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The Impact of Remittance on Domestic Investment: The Role of Financial and Institutional Development in Five Countries in Sub-Saharan Africa

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Abstract

Migrants' remittances may stimulate domestic investment in the country of origin, due to the moderating role of local institutions and financial sector development. I test this proposition using a balanced panel data of five Sub-Saharan African countries from 1984 to 2014. Panel fixed effects are used as the estimation technique. In a fixed effect regression of remittances and institutional development on domestic investment, while controlling for the level of economic development, the estimates indicate that remittances exert a significant positive effect on domestic investment. Also, the interaction effect of remittances and institutions shows that political institution serves as a mechanism through which remittances impact domestic investment. Besides, the interaction of financial development and remittances yields a modest impact on investment. The findings indicate that the effect of remittances on investment are larger in the presence of better financial institutions. Hence, policy makers are encouraged to improve institutions in the five countries studied in particular and Africa as a whole.

Keywords: Remittances, Domestic Investment, Fixed Effects, Institutions and Financial Development.

1. Introduction

Conventional wisdom holds that increasing investment in productive assets such as physical capital and value-creating micro-enterprises is crucial to ensuring the long-term growth that developing countries want. However, investing in productive assets requires a mix of public and private financial resources. This fact explains to some extent the crucial role of external financial inflows such as foreign direct investment and official development assistance.

A key signal of the increasing integration between high-income and low-income countries is the upsurge in migrant flows from developing to advanced nations. The associated incident of remittances has also been the focus of policy makers and development economists. Remittances are noted to be

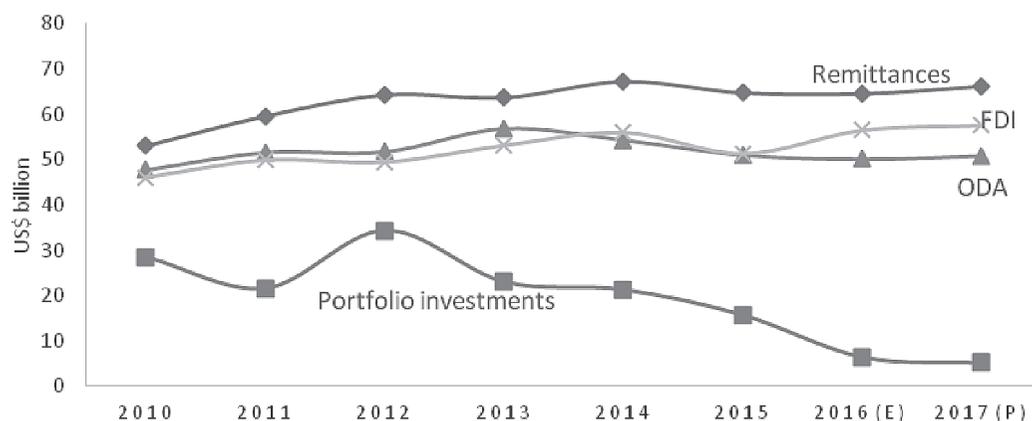
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the most significant contribution of migrants to their home economies (Adams 2003; Taylor *et al.* 1996). Remittance inflows to developing economies are large and growing. In 2013, reported assessments show that remittances to developing economies totalled US\$417 billion out of the global amount of US\$573 billion (World Bank 2013). However, those flows may understate the actual international remittances, a point on which the literature unanimously agrees (World Bank 2006; Freund and Spatafora 2008). A high proportion of the flows went to Africa, which indicates that the continent has been part of the overall rising global trend. Between 2010 and 2013, remittance inflows into Africa increased by more than 17%, from US\$29.7 billion to about US\$34.7 billion, surpassing the Official Development Assistance (World Bank 2013).

Based on current remittance data, the World Bank (2016) shows that remittances as a percentage of Gross Domestic Product (GDP) to the South Asia region were 4.46%, 2.25% for sub-Saharan Africa (SSA), 1.78% for the Middle East and North Africa (MENA), 1.14% for Latin America and the Caribbean, and 0.46% for East Asia and the Pacific. Moreover, for the five countries studied, remittances financed 31.05% of Ghana’s imports in 2003 (Addison 2004: 31) and one-third of imports from Nigeria in 2013 (World Bank 2015: 23). Remittance inflows into Africa have been stable and rising relative to other external flows, as shown in Figure 1.

For many African countries, remittances represent strategic buffer stock that helps to increase foreign exchange reserves, support macroeconomic stability and allow for investments, including education and small businesses (AfDB/OECD/UNDP 2017: 57). In 2017, AfDB/OECD/UNDP (2017: 43) shows that total external flows to Africa are expected to increase slightly to US\$ 179.7 billion on account of sharp rises in remittances (+ 2.4%), Foreign Direct Investment (FDI) (+ 1.9%) and Official Development Assistance (ODA) (+ 1.4%). Remittances surged approximately 50% from 2005 to 2009

Figure 1 Remittances and Other External Flows to Africa, 2010–2017



Note: (e) estimates; (p) projections.

Source: Organization for Economic Co-operation and Development (2017)

and are projected to hit US\$ 66.2 billion in 2017 up from US\$ 64.6 billion in 2016. As shown in Table 1, in 2016, seven countries in Africa including Lesotho, Gambia, Senegal and Liberia, had remittances-to-GDP ratio over 10%, while nine African countries experienced remittances per capita above US\$100.

Despite an upsurge in remittance inflows into SSA countries, the empirical literature on the contribution of remittances to domestic investment in Africa is still a matter of intense debate among practitioners, policy-makers and scholars in migration studies. At the macro-level, while some empirical studies show that remittance inflows may have a positive effect on investment in the countries of origin through their impact on macroeconomic stability as well as increasing recipients' collateral (Barajas *et al.* 2009; Chami Hakura and Montiel 2009; Senbeta 2013), studies such as Massey *et al.* (1987) and Chami *et al.* (2005) contend that remittances are mainly driven by altruism and are usually used to smooth consumption and improve welfare. Hence, remittances might not be used for productive investment purposes.

This study critically investigates the impact of remittance inflows on investment under different levels of the financial sector and institutional development in five remittances-recipient countries in SSA, namely Ghana, Kenya, Nigeria, Senegal and Togo. The study uses a balanced panel data set which spans from 1984 to 2014. Results indicate that remittances have a significant positive impact on domestic investment. Moreover, the interaction of remittance inflows and institutional indicators exerts a positive and significant impact on investment. I document a rather modest impact on investment when remittances and financial sector development indicators were interacted, suggesting that remittance recipients are less likely to receive remittances from financial institutions. A better

Table 1 Fifteen Largest Recipient Countries in Africa (Expressed by % of GDP), 2016

Country	Current US\$ billion	US\$ per capita	% GDP
Nigeria	20.00	108.9	4.8
Egypt	18.66	204.9	5.7
Morocco	7.10	209.9	6.8
Ghana	2.15	78.1	5.0
Tunisia	2.02	180.0	4.8
Senegal	1.96	127.4	13.2
Mali	0.94	55.6	6.6
Liberia	0.66	150.0	30.4
Togo	0.45	60.3	10.0
Lesotho	0.32	165.3	17.7
Cabo Verde	0.20	384.7	12.1
Gambia	0.19	91.3	21.0
Comoros	0.13	161.4	21.4
Guinea-Bissau	0.07	36.3	5.6
Sao Tome & Principe	0.02	93.5	5.5

Source: World Bank (2016)

understanding of the channel via which remittances affect investment is necessary for formulating smart and appropriate policy to facilitate the investment impact of remittance inflows.

The rest of the study is organised as follows. Section 1 deals with the introduction. Section 2 presents the literature review. Section 3 introduces the empirical strategies and the data set. Section 4 discusses the empirical findings, and Section 5 concludes the study.

2. Literature Review

2.1. Remittance Inflows and Domestic Investment

In the 1950s and 1960s, economic development theorists claimed that an increase in domestic investment by governments and individuals could be the panacea to economic development and transformation of underdeveloped countries (Lewis 1954; Rostow 1960). Studies have shown that most developing countries face financial challenges to carry the productive capacity of their economies and citizens (Levine and Zervos 1998; Rajan and Zingales 1998). In these countries, remittances can play important roles in facilitating investments in both private and public goods. Contrary to popular belief that remittance inflows are mainly spent on unproductive activities, remittances can serve as a critical source of development funds for receiving countries. Woodruff and Zenteno, (2011) argue that remittances contribute to investment growth. Their results provide evidence that most remittance-receiving countries have weak credit markets. Hence remittances often become funds for financing investment in small- and medium-scale enterprises (Amuedo-Dorantes and Pozo 2006).

Thus remittance inflows may have some relationship with domestic investment in developing countries (Dzansi 2013). Adelman and Taylor (1988) utilise a social accounting matrix (SAM) multiplier analysis to assess the effects of remittance inflows on the level and distribution of household wealth in rural Mexico. They observe that each \$100 decrease in remittances from the United States leads to a \$25 decrease in physical investment and a \$13 decline in educational investment. Similarly, Mishra (2005) investigates the macroeconomic impact of remittances on 13 Caribbean countries. He finds that a 1% increase in remittance inflows causes a 0.6% increase in domestic investment.

Remittances may influence national income in a significant number of developing economies. The World Bank (2006: 86) states that “in economies where the financial system is underdeveloped, remittances appear to alleviate credit constraints and may stimulate economic growth”. Supporting this point, a study by Mundaca (2009) based on 39 selected Latin American and Caribbean countries during the period of 1970–2002 established the existence of complementarity between remittances and financial development in facilitating growth. In contrast, Chami *et al.* (2005) do not find any significant impact of remittances on investment growth. These authors claim that remittance inflows are not profit driven and appear not to serve as a source of investment capital at the macro-level.

2.2. Potential Linkages Between Remittance Inflows and Financial Development

The effect of remittances on financial sector development is, in principle, unclear. The concept that remittances might improve financial sector development in low-income economies is based on the notion that money sent via banks would enhance recipients' economies to have a foothold on other financial services and products, which could have been otherwise impossible (Fedewa and Orozco 2006). Nevertheless, providing money transfer services permits financial institutions to "get to know" and keep in touch with "unbanked" remittance recipients. Also, supposing that higher formal lending to remittance receivers fails to happen, in general, loanable credits in the country might surge if banks' loans increase by deposits associated with remittances. More recently, Aggarwal, Demirgüç-Kunt and Martinez-Peria (2011) analysed the impact of remittances on financial development for 99 developing economies for the period 1975-2003. They found that improved institutional framework has resulted in an increase in deposits and bank credits in the domestic banking system. Dzansi (2013) supports this finding and observes a complementarity between remittance inflows and financial sector development in facilitating investment growth among 79 developing countries during the period of 1995 to 2005. On the contrary, Fajnzylber and Lopez (2007) argue that an increase in remittance inflows might not cause a surge in credit to the economic if these external flows are rather used to sustain the government. They also claim that a rise in remittance inflows might not boost bank deposits if recipients distrust banks and adopt other means to save these external inflows.

Remittance inflows are a critical source of external funds for domestic investment in the major sectors such as housing and health, as well as business/enterprise development (Aggarwal *et al.* 2011; Ratha and Silwal 2012; Terry and Wilson 2005). Thus funds generated from remittances have a multiplier effect on recipient economies, and at the apex remittances promote economic growth in developing countries (Taylor and Dyer 2009).

The multiplier effect can, therefore, be traced for various channels (Pradhan *et al.* 2008; Ziesemer 2006). For instance, remittances might help in the financing of domestic consumption (Adams 2006; De Haas 2010), which is not necessarily a bad thing, especially investing in some consumption goods such as education and food, which might also be regarded as investment to augment human capital (Lucas 2006). On the other hand, remittances may positively influence growth and investment in productive sectors in developing countries when remittance receivers channel them into productive ventures (Chowdhury 2016). According to Chowdhury (2016), this assertion stems from Friedman's permanent income hypothesis, which stipulates that the propensity to save is higher among households receiving remittances compared to other family income (Friedman 1956). Nonetheless, this can only be the case when the financial sector of these economies become well developed (Freund and Spatafora 2008; Giuliano and Ruiz-Arranz 2009). Chowdhury (2016) notes that in remittance-receiving economies, where financial systems are poorly developed, the usage of funds received from remittances for productive investment negatively impacts growth due to liquidity constraints.

2.3. Remittances and Institutional Framework

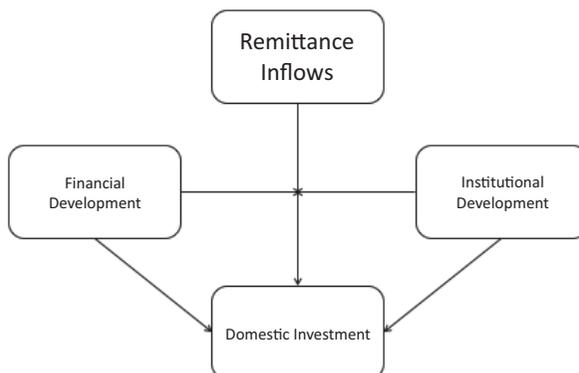
A considerable amount of literature has examined the link and the interaction between remittances and institutional development for developing economies using different estimation approaches. However, there is little consensus on results. The levels of institutional development within developing countries have been found to have some significant influence on the availability and utilisation of remitted funds. Therefore, the institutional framework and policies operating in a country may affect investment initiated by remittance receivers. A typical example is the extent of development of the political institutions in the receiving country. Kevin (2017) assesses the effect of remittance inflows on democratic institutions in SSA. Using remittance data on 45 economies in SSA for the period 1975 to 2014, he claims that there is a positive relationship between remittance inflows and democratic institutions. Additionally, he observes that a one standard deviation rise in remittance inflows enhances political institutions by approximately 0.32 standard deviations, indicating that remittances may boost political institutions by ameliorating poverty and improving schooling.

For many remittance senders, political instability, stifling bureaucracies and corruption in their countries of origin are drags on how much is remitted for productive investment activities. In contrast, studies have established that migrants tend to channel remittances into investment purposes in their countries of origin when the institutional climate is congenial (Barajas *et al.* 2009; Singh, Haacker and Lee 2009). Further, remittance recipients are most inclined to engage in entrepreneurial activities under high levels of quality institutions, while the opposite is likely to be true in a weak institutional setting. Therefore, countries with better institutions coupled with a stable political environment are more effective in utilising remittances to enhance economic growth.

In a seminal study, North (1990) establishes that institution such as property rights and less distortionary policies influence resource allocation by creating the incentives for private individuals and private entities to carry out viable and productive ventures. From the evidence provided above, it suggests that some country specific institutional factors have either greatly hindered or propelled the utilisation and inflow of remitted funds for productive investments. This may include, but is not limited to, corruption, excessive bureaucracy in business registration, property rights, and legal regimes, among others.

Recent studies have also indicated that remittances do have some significant influence on the banking sector of remitted countries. In their study, Demirgüç-Kunt *et al.* (2011) observe a positive correlation between remittance inflows and account deposits in Mexico. Similarly, Aggarwal *et al.* (2011) also observe that remittances influence the volume of credit intermediated by local banks within remittance-recipient countries. These recent empirical findings to a large extent deviate from earlier studies that found no evidence to indicate that remittances are sources of investment capital at the macro-level (Chami *et al.* 2005; IMF 2005). As such, more research is necessary to understand the remittance-investment nexus under different levels of financial and institutional development from

Figure 2 Conceptual Framework



Source: Author's conception

the African perspective considering that financial and institutional frameworks in most remittance-recipient countries function differently. For example, in most Latin American countries, remittance recipients are less likely to utilize banks because of greater distrust of financial institutions (Fajnzylber and Lopez 2007). In the Philippines and most of the South Asian countries, most remittance recipients are more likely to receive remittances via banks and credit unions as well as informal channels such as *hawala* and *padala* (Yang 2011). In SSA countries, weak financial infrastructure in rural areas makes it difficult for financial institutions to provide remittance-linked services and products to these localities.

The conceptual framework for this paper is presented graphically in Figure 2 below. It illustrates the various linkages among remittance inflows, financial sector development, the institutional framework and domestic investment.

3. Empirical Strategy and Data Description

3.1. Empirical Strategy

This paper explores how remittance inflows might affect domestic investment among a panel of five SSA countries under different levels of financial and institutional development. Using a modified version of the investment model suggested by Feldstein and Horioka (1980) as well as the empirical studies of Catrinescu *et al.* (2009) and Balde´ (2011), the remittance-investment nexus is examined by estimating the following econometric model:

$$INV_{it} = \beta_0 + \beta_1 REMIT_{it} + \beta_2 FD_{it} + \beta_3 INST_{it} + \beta_4 (REMIT_{it} * FD_{it}) + \beta_5 (REMIT_{it} * INST_{it}) + \beta_6 X_{it} + \eta_i + e_{it} \quad (1)$$

where the dependent variable is Investment (Inv_{it}) measured by gross fixed capital formation as a percentage of GDP in country i in year t ; $REMIT_{it}$ represents remittances as a percentage to GDP in

country i , in year t ; $INST_{it}$ is the level of political risk in country i , in year t ; FD_{it} denotes domestic credit provided to the private sector expressed as a percentage of GDP in country i , in year t ; while $REMIT_{it} * FD_{it}$ represents the interaction term between financial sector development indicator and remittances. The interaction term indicates if the marginal effect of remittances depends on financial development. A positive (negative) and significant interaction term will indicate the complementarity (substitutability) of financial sector development and remittances in domestic investment. In the same vein, $REMIT_{it} * INST_{it}$ denotes an interaction term between remittances and the institutional development indicator. A positive (negative) and significant interaction term will depict the complementarity (substitutability) of governance institutional development and remittances in domestic investment. η_i denotes unobserved country-specific factors that influence investment but are not directly captured, while X_{it} is a set of control variables such as per capita income, measured in constant US\$, lending rate is measure in annual percentage, and e_{it} is the error term.

First, Equation (1) can be tested using several econometric techniques. Ordinary Least Squares (OLS) can be utilized, but in this circumstance, OLS estimation may produce biased estimates of the regression parameters due to the potential endogeneity problem of reverse causality between remittances and other variables. The challenges of endogeneity that is usually related to panel data analysis are often addressed using the generalized method of moments (GMM) postulated by Blundell and Bond (1998). The GMM estimation approach is regarded quite appropriate in analysis involving a dynamic panel data models. There are many advantages in using GMM estimations. The GMM methodology do not only removes any bias that may occur from neglecting dynamic endogeneity, but also gives good instruments that address simultaneity while removing any unobservable heterogeneity. As emphasized by Lartey (2011), GMM estimators are designed to address omitted variables in static panel models and they also resolve complications of endogeneity due to the addition of lagged dependent variable as an explanatory variable. However, I did not employ GMM estimation technique when estimating my model due to the small sample size. For instance, Wooldridge (2001: 91) observes that with small sample sizes, finite-sample bias in GMM estimators becomes a problem.

Endogeneity problems may arise for many reasons. Domestic investment is hypothesized to be a positive function of GDP per capita. In their study, Greene and Villanueva (1991) observe that countries with higher GDP per capita could allocate more resources to domestic savings, which could be utilized to finance investment ventures. This implies that a rise in income per capita may lead to an increase in domestic investments; yet an increase in domestic investments may cause an increase in income per capita (Loayza *et al.* 2000; Keefer and Knack 2007). In this study, either random or fixed effects was conducted. One important statistical feature is worth noting. The F- ratio is significant at least at the 1% level, which permits me to reject the null hypothesis of individual homogeneity and conclude that individual specificities are present. Hence, the appropriate model to use in this study is either random effects or fixed effects. Therefore, the models were re-estimated and this solution

applied with either fixed effects or random effects.

Following Wooldridge (2002: 290), I perform the Hausman test to compare the coefficient estimates obtained from the fixed effects with those of the random estimator. The country-varying factors differ across countries but are fixed within a country over time. To avoid possible correlation of the hidden country-specific predictors with the included right-hand-side predictors, the fixed-effects technique fine-tunes all the model predictors by subtracting the mean of each over time. The non-varying country-specific predictors and the intercept then drop out of the predicted model, and hence the predicted parameters reflect more precisely the impacts of explanatory predictors. In contrast, the random-estimator postulates that the coefficients of country-specific variables have no fixed values but are rather normally distributed with a constant mean and variance. Estimation using the random-estimator, if true, yields an efficient parameter estimate, though the fixed-effects computation provides more consistent parameters. The Hausman test estimation rejects the null hypothesis of no fixed effects at least at the 1% level of significant. Hence, fixed effect estimation should be chosen over random effect. The fixed effects estimator controls for country effects and provides consistent parameter estimates.

3.2. Data Description

In this paper, I utilize data gathered from two main sources. Data on political risk (POL) were drawn from the Political Risk Services (PRS). Data on gross fixed capital formation (INV), personal remittances (REMGDP), lending interest rate (IR), domestic credit (CRGDP), and GDP per capita (RGDP) were gleaned from the World Development Indicators (WDI) of the World Bank.

It is instructive to examine the selection and definition of key variables, starting with the major variable of interest; remittances. $REMIT_{it}$. Remittances are classified as unrequited transfers remitted to families and friends by migrants working outside their country of origin. Remittances consist of three components: workers' remittances, employees' compensation and migrants' transfers. Workers' remittances are defined as prevailing private transfers from foreign workers' residing in the destination country for not less than a year, regardless of their immigration status, to recipients in their home country. If a migrant worker stays in the destination country for less than a year, their gross earnings in the destination country should be seen as employees' compensation. Migrants' transfers are referred to as the net worth of individuals that arise as a result of migrating to the destination country (Gammeltoft 2002). Following influential papers on remittances (Mundaca 2009; Pradhan *et al.* 2008), I define $REMIT_{it}$ as the sum of employees' compensation, and workers' remittances received in the country i expressed as a percentage of GDP in year t .

A set of control variables that the literature identifies as significant correlates of investment were added to the model. I appropriately control for the effects of economic growth on investment, because economic growth leads to expansion of people's incomes and hence aggregate demand. The unbridled

increase in total demand might signal investors to double their productive activities, as shown in Keynesian economic theory. Thus, this effect is checked by adding the GDP per capita into the model.

The existing literature on remittance and investment growth suggests several indicators of financial sector development. Indicators differ among empirical works. Giuliano and Ruiz-Arranz (2009) use bank credit, liquid liabilities and private sector credit, while Rao and Hassan (2011) and Feeny, Iamsiraroj, and McGillivray (2014) use M2 as a ratio of GDP as an indicator for financial development. The key measure of financial sector development used in this study is CREDIT/GDP. It represents the activities of financial intermediaries in channelling savings from private individuals to private entities. It is a standard practice in the empirical literature on remittances to utilize one or more measures of institutional development as independent variables. Dzansi (2013) uses political risk, while Catrinescu *et al.* (2009) and Olubiyi (2013) use bureaucracy quality, law and order, corruption, and democratic accountability as indicators of institutional development. In a cross-sectional study, Bates *et al.*, (2006) show that Africa has supplied far more than its share of political instability. Hence, in an African context, political risk variable is important because weak political instability generates fear among potential investors and hence reduces investment outlay (Alesina and Perotti 1993). Concerns have been voiced over the way in which institutional quality is assessed. For instance, surveys of investors are commonly used to measure institutional quality of a country which reflects perceptions instead of the formal conditions of the institutional setting (Rodrik 2004). However, using subjective institutional measures rather than objective institutional measures in investment or growth studies is found to be quite consistent (Moers, 1999). This study is aware of other measures of institutional quality in most empirical works, for instances, the anti-expropriation index by Acemoglu *et al.* (2001), the composite index by Kaufmann *et al.* (2003) as well as the rule of law index by Rodrik *et al.* (2004). But, these data sets span over a limited time-frame which can scarcely be suitable for meaningful time-series estimation. Therefore, PRS indicator of political risk is used in this study because of data availability and its long time-series coverage.

Neoclassical theory of investment which is explained in the accelerator theory as well as the classic study of Jorgensen (1971), indicate that the desired stock of capital (that is, investment) has a positive association with income. This implies that high demand as a result of increasing income will boost enterprises to expand investment to meet demand. Also, the Neoclassical theory indicates a negative association between investment outlays and real interest rates; high level of interest rates causes commercial lending by banks to shrink because it increases the debt burden of borrowers. McKinnon (1973) questions this unrealistic assumption by describing the distorting effects of inflation, such as capital shortage and negative interest rates. He forcefully argues that high interest rates will stimulate investments by increasing savings and domestic credit. In line with McKinnon, the macroeconomist Ndikumana (2000) claims that regardless of the high level of nominal interest rates, real interest rates which act on both through discount factor for future returns and the cost of capital are always negative

because of high rates of inflation. Thus, the lending interest rate variable is the bank rate that often meets the funding needs of the private sector and is taken to proxy the user cost of capital.

My control variables are ones the literature identifies as significant correlates of investment. These include the GDP per capita (Wai and Wong 1982), governance institutions (North and Thomas 1973; Acemoglu 2009), credit or financial sector development (Ndikumana 2000) and lending interest rate (Green and Villanueva 1991). To these variables, I add remittances as the key variable of interest. The data were analysed using Stata 12.1 statistical software, which is widely regarded for dealing with the challenges that are unique to panel data studies. The selection of these five countries and time was based on the availability of data as well as the increase of remittances to the countries. Full details of variable sources, definitions and the list of countries used in the study are given in Appendices A and B.

4. Empirical Results and Discussion

Before proceeding to present the regression estimates, I present descriptive statistics for the key variables used in this paper in Table 2. For the dependent variable, the highest growth rate of domestic investment exceeds 24% of GDP, while the minimum growth rate of the domestic investments is 2.01% of GDP. GDP per capita has been identified as the key determinant of investment (Greene and Villanueva 1991), remittance inflows, a key variable of interest, have an average value of 3.5% and a maximum value of 13.4% of GDP for the period 1984 to 2014. Thus, remittances constitute a sizeable share of GDP. To capture the effect of governance institutions on investment, a key measure of institutional development such as political risk was included in the model. The International Country Risk Guide (ICRG) gives a medium for assessing the institutional qualities of nations on a comparable basis. The risk ratings range from 80–100 points which depict very low risk while 0–49.9 points show very high risk. The average value of political risk in the study is 54 points. The literature has extensively documented various indicators for financial sector development (Beck *et al.* 1999). A primary indicator of financial development in this study is domestic credit expressed as a percentage of

Table 2 Summary Statistics

Variables	Observations	Mean	Std. Dev	Max	Min
Investment/GDP	155	17.55	5.37	30.92	5.45
Log Real GDP Capita	155	6.31	0.56	8.03	5.02
Remittances/GDP	155	3.52	3.59	13.04	0.01
Lending interest Rate	155	16.39	6.31	36.24	6.50
Political risk	155	53.88	7.38	68.50	36.00
Domestic Credit/GDP	155	30.25	9.03	48.67	4.91

Note: Definitions and sources are reported in Appendix A.

Source: Author's calculation based on PRS (2014) and World Bank (2015b)

GDP. The minimum growth rate of domestic credit is 5%, while the maximum growth rate is 49%.

Table 3 shows the correlation among variables used in the study. Domestic investment and remittances, a key variable of interest in the study, has a positive and significant relationship at least at the 10% level. Likewise, nearly all relationships between investment and the independent variables are positive and significant except lending interest rate. The correlation between domestic investment and various independent variables again shows the absence of multicollinearity in the model.

Table 4 presents the panel fixed effects estimation results for the measures of domestic investment. For all results displayed, each specification was tested applying both random effects and fixed effects. The coefficient on the key variable of interest, β_1 could be both positive and negative, and I am interested in testing whether the effect of remittances on investment rate is statistically significant. All the columns except column (4) show a positive and significant effect of remittances on investment rate, which implies that investment opportunities may drive the decision to remit. Another way of interpreting this finding is that migrants send remittances for investment purpose to facilitate their eventual return, and this is consistent with the findings of Organization for Economic Co-operation and Development (2006). Also, remittances and governance institutions are complementary since their interactive term is positive and significant. This implies that political institution serves as a mechanism or channel through which remittances impact domestic investment.

In all specifications, GDP per capita influences investment positively. Its coefficient is statistically significant at least at the 1% level, implying that GDP per capita strongly increases domestic investment in the five countries studied. This defends the hypothesis of a relatively huge contribution of per capita income to investment.

All five countries went through the phase of financial liberalisation initiated by the World Bank in the early 1990s, which makes it logical to estimate the interaction between financial development and remittances. The estimated results indicate that financial sector development has a positive effect on investment, but the interaction term yields a modest impact when the financial variable interacted with

Table 3 Correlation Matrix: Test of Multicollinearity

	1	2	3	4	5	6
1. INV	1.00					
2. Log RGDP	0.29*	1.00				
3. REM	0.13*	0.38*	1.00			
4. CRED	0.39*	-0.07*	-0.34*	1.00		
5. POL	0.50*	0.08	-0.04	0.38*	1.00	
6. IR	-0.22*	-0.44*	-0.30*	0.04	0.11*	1.00

Notes: Inv = gross fixed capital formation to the private sector (% of GDP) is used as a proxy for investment rate, REM = Personal remittances, received (% of GDP), CRE = Domestic credit to private sector by financial institutions (% of GDP), IR = lending interest rate, Log RGDP = log of real GDP per capita, POL = political risk rating.

Table 4 Financial and Institutional Development in the Remittance-Investment Nexus (1984-2014)

Dependent variable: Investment/GDP (Gross fixed capital formation expressed as percentage of GDP)						
Variables	Fixed Effects (1)	Fixed Effects (2)	Fixed Effects (3)	Fixed Effects (4)	Fixed Effects (5)	Fixed Effects (6)
<i>Constant</i>	17.549*** (0.305)	17.549*** (0.292)	17.778*** (0.306)	17.539*** (0.272)	17.594*** (0.271)	17.765*** (0.306)
<i>Log RGDP</i>	1.841** (0.609)	1.903** (0.583)	1.741** (0.580)	1.807*** (0.510)	2.138*** (0.483)	2.003** (0.642)
<i>REM</i>	0.189* (0.108)	0.228* (0.104)	0.308** (0.109)	0.102 (0.092)	0.201* (0.089)	0.299** (0.109)
<i>CRED</i>		0.159*** (0.041)	0.134** (0.042)			0.142** (0.043)
<i>REM*CRED</i>			0.020* (0.008)			0.019* (0.009)
<i>POL</i>				0.253*** (0.049)	0.352*** (0.051)	
<i>REM*POL</i>					0.056*** (0.013)	
<i>IR</i>						-0.057 (0.060)
<i>Observation</i>	155	155	155	155	155	155
<i>No. of countries</i>	5	5	5	5	5	5
<i>Country effects</i>	Yes	Yes	Yes	Yes	Yes	Yes
<i>Adj. R²</i>	0.077	0.155	0.176	0.210	0.270	0.176
<i>F-statistic</i>	9.450***	11.770***	10.250***	17.730***	20.000***	8.370***

Notes: (1) Time dummies (crisis dummies) are tested but not significant. (2) Each specification was tested using random effects. The Hausman test, however, rejects random effects in each case (3) Robust standard errors in parentheses and (4) *, **, *** show significant at 1%, 5%, and 10% levels, respectively.

remittances. A possible explanation for this might be that unrecorded remittance flows constitute a larger share of total flows to Africa (World Bank 2006; Freund and Spatafora 2008). Also, this finding may be described by the fact that the costs of banking in the region are expensive. Data collected by Beck *et al.* (2006), show that the costs of maintaining a bank account and the fees associated with loans are quite high in SSA. Also, the high lending interest rate is detrimental to investment; its coefficient is negative, which shows that lending interest exerts an adverse effect on investment growth.

5. Summary and Conclusion

This study re-examines the relationship among remittances, institutions, financial sector development and the growth rate of domestic investment for five key remittance-recipient developing

economies in SSA. The present study goes beyond the direct impacts of remittance inflows on domestic investment by estimating the interactive effects of key variables of interest. To this end, the study includes several interaction terms between remittances, governance institutions and financial sector development variables and tests their impacts on the growth rate of domestic investment.

Using an investment equation, this study establishes a positive relationship between investment rate and remittances for a typical country within the sample. The introduction of an institutional sector indicator in the investment equation illustrates that the institutional sector variable appears to have positive and significant affects on investment growth. Further, the interaction effect of remittances and governance institutions is investment enhancing. The evidence from this study would suggest that remittance inflows are effective in stimulating domestic investment in the improved institutional environment. In other words, improvement in institutional quality complements the positive role of remittances in stimulating investment. An implication of this is the possibility that institutional improvements create incentives for the remittance receivers to adjust their spending behavior in favor of investment in a typical country within the sample. Hence, policy interventions to improve political stability are also essential for augmenting the benefit effects of remittances.

Improvement in financial sector development could be the result of several reform initiatives, with developing economies planning to strengthen their financial sector relative to economic growth to increase savings and investment. Such a rise in the volume of credit from financial institutions is supposed to have a direct positive impact on domestic investment. In line with my expectation, the estimated coefficient of the interaction term between the financial development variable and remittances is significant, which indicates that financial development helps to channel remittance inflows to more productive investment activities. There could be different explanations for the findings that financial development exerts a positive but smaller impact on the remittance-investment growth nexus. First, remittances might not boost investment or deposits in the countries studied if there is limited access to physical banking branches. The distance to the nearest banking branch could be a challenge for remittance receivers to demand more credit from the financial institutions. Remittance receivers in the five countries studied may be less inclined to receive remittances through banks. According to some studies, most remittance-receiving countries in Africa have a low level of domestic financial development, and most remittance recipients use informal remittance channels in part because of high cost and limited access to banking services (Aggarwal *et al.* 2006; Demirguc-Kunt, Beck and Honohan 2008). Also, in many parts of Africa, remittance services are barely linked to formal financial institution services in a manner that could increase the use of remittances or access to other financial products on account of frequent transfers. The findings of this study suggest that countries should encourage cost-effective payment technologies and the effective role of financial markets through integrated and inclusive services for migrants' families. Also, remittance-receiving countries in SSA should encourage private-public partnerships to solve the payment infrastructure

challenge by implementing pilot projects in specific remittance corridors that financial institutions fail to reach. Finally, the African Institute of Remittances (AIR) should work in partnership with African Central Banks and money transfer operators (The Western Union and MoneyGram) to reduce remittances transfer costs and encourage remittances via banks. Although remittances appear to exert positive impact on domestic investment, further study should be undertaken, considering the potential existence of non-linearities in the remittances-investment nexus. I argue that using comprehensive and large sample size and perhaps with GMM methodology to address the endogeneity of remittances should be central to the future study agenda.

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Appendix A: Variable Definitions and Sources

Variables	Variable definitions	Sources
Investment rate	Gross fixed capital formation (% of GDP)	World Development Indicators, World Bank
GDP per capita	Gross domestic product per capita, measure in constant (2000) US dollars	World Development Indicators, World Bank
Remittances	Workers' remittance (% of GDP)	World Development Indicators, World Bank
Domestic Credit	Domestic credit to private sector (% of GDP) (% of GDP)	World Development Indicators, World Bank
ICRG composite political risk	Political risk: A vehicle of examining the political stability of a country and ranges from a high value of 100 (least risk) to a low value of 0 (highest risk)	ICRG, PRS
Interest rate	Lending interest rate (%)	World Development Indicators, World Bank

Appendix B: List of Countries in the Study

Country	2013 remittances (in billions of US\$)	Development status
Ghana	1.8	Lower-middle income DC
Kenya	1.3	Lower-middle income DC
Nigeria	20.7	Lower-middle income DC
Senegal	1.6	Low-income DC
Togo	0.3	Low-income DC

Source: World Bank (2015b)

Appendix C: Financial and Institutional Development in the Remittance-Investment Nexus (1984–2014)

Dependent variable: Investment/GDP (Gross fixed capital formation expressed as percentage of GDP)

Variables	Pooled OLS (1)	Pooled OLS (2)	Fixed Effects (3)	Fixed Effects (4)	Difference GMM (5)	Difference GMM (6)
<i>Constant</i>	17.777*** (0.386)	17.595*** (0.254)	17.765*** (0.306)	17.594*** (0.271)	17.748*** (0.176)	17.799*** (0.156)
<i>Log RGDP</i>	2.061** (0.771)	2.062*** (0.507)	2.003** (0.642)	2.138*** (0.483)	2.028*** (0.352)	2.139*** (0.301)
<i>REM/GDP</i>	0.317* (0.122)	0.409*** (0.079)	0.299** (0.109)	0.201* (0.089)	0.316*** (0.055)	0.405*** (0.047)
<i>CREDIT/GDP</i>	0.269*** (0.044)		0.142** (0.043)		0.280*** (0.021)	
<i>REM* CRED</i>	0.021* (0.011)		0.019* (0.009)		0.018** (0.005)	
<i>POL</i>		0.273*** (0.037)		0.352*** (0.051)		0.264*** (0.023)
<i>REM* POL</i>		0.064*** (0.012)		0.056*** (0.013)		0.066*** (0.007)
<i>IR</i>	-0.064 (0.066)		-0.057 (0.060)		-0.066*** (0.030)	
<i>Observation</i>	155	155	155	155	155	155
<i>No. of countries</i>			5	5	5	5
<i>Country effects</i>			Yes	Yes		
<i>Adj. R²</i>	0.28	0.42	0.18	0.270		
<i>F-statistic</i>	13.08***	29.31***	8.37***	20.000***		
<i>Chi Square</i>					318.10	328.90
<i>[P-Value]</i>					[0.000]	[0.000]
<i>AR(1) test</i>					-2.66	-3.00
<i>[P-value]</i>					[0.008]	[0.003]
<i>AR(2) test</i>					-1.72	-1.20
<i>[P-value]</i>					[0.086]	[0.229]
<i>Sargan</i>					393.14	342.01

Notes: Robust standard errors in parentheses and (4) *, **, *** show significant at 1%, 5%, and 10% levels, respectively.