Does the size of the informal economy impede the impact of remittances on economic growth? Evidence from Sub-Saharan African countries

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Abstract

The purpose of this paper is to investigate the relationship between remittances and economic growth. Additionally, it examines whether the size of the informal economy alter negatively the effect of remittances on economic growth, which surprisingly has received less attention in the literature. The paper applied the Ordinary Least Squared (OLS) and system Generalized Method of Moment (GMM) by Arellano and Bond (1991) and Arellano and Bover (1995). The sample include 30 Sub-Saharan African (SSA) countries over 1991-2015. The results show that: first, remittances have a positive and significant effect on economic growth. Second, the impact of remittances on economic growth decreases with the size of the informal economy.

Keywords: Remittances, the informal economy, economic growth, SSA.

JEL Classification: E26; F22; F43; O55

1. Introduction

This paper aims to investigate the effect of remittances on economy growth. It additionally examines the relevance of the informal economy on the relationship between remittances and economic growth in 30 sub-Saharan African countries over the period 1991-2015. Using Ordinary Least Squared (OLS) and System Generalized Method of Moments (GMM), results show that remittances affect positively and significantly economic growth and that the impact of remittances on economic growth decreases with the size of informal economy.

In the recent times, economists and policy makers considered international remittances as an important contributor to economic growth such as capital (Njangang et al., 2018). Developing countries, and particularly Sub-Saharan African countries have been experiencing rapid expansion of migrant remittances in the last decades, far exceeding the official development assistance received and other private capital inflows in many countries (Fig 1). According to the World Bank (2017), officially, recorded remittances to developing countries is estimated to US$ 442 billion in 2017. On the other hand, remittances to sub Saharan African countries increased from US$29.9 billion in 2010 to an estimated US$37.8 billion in 2017 and are forecast to hit around US$39.2 billion in 2018 and US$39.6 billion in 2019. Although this amount seems lower compared to other regions (East Asia with US$128 billion, South Asia with US$111.6 billion and MENA region with US$51.2 in 2017), it does not take into account remittances transferred through informal channels, such as friends and family members travelling abroad, or informal money-transfer networks such as the "hawala" system.

Despite their increased importance and volume, the impact of remittances on economic growth is still an unresolved puzzle. Some studies in this literature found that remittances have a positive impact on economic growth in the recipient countries (Nyamongo et al., 2012; Nsiah and Fayissa, 2013; Olubiyi, 2014; Meyer and Shera, 2017), while others found no such evidence (Ahamada and Coulibaly, 2013) and somewhat a negative impact (Chami et al., 2003; Amuedo-Dorantes and Pozo, 2004; Acosta et al., 2009; Elu and Price, 2012) on economic growth. At the crossroads of these two opposing groups, there is a third group of researchers who consider the indirect effects of remittances on economic growth. Indeed, it has been shown in the literature that remittances can influence economic growth through several channels such as growth volatility (Hnatkovska and Loayza, 2004), Exchange rates (Lopez et al., 2007; Lartey et al., 2008), human capital formation (Yang, 2008; Calero et al., 2009 and Adams and Cuecuecha, 2010), investment (Woodruff and Zenteno, 2007) and financial development (Giuliano and Ruiz–Arranz, 2009; Nyamongo et al., 2012; Kumar et al., 2018). This study is related to this

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third group of researchers and investigates the relevance of the size of the informal economy on the relation between remittances and economic growth in Sub-Saharan African countries.

Although a large part of the remittances literature focuses on the remittances–growth relationship in both developing and developed countries, to the best of our knowledge, there are no studies that focus specifically on the role of the size of the informal economy on the link between remittances and economic growth. As we know that developing countries, and particularly Sub-Saharan African countries are characterised by a large informal sector, a large informal economy might alter the effect of remittances on economic growth. Moreover, the informal economy has proved to be a major obstacle of development in developing countries where as much as 75% of production takes places underground (compared to only around 10% in developed countries) (Schneider and Enste, 2000). Our goal is to bridge this gap by analysing the relevance of the size of the informal economy in the relationship between remittances and economic growth in Sub-Saharan Africa.

Figure 1: Remittances, foreign aid and FDI, 1980-2016.
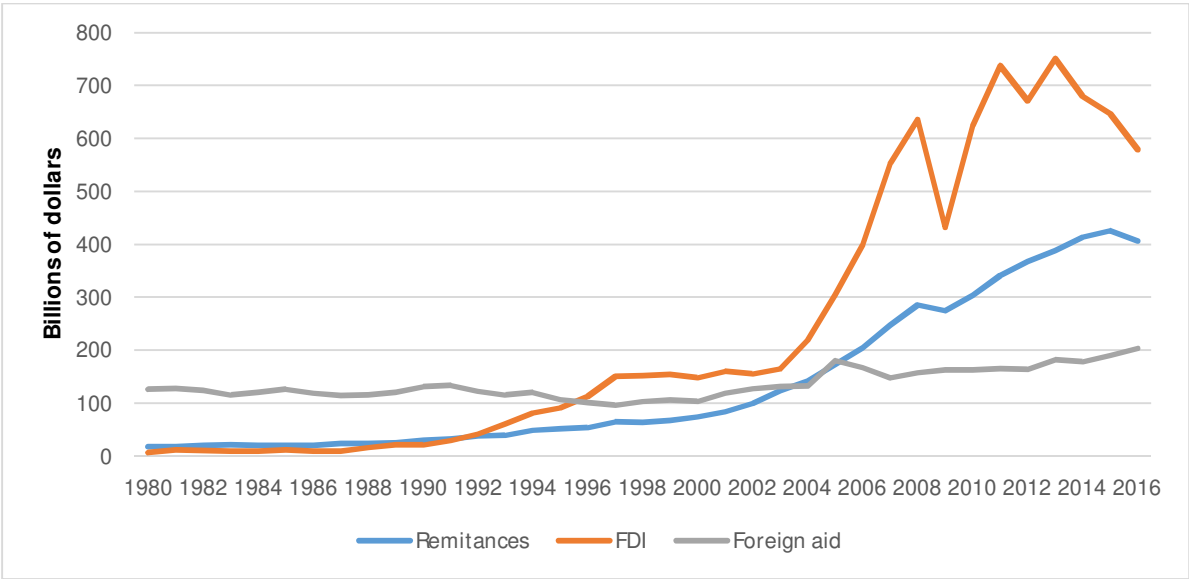
Source: World Development Indicator (2017) and authors' calculations.

The rest of this paper is organized as follows. Section 2 presents a brief literature reviews. Section 3 lays out the data, the empirical mode, and the estimation strategy. Section 4 presents and analyses the results. Section 5 concludes with policy implications.

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2. Brief literature reviews

The relationship between remittances and economic growth has been widely examined in the literature (Chami et al., 2008; Pradhan et al., 2008; Rao and Hassan, 2011; Cooray, 2012; Feeny et al., 2013). The question that researchers are trying to answer is whether and to what extent remittances contribute to economic development. Nevertheless, empirical studies have shown inconsistent and even contradictory results in terms of the link between remittances and economic growth. The enormous and growing literature on this subject can be categorized under two main strands. The first strand supports the optimistic view that remittances have a positive impact on economic growth, while the second strand contradicts the previous views and argues that remittances can be detrimental for economic growth.

Several studies have reported evidence that remittances have a positive and significant effects 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, 2011; Anton, 2010; Yang, 2008; Woodruff and Zenteno, 2007), all of which have a significant effect on productivity, employment and finally on economic growth. Recently, Williams (2018) investigated the effect of remittances on a large panel of 109 developing countries and found that remittances promote growth in countries with good quality of democratic institutions. The positive growth effect of remittances is confirmed in several other studies (Olubiyi, 2014).

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 endeavor 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 rather than productivity improving spending. 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 reason 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).

3. Data and methodology

The empirical approach is designed to assess the role of the size of the informal economy in the relationship between remittances and economic growth in Sub-Saharan African countries. In this section our data is described (section 3.1), model specification is presented (section 3.2) and the estimation strategy is discussed (section 3.3).

3.1. Data

We investigate a panel of 30 Sub-Saharan African countries over the period 1991-2015 with data from different sources. The choice of the selected countries and periodicity for this study are primarily dictated by the availability of reliable data. In line with the empirical growth literature, the dataset is average over five-year period to validate the methodology used. More

precisely, the dataset is divided into five non overlapping five-year intervals: 1991-1995; 1996-2000; 2001-2005; 2006-2010 and 2011-2015. The full description of the data is as follows:

The dependent variable is economic growth measured by the GDP per capita growth. This variable is obtained directly from the World Bank: African Development indicators. Our main independent variables are remittances received as a percentage of GDP and the size of the informal economy (or shadow economy) as a percentage of GDP. The size of the informal economy is obtained from Medina and Schneider (2017). These authors applied the Multiple Indicators Multiple Causes (MIMIC) modelling approach to estimate the size of the informal economy as a percentage of GDP. Remittances received is gathered from the World Bank: African Development indicators.

Table 1: Summary statistics, 5 year-average for the period 1991-2015.

Variable	Obs	Mean	S.D	Minimum	Maximum
Remittances	150	.1951417	1.595904	-4.044901	3.45031
Informal economy	150	3.647377	.2404783	2.956471	4.204693
GDP per capita growth	150	6.894765	.9650817	5.289112	9.342908
Population growth	150	2.68096	.6407887	.7072151	6.127723
Inflation rate	147	3.803759	.4550685	.5659054	6.479244
Trade openness	150	4.175024	.4000912	2.94973	5.371137
Financial development	150	3.258088	.4843104	2.212731	5.703973
Government expenditure	150	2.603425	.3593497	1.521541	3.660246
Human capital	150	4.527339	.2667194	3.394354	5.003238
Labor force participation	150	4.213145	.1720849	3.843616	4.480068
corruption	150	2.142611	.7750722	0	4.333334
Government stability	150	8.235278	1.282659	5.91667	10.99166

S.D: Standard Deviation

Next to the informal economy variable, we include nine control variables, generally considered in the literature as determinants of economic growth: (i) Population growth; (ii) Inflation rate; (iii) Trade openness; (iv) financial development (M2); (v) Government expenditure; (vi) Human Capital; (vii) Labor force participation; (viii) Corruption control and (ix) Government stability. Table 1 and 2 present the descriptive statistics and correlation matrix of the variable employed in the analysis respectively. 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. Moreover, we notice from correlation matrix that, while remittances and economic growth are positively correlated, the correlation between the informal economy and economic growth is negative. However, since correlation does not mean causality, this correlation will be verified by empirical analysis. The Definition of variables and list of countries are given in appendix. All variables are in log transformed, except corruption and government stability.

Table 2 : Correlation matrix

	Remit	IS	GDPPg	PopG	Inflation	Trade	M2	Govex	HK	Laborforce	corruption	govstab
Remit	1.0000											
IS	0.1564	1.0000										
GDPPg	0.0857	-0.1236	1.0000									
PopG	0.1024	0.0096	0.1580	1.0000								
Inflation	-0.1690	0.2398	-0.2056	-0.1174	1.0000							
Trade	-0.1203	-0.0915	-0.0343	-0.0648	0.0659	1.0000						
FinDev	0.0657	-0.0708	0.0688	-0.2437	0.0192	0.3465	1.0000					
Govex	-0.2276	-0.0974	0.0126	-0.0318	0.0453	0.4377	0.3581	1.0000				
HK	-0.2164	-0.1829	-0.0138	-0.1531	-0.0250	0.4376	0.2537	0.0649	1.0000			
Laborforce	-0.0787	0.3036	0.0537	0.2119	0.1652	0.0436	0.0183	0.1222	0.0082	1.0000		
Corruption	-0.1866	0.0814	-0.1167	0.0348	0.0115	0.1076	0.0527	0.2865	0.0306	0.1079	1.0000	
Govstab	0.0068	-0.1773	0.3191	0.0627	-0.2493	0.2827	0.0306	0.0946	0.2202	-0.0848	-0.0654	1.0000

Note. Remit : remittances. IS: the size of the informal economy. GDPPg : GDP per capita growth. PopG : population growth rate. M2: financial development. Trade: trade openness. Govex : government expenditure. HK : human capital. Laborforce : labor force participation. Govstab : government stability.

3.2.Model specification

To investigate the relationship between remittances, the informal economy and economic growth, we divide the sample period 1991–2015 into 5 non-overlapping 5-year periods to avoid the influence of idiosyncratic economic dynamics at business cycle frequency, as well as to control for cyclical output movements. As a starting exercise, we estimate the impact of remittances on economic growth without introducing in our first regression the informal economy variable. For this purpose, the empirical model is based on Lartey (2013); Adams and Klobodu (2016) and Zghidi et al. (2018). Following these studies, we estimate the following equation:

$$growth_{it} = gdp_{it} - gdp_{it-1} = \beta_0 + \beta_1 gdp_{it-1} + \beta_2 Remittances_{it} + \beta_3 X_{it} + \mu_i$$

$$+ v_t + \varepsilon_{it} \qquad (1)$$

Where $growth_{it}$ equals the growth rate of GDP per capita, gdp_{it} is the logarithm of GDP per capita growth, $Remittances_{it}$ is equal to remittances over GDP, X_{it} represents a vector of conditioning information that controls for other factors associated with economic growth, μ_i is an unobserved country-specific effect, v_t is time specific effect and ε_{it} is the error term.

Beyond the direct impact of remittances on economic growth described in equation (1), the growth effect of remittances can occur through indirect channels. As mentioned above, this paper investigates the role of the size of the informal economy in the relationship between remittances and economic growth. For this purpose, we interact remittances with the size of the informal economy variable and test for the significance of the interacted coefficient. The specification of the equation is the following:

$$growth_{it} = \beta_0 + \beta_1 gdp_{it-1} + \beta_2 Remittances_{it} + \beta_3(Remittances_{it} \times Informal_{it})$$

$$+ \beta_4 Informal_{it} + \beta_5 X_{it} + \mu_i + v_t + \varepsilon_{it} \qquad (2)$$

Where $Informal_{it}$ is the informal economy, $(Remittances_{it} \times Informal_{it})$ is the interaction term between remittances and the informal economy. To test the hypothesis explained above, we are interested in β_2 and β_3, which provide information on the marginal effect of remittances on economic growth according to the size of the informal economy. A negative coefficient of interaction between remittances and the informal economy would imply that the marginal impact of remittances on growth is decreasing with the size of the informal economy. On the other hand, a positive interaction would indicate that the growth effects of remittances are enhanced by the informal economy.

3.3. Estimation strategy

To investigate the relationship between remittances, the informal economy and economic growth, a panel data models for five non overlapping five-year intervals are estimated from 1991 to 2015. Our benchmark model (Eq.1) is estimated with two different panel methods, namely, the Ordinary Least Squared (OLS) and Generalized Method of Moments (GMM). We first use the Ordinary Least Square (OLS) estimator to estimation Equation (1). However, when the OLS technique is used to estimate this model, the estimated coefficients are inconsistent and likely to be biased since the lagged value of GDP is positively correlated with the omitted fixed effects. Moreover, due to the fact that there is a possibility that both remittances and

growth are endogenous, to estimate Equation (1) we apply the System Generalized method of moment (GMM) proposed by Arellano and Bond (1991), Arellano and Bover (1995), and Blundell and Bond (1998). GMM is useful for several advantages. First, GMM estimator has been widely used to address the endogeneity problem that appears in panel data estimation of growth regressions (Arellano and Bover, 1995 and Blundell and Bond, 1998). Second, GMM estimator also take into account the biases that appear due to country-specific effects or the presence of the initial GDP in the growth's covariates. Third, GMM also avoids simultaneity or reverse causality problems. The consistency of the GMM estimator depends on two things: the validity of the assumption that the error term does not exhibit serial correlation (AR2) and the validity of the instruments (Hansen test).

GMM method have two variant namely, the one-step estimators and two-step estimators. However, the two-step estimator has been proved to be more efficient than the one-step estimator because it uses optimal weighting matrices (Law et al., 2017). Therefore, this paper applies the two-step system GMM. The use of two-step estimator to a small cross-section dimension may lead to biased standard errors. To correct this bias, the Arellano and Bover (1995) extension by Roodman (2009a, 2009b) is applied. This estimation strategy uses forward orthogonal deviations in place of first differences. GMM with forward orthogonal deviation has been proved to account for cross sectional dependence and to limit instruments proliferation (Balgati, 2008).

4. Empirical results

In this section, we present results obtained from the estimations. The baseline estimations is carried out using OLS and system GMM. Analysis will primarily start with the simplest version of the model by investigating if remittances promote economic growth. All variables have been converted into logarithmic form for the empirical estimation with the exception of the institutional variable (corruption and government stability). Coefficients are thus interpreted as elasticity. Results are presented in Table 3-6. Table 3 presents OLS and System GMM results of the impact of remittances on economic growth. Table 4 replicates the results presented in Table 3 with more control variables. The interaction effect of remittances and the size of the informal economy on economic growth is reported in Table 5. The estimation regressions satisfy mutually the Hansen test of the validity of instruments and the serial correlation test (AR (2)).

Table 3: Baseline model: Impact of Remittances on economic growth

| | Dependent variable : GDP per capita growth | | | | | |
| | OLS | | | GMM | | |
	(1)	(2)	(3)	(4)	(5)	(6)
Remittances	**0.289***	**0.283***	**0.272***	**0.0522***	**0.0432***	**0.0404***
	(0.0358)	**(0.0370)**	**(0.0380)**	**(0.0117)**	**(0.00636)**	**(0.0103)**
Population growth	-0.624***	-0.625***	-0.611***	-0.00266	-0.00246	-0.00526
	(0.109)	(0.109)	(0.110)	(0.0221)	(0.0215)	(0.0212)
Inflation rate	-0.216	-0.211	-0.198	-0.0983***	-0.0850***	-0.105***
	(0.131)	(0.132)	(0.132)	(0.0177)	(0.0108)	(0.0172)
Trade openness	0.433***	0.399**	0.312*	0.0914***	0.0666**	0.0560
	(0.157)	(0.166)	(0.181)	(0.0291)	(0.0270)	(0.0365)
Financial development	0.253*	0.225	0.199	0.0176	0.0305***	0.0170
	(0.138)	(0.145)	(0.146)	(0.0108)	(0.00505)	(0.0111)
Government expenditure		0.125	0.176		0.0558	0.0177
		(0.195)	(0.200)		(0.0406)	(0.0378)
Human capital			0.308			0.166*
			(0.255)			(0.0832)
L.(GDP per capita growth)				0.935***	0.963***	0.952***
				(0.0339)	(0.0240)	(0.0337)
Constant	6.790***	6.683***	5.514***	7.653*	8.019**	8.924**
	(0.900)	(0.917)	(1.333)	(3.902)	(3.837)	(3.754)
R-squared	0.488	0.489	0.494			
Observations	147	147	147	119	119	119
Instruments				26	28	28
Number of countries				30	30	30
AR(1) test				0.0620	0.0688	0.0603
AR(2) test				0.288	0.255	0.248
Hansen OIR				0.238	0.368	0.764

Note. Standard errors are reported in parenthesis. ***,**,* significant at 1%, 5% and 10% levels respectively.

4.1.Baseline estimators

Table 3 reports OLS and System GMM results of the impact of remittances on economic growth. Results shows that remittances have a positive and strongly significant effect on economic growth. These results suggest that remittances on itself promote economic growth in our sample of countries. For example results in column (3) and (6) suggest that a 1 percent increase in remittances increases economic growth by 0.272% and 0.0404% respectively for OLS and System GMM estimators. These results can be explained by the fact that remittances are seen as an important sources of savings, consumption for some countries, improving education and health access, providing African countries access to capital for investment and

thus lead to more economic growth. This result is consistent with several past studies on remittances - growth nexus (World Bank, 2006; Mundaca, 2009; Nyamongo et al., 2012; Kumar et al., 2018). For the independent variables population growth and inflation, we get a negative sign suggesting that the higher growth rate of population and inflation rate in a country, the lower is the rate of economic growth. The coefficients associated with the independent variable trade openness and human capital have the theoretically expected positive sign and the sign is highly statistically significant (for trade openness), implying that the higher the trade with foreign countries, the higher the rate of economic growth. The coefficient on government expenditure is positive but non- significant.

4.2. Accounting for other factors that may influence economic growth

We confront our baseline results in terms of alternative explanations for our model. For this purpose, we evaluate our results by including more control variables, namely: Labor force participation rate, corruption control and government stability. Table 4 presents OLS and System GMM results of the impact of remittances on economic growth with these additional control variables. Results reinforce our previous findings in Table 3. These results confirm that the effect of remittances on economic growth is positive and statistically significant. Results in Column (2) and (5) show that a 1 percent increase in remittances leads to 0.286% and 0.0622% increase in economic growth respectively for OLS and GMM estimation methods.

4.3. Interaction effect of remittances and the informal economy on economic growth

Beyond the direct impact of remittances on economic growth presented in Table 3-4, the growth effect of remittances can occur through indirect channels. As mentioned above, this paper investigates the role of the informal economy on the relationship between remittances and economic growth. For this purpose, we interact remittances with the informal economy variable (Remittances*Informal economy) and test for the significance of the interacted coefficient. The sign of the interacted coefficient provides information regarding the nature of remittances. More specifically, a positive interaction term reveals that they are complementary and that a large size of the shadow economy enhances the impact of remittances on economic growth. On the other hand, a negative sign indicates that the shadow economy decreases the positive effect of remittances on economic growth. Table 5 (columns 2 and 4) presents OLS and system GMM estimates. Our analysis focus on the System GMM specification. Results show that the coefficient associated with (Remittances*Informal economy) is negative and statistically

significant, which indicates that the impact of remittances on economic growth decreases significantly with the size of the informal economy. This result suggests that if Sub-Saharan African countries want to fully benefit from the economic outcomes of migrant remittances, they must put in place policies to encourage the transition from the informal sector to the formal sector.

Table 4: estimation with more control variables

| | Dependent variable : GDP per capita growth | | | | | |
| | OLS | | | GMM | | |
	(1)	(2)	(3)	(4)	(5)	(6)
Remittances	**0.282***	**0.286***	**0.284***	**0.0439***	**0.0622***	**0.0358***
	(0.0289)	**(0.0291)**	**(0.0294)**	**(0.0107)**	**(0.0165)**	**(0.0123)**
Population growth	-0.327***	-0.338***	-0.327***	-0.0128	-0.0514**	-0.0409*
	(0.0882)	(0.0886)	(0.0884)	(0.0175)	(0.0242)	(0.0226)
Inflation rate	-0.0342	-0.0464**	-0.0164	-0.0882***	-0.0731**	-0.0383**
	(0.103)	(0.0184)	(0.0209)	(0.0143)	(0.0314)	(0.0145)
Trade openness	0.828***	0.636***	0.596***	0.0674**	0.0890***	0.0861***
	(0.179)	(0.183)	(0.171)	(0.0300)	(0.0269)	(0.0222)
Financial development	0.263**	0.253**	0.256**	0.0598*	0.0500***	0.0480*
	(0.112)	(0.112)	(0.114)	(0.0343)	(0.0138)	(0.0272)
Government expenditure	0.364**	0.386**	0.369**	0.000448	0.0645	0.111**
	(0.153)	(0.154)	(0.154)	(0.0471)	(0.0662)	(0.0503)
Human capital	0.482**	0.494**	0.479**	0.249***	0.00935	0.0828
	(0.195)	(0.195)	(0.196)	(0.0675)	(0.118)	(0.113)
Labor force participation	-0.155	-0.216*	-0.196	-0.3351**	-0.3516*	-0.1000**
	(0.100)	(0.127)	(0.127)	(0.122)	(0.202)	(0.0465)
Corruption Control		0.0703			0.0583**	
		(0.0612)			(0.0231)	
Government stability			0.0118			0.0116
			(0.0378)			(0.00924)
L.(GDP per capita growth)				0.960***	0.950***	0.944***
				(0.0340)	(0.0299)	(0.0278)
Constant	14.59***	14.55***	14.72***	8.924**	8.809***	7.585**
	(1.355)	(1.353)	(1.418)	(3.754)	(3.032)	(3.820)
R-squared	0.710	0.712	0.710			
Observations	147	147	147	119	119	119
Instruments				26	29	29
Number of countries				30	30	30
AR(1) test				0.0587	0.0884	0.0606
AR(2) test				0.286	0.168	0.977
Hansen OIR				0.783	0.965	0.924

Note. Standard errors are reported in parenthesis. ***,**,* significant at 1%, 5% and 10% levels respectively.

Consistent with previous studies, results report in Table 5 also show that the size of the informal economy affects negatively economic growth (Loayza, 2016; Afonso and Sarabanda, 2017). With regards to the control variables, their signs are consistent with standard growth regressions.

Table 5 : Remittances, informal economy and economic growth

	Dependent variable : GDP per capita growth			
	OLS		GMM	
	(1)	(2)	(3)	(4)
Remittances	**0.246***	**0.283***	**0.0387***	**0.0804***
	(0.128)	**(0.0636)**	**(0.00681)**	**(0.0203)**
Informal economy	-0.981***	-1.048***	-0.0425	-0.0667
	(0.244)	(0.228)	(0.0313)	(0.0598)
Remittances*Informal economy		**-0.0717***		**-0.0590***
		(0.0158)		**(0.0325)**
Population growth	-0.596***	-0.499***	-0.0202	-0.0963**
	(0.104)	(0.0990)	(0.0204)	(0.0455)
Inflation rate	-0.0746	0.0132	-0.0843***	-0.0995***
	(0.130)	(0.122)	(0.0114)	(0.0138)
Trade openness	0.359**	0.164	0.0554*	0.00693
	(0.158)	(0.162)	(0.0272)	(0.0381)
Financial development	0.135**	0.169***	0.0307***	0.00932
	(0.0612)	(0.0303)	(0.00574)	(0.0173)
Government expenditure	0.0874	0.174	0.0607	0.0260
	(0.186)	(0.177)	(0.0411)	(0.0563)
Human capital		0.238		0.147
		(0.226)		(0.104)
L.(GDP per capita growth)			0.968***	0.967***
			(0.0236)	(0.0354)
Constant	9.947***	9.321***	9.911***	10.04***
	(1.190)	(1.421)	(3.763)	(3.063)
R-squared	0.542	0.610		
Observations	147	147	119	119
Instruments			27	29
Number of countries			30	30
AR(1) test			0.0698	0.0566
AR(2) test			0.257	0.381
Hansen OIR			0.362	0.949

Note. Standard errors are reported in parenthesis. ***,**,* significant at 1%, 5% and 10% levels respectively.

5. Conclusion

Do remittances spur economic growth in Sub-Saharan African countries? How does the size of the informal economy influence the effects of remittances on economic growth? To answer these important economic questions, this paper investigates the relationship between remittances and economic growth using the annual data of 30 Sub-Saharan African countries over the period 1991–2015. It additionally examines whether the shadow economy influence the positive effects of remittances on economic growth. The empirical evidence is based on ordinary Least Squared (OLS) and System Generalized Method of Moment (GMM). The results suggest that remittances have a highly statistically significant positive effect on economic growth. The positive impact of remittances on economic growth is quantitatively important and robust to the inclusion of more control variables. This clearly suggests that higher level of remittances leads to more economic growth. The interaction term between remittances and informal economy has a negative and significant influence on economic growth. This result suggests that a larger informal economy impede the effect of remittances on economic growth.

We can draw the following policy implications from our results. Governments willing to benefit more from remittances in terms of economic growth should put in place policies that encourage and facilitate the transformation of informal activities into formal activities. Which would allow them to better control the transfers of remittances and to better profit from them.

Appendix

Table 6 : Definitions of variables

Variables	Variables Definition (measurement)	Sources
GDP per capita growth	GDP per capita growth (annual %)	World Bank (WDI)
Remittances	Personal remittances, received (% of GDP)	World Bank (WDI)
Informal economy	Informal economy (% of GDP)	Medina and Schneider (2017)
Government expenditure	General government final consumption expenditure (% of GDP)	World Bank (WDI)
Population	Population growth (annual %)	World Bank (WDI)
Trade openness	Sum of exports and imports (% of GDP)	World Bank (WDI)
Financial development	Broad money (% of GDP)	World Bank (WDI)
Human capital	School enrollment, primary (% gross)	World Bank (WDI)
Inflation rate	Inflation, consumer prices (annual %)	World Bank (WDI)
Labor force participation	Labor force participation rate, total (% of total population ages 15-64) (modeled ILO estimate)	World Bank (WDI)
Corruption control	A measure of corruption within the political system that is a threat to foreign investment by distorting the economic and financial environment, reducing the efficiency of government and business by enabling people to assume positions of power through patronage rather than ability, and introducing inherent instability into the political process	ICRG
Government stability	A measure of both of the government's ability to carry out its declared program(s), and its ability to stay in office. The risk rating assigned is the sum of three subcomponents: Government Unity, Legislative Strength, and Popular Support	ICRG

Table 7: List of countries (30)

Angola	Guinea	Nigeria
Botswana	Guinea-Bissau	Senegal
Burkina Faso	Kenya	Sierra Leone
Cameroon	Liberia	South Africa
Congo, Rep	Madagascar	Sudan
Côte d'Ivoire	Malawi	Tanzania
Ethiopia	Mali	Togo
Gabon	Mozambique	Uganda
The Gambia	Namibia	Zambia
Ghana	Niger	Zimbabwe

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