenny et al. (2013); Lim and Simmons (2015) and Nwaogu and Ryan, 2015).

In terms of foreign aid- growth nexus, the coefficient of ODA is negative and non-significant in all the three estimators. Implying that foreign aid receive by African countries do not enhance economic growth in the long-run. This result is in line with some past studies (Dhakal et al. 1996; Adedokun 2017). Several factors can justify this result: first, the dependence of some African countries for help. As a result of receiving a lot of help from international organizations, African countries, especially the poorest, have become very dependent. As growth faltered despite massive aid flows, foreign aid has bound them into a debt trap (Mallik 2008). Second, corruption, poor governance and mismanagement of aid received: for several African countries,

the aid received was intended for investment projects because of the low level of savings of these countries. However, in reality, some of these funds are diverted for personal purposes. Thirdly, aid received by some African countries is for humanitarian causes, in order to manage natural disasters, food and security crises and therefore cannot promote economic growth.

Table 5. The effect of FDI, Remittances and ODA on economic growth with control variables

	Dependent variable : Log of GDP per capita			
	PMG	MG	Hausman test	DFE
Long-run coefficients				
FDI	0.241***	0.107	2.54	0.248**
	(0.042)	(0.136)	[0.6523]	(0.280)
Remittances	0.146	0.156		0.0829*
	(0.0177)	(0.112)		(0.0430)
ODA	-0.322	-0.141		-0.112**
	(0.282)	(0.198)		(0.0564)
Financial development	0.411***	0.255		0.225
	(0.0495)	(0.217)		(0.159)
Trade Opennes	0.422***	0.362*		0.290
	(0.0491)	(0.128)		(0.187)
Error correction term				
Phi	-0.0474***	-0.236***		-0.0470***
	(0.0128)	(0.0476)		(0.0101)
Short-run coefficients				
D.FDI	-0.0683	-0.165		-0.00857
	(0.0683)	(0.128)		(0.0428)
D.Remittances	-0.0208*	-0.00197*		-0.0104***
	(0.0169)	(0.00621)		(0.00268)
D.ODA	0.00540	0.000588		0.00192
	(0.00582)	(0.00527)		(0.00213)
D.(Financial development)	-0.0316	-0.0780***		-0.0481***
	(0.0207)	(0.0272)		(0.0122)
D.(Trade Openness)	-0.00192	-0.00658		-0.0451***
	(0.0224)	(0.0152)		(0.0121)
Constant	-0.242***	-0.144		-0.205
	(0.0691)	(0.896)		(0.184)
Observations	869	869		869

Note : The values in the parentheses are the standard error [p-value] of corresponding coefficients estimates. ***, **, and * denote a significance of 1%, 5%, and 10%, respectively.

The short-run coefficients tell a different story. As said above, short-run coefficients are not restricted to be the same across countries, so that we do not have a single pooled estimate

for each coefficient. We find that relationship between FDI and economic growth and between foreign aid and economic growth are negative and non-significant in short-run. Moreover, the relationship between remittances and economic growth is positive but still non-significant. Thus, comparing the long- and short-run estimates, a first broad conclusion is that the relationship between FDI, Remittances, foreign aid and economic growth in Africa depends on whether their movements are temporary (short-run) or permanent (long-run).

4.3. Robustness check

We confront our results in terms of alternative explanations for our model. For this purpose, we evaluate our results by including more control namely: GDP per capita and trade openness. Results from PMG, MG and DFE are reported in Table 5. Using the ARDL (1, 1, 1, 1) results in Table 5 reinforce our previous findings in Table 4. This results confirm that the effect of FDI on economic growth is positive and statistically significant in the long-run and non-significant in the short-run. Results in Table 5 show that a 1 percent increase in foreign direct investment leads to 0.241% and 0.248% increase in economic growth respectively for PMG and DFE estimation methods. The effects of remittances and foreign aid on economic growth are non-significant both in long-run and short-run. Moreover, the error-correction terms still have a negative and significant coefficients.

4.4. The effect of economic development level

We saw in Table 4 and 5 that the effects of FDI, remittances and foreign aid on economic growth depends on whether their movements are temporary or permanent. We now investigate if the relationship between these variables depends on the level of economic development. For this purpose, we split the sample into three subgroups, namely: lower-income, lower-middle-income and upper-middle – income subsamples according to 2017 World Bank Classification. The estimated coefficients from PMG, MG and DFE are displayed in Table 6.

When looking at the long-run coefficients, FDI have positive and significant effects on economic growth in most subgroups except for Low-income where the impact of FDI on growth is positive but non-significant. This result implies that the impact of FDI on economic growth is positive in countries with relative higher income. The coefficient of FDI is 0.022 and 0.009 in lower-middle income and upper-middle income countries respectively, suggesting that the long-run effect of FDI on economic growth decreases when the level of income is high.

Table 6. FDI, Remittances, Foreign aid and economic growth by income level

	Low-income			Lower-midlle-income			Upper-midlle-income		
	PMG	MG	DFE	PMG	MG	DFE	PMG	MG	DFE
Long-run coefficients									
FDI	0.092	0.034	0.077*	0.022***	0.031	0.0122**	0.009*	-0.037	0.079*
	(0.022)	(1.171)	(0.0050)	(0.0075)	(0.302)	(0.189)	(0.0016)	(0.106)	(0.093)
Remittances	0.0246**	0.000905*	0.0201*	-0.0677	-0.0043	-0.0062	-0.131	0.0225	0.208
	(0.0268)	(0.0506)	(0.109)	(0.0408)	(0.160)	(0.193)	(0.0334)	(0.0646)	(0.771)
ODA	-0.561***	-0.176**	-0.0834	-0.204***	-0.244	-0.282*	-0.078	-0.263	-0.265
	(0.0658)	(0.0812)	(0.192)	(0.0438)	(0.171)	(0.169)	(0.0148)	(0.381)	(0.800)
Hausman test	0.56[0.6324]			0.28[0.1423]			0.38[0.6941]		
Error correction term									
Phi	-0.0232***	-0.244***	-0.0426**	-0.0410***	-0.0696**	-0.0216**	-0.0278***	-0.0550***	-0.0073**
	(0.0178)	(0.0664)	(0.0174)	(0.0139)	(0.0282)	(0.00872)	(0.0185)	(0.0109)	(0.0198)
Short-run coefficients									
D.FDI	-0.0163	-0.202	0.0418	-0.0808	0.0441	0.00603	-0.200	-0.218	-0.00572
	(0.135)	(0.216)	(0.0724)	(0.0847)	(0.102)	(0.0517)	(0.262)	(0.270)	(0.118)
D.Remittances	-0.0222	-0.0173*	-0.0200	-0.00670	-0.0119	-0.00665*	-0.000577	-0.00427	-0.00185
	(0.0120)	(0.00992)	(0.00456)	(0.00631)	(0.00918)	(0.00401)	(0.0110)	(0.00956)	(0.00398)
D.ODA	-0.0159	-0.0127	-0.0372***	0.00977	0.00672	0.00308	0.0384	0.0176	0.00183
	(0.0152)	(0.0120)	(0.00963)	(0.00834)	(0.00902)	(0.00431)	(0.0214)	(0.0139)	(0.00160)
Constant	-0.0855**	-0.592*	-0.111**	-1.092***	-0.160**	0.220**	-2.562*	-1.756**	-1.139*
	(0.0877)	(0.425)	(0.288)	(0.377)	(0.719)	(0.211)	(1.720)	(1.667)	(0.585)
Observations	428	428	428	337	337	337	126	126	126

Note: The dependent variable is GDP per capita. The values in the parentheses are the standard error [p-value] of corresponding coefficients estimates. ***, **, and * denote a significance of 1%, 5%, and 10%, respectively.

This result is consistent with previous studies, which demonstrate that countries with good institutions quality experience better growth performance (Butkiewicz and Yanikkaya 2006; Nawaz 2015). The long-run effect of remittances on economic growth is globally consistent with results in Table 4 and 5 except for low- income countries, where the effect is positive and significant. For aid-growth relationship, the long-run coefficients are globally negative and significant except in upper-middle income.

The short-run coefficients of FDI, remittances and foreign aid are different from the long-run coefficients. The impact of FDI, Foreign aid and remittances on economic growth are insignificant in all subsamples. Suggesting that in the short run FDI, foreign aid and remittances received by African countries are not sufficient to enhance economic growth.

5. Conclusion

This paper empirically investigates the long-run and short-run effects of foreign direct investment, remittances and foreign aid received by 38 African countries over the period 1980-2016. Empirical evidence is based on Pooled Mean group (PMG) estimator. The following findings are established. First, in the long-run, while FDI have a positive and significant effect on economic growth, remittances and foreign aid do not have any significant effects on economic growth in Africa as a whole. In the short-run FDI, remittances and foreign aid do not have any significant effect on economic growth in African countries as a whole.

To verify if the relationship between FDI, remittances, foreign aid and economic growth is possibly country-specific, we classify our sample in three subsample depending upon the levels of economic development. Our results confirm that the effect of FDI, remittances and foreign aid on economic growth varies with the level of income. In the long-run, while the effect of FDI on economic growth is positive and significant in lower-middle-income and upper-middle –income countries, the effect is non-significant in low-income countries. Remittances have a positive effect on economic growth in low-income countries but non-significant effects in lower-middle-income and upper-middle-income countries. With regard to foreign aid, the overall effect is negative and significant except in upper-middle-income countries where the effect is non-significant. In the short-run, FDI, remittances and foreign aid do not have any significant effect on economic growth.

Globally, an important policy implication of this study is that African governments should implement policies that take into account the reality of each recipient economy. More

specifically, studies have shown that aid received in Africa suffers from the problem of corruption. African countries therefore need to improve their governance in order to better manage the aid received and thus increase the economic benefit of aid. For remittances, studies have shown that much of the funds received are oriented towards the consumption of imported products. As a result, governments should put in place policies that encourage the production and consumption of local products. With regard to FDI, African countries should improve the business environment and establish a facilitating framework for both foreign and domestic investors. Several countries have already taken such measures, however, much remains to be done in this direction.

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Appendices

Appendix 1

Table 7 List of countries

Algeria	Guinea	Nigeria
Benin	Guinea-Bissau	Rwanda
Botswana	Kenya	Senegal
Burkina Faso	Lesotho	Seychelles
Cabo Verde	Liberia	Sierra Leone
Cameroon	Madagascar	South Africa
Comoros	Malawi	Sudan
Congo, Rep.	Mali	Swaziland
Cote d'Ivoire	Mauritius	Tanzania
Djibouti	Morocco	Togo
Egypt, Arab Rep.	Mozambique	Tunisia
Ethiopia	Namibia	Uganda
Ghana	Niger	

Appendix 2

Table 8 Variables definitions

Variables	Signs	Variable definitions (measurement)	Sources
GDP per capita growth	GDP	GDP per capita growth (annual %)	World Bank (WDI)
Remittances	REMIT	Personal remittances, received (% of GDP)	World Bank (WDI)
Foreign Aid	ODA	Net ODA received (% of GNI)	World Bank (WDI)
Foreign direct investment	FDI	Foreign direct investment, net inflows (% of GDP)	World Bank (WDI)
Trade openness	Trade	The sum of exports and imports of goods and services (% of GDP)	World Bank (WDI)
Financial development	M2	Money and quasi money (% of GDP)	World Bank (WDI)