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Article

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DEVELOPMENT ECONOMICS | RESEARCH ARTICLE

Does financial development mediate the impact of remittances on sustainable human capital investment? New insights from SSA countries

Uweis Abdulahi Ali Bare^{1*}, Yasmin Bani¹, Normaz Wana Ismail¹ and Anitha Rosland¹

Abstract: Remittances play an important role in human capital development in sub-Saharan Africa, particularly when it comes to helping families to pay for their children's education, access health care and alleviate poverty. However, many countries on the continent lack the financial systems to efficiently facilitate the inflows of remittances and allow them to be used to their greatest potential such as investment in education. The education of children is particularly essential if Saharan Africa is to achieve sustainable development goal number four which aims to ensure inclusive and quality education for all by 2030. This paper examines the impact of remittances on human capital development from 1996–2016 in sub-Saharan Africa and further explores the role financial development in this established nexus. The empirical results revealed that remittances positively influence human capital investment, but when interacted with financial development and regressed on human capital investment, we found remittances impact to be more pronounced and statistically influence human capital. This study recommends that

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PUBLIC INTEREST STATEMENT

Remittances – money sent by migrants working from abroad to their country of origin represents the most important source of external funding for developing countries. These foreign funds presumably offer a massive contribution to education. As such, remittances help ease the households' budget constraints by smoothing consumption needs and supporting the educational needs of the household members. However, the importance of remittances has subsequently been divided by contradictory implications or certain policy environments. This contradictory outcome requires fresh insights into how policymakers help facilitate remittances into their country to promote greater human capital investment. Against this backdrop, this research explores how financial development – effective banks support this foreign money's flow, saving, and investment to better education outcomes in SSA countries. We find that remittances positively influence human capital if the financial development of the recipient countries is well-functioning. To this end, we propose policy prescriptions to harness the inflows of remittances in SSA and other developing countries.

policymakers develop proactive policies that facilitate the inflows of remittances. Our policy suggestions are based on the fact that remittance recipients in SSA countries do not have adequate funds to invest in human capital because of weak financial systems. Financial market reform is therefore paramount for attracting greater remittances into SSA countries which, in turn, could be harnessed to ease credit constraints and allow for greater investment into human capital.

Subjects: Economics; Macroeconomics; Development Economics

Keywords: human capital investment; remittances; financial development; GMM; SSA

1. Introduction

The potential developmental impact of remittances has drawn increasing attention in recent years. Remittances have become the largest source of foreign inflows into many developing countries. Money sent home by migrant workers is estimated to have reached US\$529 billion, surpassing foreign direct investment (FDI) and foreign aid (World Bank, 2019). The increase of remittances is driven by the rise of migration from developing economies due to limited economic opportunities and poor living standards. The surging remittance inflows in developing countries are presumed to be an important driver for development such as promoting improved access to education and healthcare which subsequently stimulates economic growth (Acharya & Leon-Gonzalez, 2014; Tiza et al., 2019; Umar, 2021).

Many developing countries, particularly in Sub-Saharan Africa (SSA), are in search of alternative funding sources to support education, healthcare and reduce poverty. The income received from remittances is an important tool for improving the prosperity of the region and has been suggested as an alternative means to finance investments. However, despite the massive inflow of remittances, lack of access to health care and education continues to impede the developmental prospects for these countries. Access to education remains a problem, particularly for disadvantaged or low-income families, and can be a significant financial strain. In SSA, poverty is a barrier to children's education (Roby et al., 2016). According to the World Bank, Education Statistics (2016), SSA had the lowest secondary gross enrolment ratio globally from 1996–2015, significantly than other developing regions, at 43.8%. Europe and the Central Asia region achieved 104.4%, followed by Latin America and the Caribbean at 94.5%; and East Asia and the Pacific at 84.4%.

The connection between remittances and education is a subject of much debate. Some scholars believe that recipients spend their remittances on consumption, meaning they have little or negligible impact on education. However, recent empirical studies by Gyimah-Brempong and Asiedu (2015) and Azam and Raza (2016) contend that remittance earnings are mostly spent on education which helps to build human capital. Keeping children in school is a primary driver for economic development.

There is scant literature examining the impact of migrant remittances on human capital investment. Evidence suggests that remittances can contribute to human capital especially in attaining educational needs of the recipient countries (Haas, 2009; Hines & Simpson, 2019; Ngoma & Ismail, 2013). Therefore, have access to remittance inflows to spend on education is important for families that are unable to access formal social security arrangements. Some studies have opposing views about the effect of remittances on education investment in developing countries. McKenzie (2006) examined migration, remittances and educational attainments for children in Mexico and argued that the absence of parents in migration might deteriorate the educational outcome of the children left at the originating country. Similarly, Gao et al. (2021) suggested that remittances have a negative impact on human capital investment. This contrasting evidence could be the problems of omitted variable bias.

Well-developed financial systems which encourage formal financial institutions such as banks to enter the remittance market are an important condition if the region is to receive higher remittance inflows. The development of financial institutions, instruments, markets and intermediaries will facilitate trade, reduce the cost of transactions, support investment, manage risks (Akçay, 2020; Bhattacharya et al., 2018; Olayungbo & Quadri, 2019) and expand service options to both the receivers and senders of remittances. As such, the development of domestic financial systems is vital for attracting more remittance inflows into formal financial institutions. If such systems were in place, senders might shift from informal channels to formal ones and recipient countries would receive more remittances (Bangake & Eggoh, 2020; Nyamongo et al., 2012). Recipient households would have access to functioning financial institutions, allowing them to save and invest money which could be spent on education. In contrast, less-functioning financial markets in the recipient country might yield the highest economic returns (Giuliano & Ruiz-Arranz, 2009; Sobiech, 2019). However, more research is needed to address the conflicting results on the impact of better financial systems on remittances, and human capital investment.

This study provides a pioneering perspective on the role of financial development in the remittances-human capital investment nexus. Most empirical studies on remittances and human capital have neglected the role of financial development. Robust financial market systems are vital to ensure access to innovative banking services such as savings and investment services that can help recipient households invest in human capital. Well-developed financial systems also help reduce the transaction cost of remittance transfers. SSA has the highest remittance transaction costs among the developing regions, and poor financial development is one reason for that. It is therefore vital to unpack the role of how financial development in SSA could impact on remittances and their use in human capital development.

It will attempt to fill the literature gap by using aggregate secondary data from SSA. Within the scant available literature on the impact of remittances, the dominant perspective is based on Latin America, with little study done on Africa. This study is unique in that it gathered together information from almost all SSA countries for which data was available. The focus on SSA countries is justified, given the lack of empirical literature across the region and the growth of remittance inflows between 1996 and 2015. However, the inflow of remittances in SSA is still small compared to other developing regions, and is further complicated by the high rates of poverty, poor health outcomes and education. This study advances the existing work by taking a larger sample size and employing GMM as a method of estimation. In addition to using the static panel models (pooled OLS, random and fixed effects), we also used GMM to overcome endogeneity issues and tackle biased coefficient estimation.

Against the backdrop of ambivalent findings from prior research, this study aggregately examines the impact of remittances on human capital investment in SSA countries and tries to answer whether financial development could complement remittances and human capital investment. To the best of our knowledge, this study leads the way in testing the mediating role of financial development in the remittances-human capital investment nexus within SSA countries. Our policy suggestions are based on the fact that remittance recipients in SSA countries do not have adequate funds to invest in human capital because of weak financial systems. Therefore, financial market reform is paramount for attracting greater remittances into SSA countries which, in turn, could be harnessed to ease credit constraints and allow for greater investment into human capital.

The rest of the article is organized as follows: section two provide a review of the related literature; section three outlines the methodology used in this study; section four reports the analysis and results; and section five offers the conclusion and policy recommendations.

2. Literature review

2.1. Theoretical literature

The theoretical foundation for the developmental impact of remittances can be traced from the new economics of labor migration theory which says that migration is an inherent contract between household members in sharing both costs and benefits (Stark & Bloom, 1985). It theorizes that the household co-finances the cost of migration for one family members in return for receiving remittances in the future. Remittances are at the core of the theory, creating an important means by which migrants share the returns with family members left behind, and a leading source of income to the receiving households. Stark et al. (1998) argued that investment decisions on education solely depend on whether a family member has the prospect to migrate. Moreover, successful migration creates remittances, thereby lifting the financial constraints and burden of the receiving households. Even if the remittances are allocated for a specific purpose such as basic consumption or repayment of a loan, they increase household income and help the receiving family to invest in education and health.

The impact of remittances on education investment can be traced from the human capital theory which emphasizes that investment in education is important for the productivity of an individual (Becker, 1962; Schultz, 1961). The theory proposes that education is a mechanism for attaining productivity, efficiency and overall socio-economic development. According to Schultz (1961), the theory of human capital explains the role of investment in education as a mechanism for social development and economic growth. Therefore, the provision of education is considered a productive investment in human capital development. Another explanation with respect to the human capital theory is the established links between investment in human capital, economic development, social progress, productivity, growth and technological innovation (Becker, 1994; Benhabib & Spiegel, 1994). From this perspective, education is viewed as a deliberate investment that prepares the labor force, boosts individual and organizational productivity and promotes national growth and development. The main view in respect to the human capital theory is that individuals make different kinds of investment decisions using some of the gained capital for schooling. Higher educational attainment and better health are other important benefits of remittances. The rapid increase of these foreign inflows is perceived to foster productive investments, where financial or credit constraints mostly prevail. Moreover, this theoretical literature has asserted that remittances have a positive effect on educational investment in children that are left behind. The hypothesis here is that remittance income will relax credit constraints and minimize the household exposure to risk, thereby leading to investment in productive activities such as education.

The theoretical literature regarding the role of financial development can be traced through the earlier work of Schumpeter (1982) which postulates that services provided by financial intermediaries are essential for economic development. Financial development literature emphasizes that financial systems provide savings and service payments that facilitate the exchange of goods, provide information to investors for investment projects which enables them to allocate funds and manage risks (Demircuc-Kunt & Levine, 2008; Rajan & Zingales, 2003). It has been stated that strong financial systems diversify risks and provide an effective allocation of capital. Therefore, the greater the financial development, the higher would be the savings mobilized towards a higher return of project investment (Adnan, 2011). The link between remittances and financial development is based on two hypotheses: complementarity and substitutability. For complementarity, Orozco (2005) asserted that if a significant portion of remittances transferred through financial institutions are saved, demand will be increased for savings and other financial instruments which will boost investment and development. Proponents of the substitutability theory argue that significant inflows of remittances ease recipients' financial constraints by acting as a substitute for credit. This reduces credit demand which impedes financial market development (Sobiech, 2019).

2.2. Empirical literature

2.2.1. Remittances and human capital

The empirical literature has demonstrated the importance of remittances on human capital investment, particularly remittances seen as an investment in education. For instance, De and Ratha (2012) examined the impact of remittances on household income, assets and human capital in Sri Lanka using bias-correlated matching estimators. This study found that remittance income had a positive and significant effect on children's education and health.

Using both cross-section and pseudo panel data, a study by Gyimah-Brempong and Asiedu (2015) showed that remittances significantly increase the chances that migrant children in their home country were able to enroll in primary and secondary schools in Ghana. The study suggested that remittances promote human capital formation. It has also been hypothesized that remittances have a positive impact on the educational attainment of the recipients. Kroeger and Anderson (2014) examined the impact of remittances on education and health in Kyrgyzstan using data from between 2005 and 2009. The findings of the study revealed that migrant remittances had no direct impact on human capital. Empirical studies using household surveys have found a positive impact of remittances on education in recipient households. This study employs secondary data rather than a household survey as the aim is to investigate the impact of remittances on education.

Some researchers have documented that remittances have an adverse effect on human capital. For instance, a study by McKenzie (2006) found that remittances had an adverse impact on households having educated parents based upon the percentage of children aged between 16 and 18 years old in full-time education. This finding is in line with a study by Cattaneo (2012), which reported that remittances had a negative effect on education expenditure in Albania. This result, however, contradicted the previous empirical studies which documented that migrant remittances have a positive and significant impact on education and health outcomes. Thus, the impact of remittances on education remains an empirical question.

A time-series study by Tchantchane et al. (2013) examined the impact of remittances on educational expenditure and economic growth in the Philippines using the ARDL from 1984–2009. The findings revealed that there was a positive relationship between remittances and education expenditure. Similarly, Azam and Raza (2016) investigated the impact of worker's remittances on human capital development in 17 countries from 1996–2013. Using fixed-effects estimation technique, they found a positive and significant effect of remittances on human capital development. This study also argued that the governance system strengthened the association between worker's remittances and human capital.

In another study, Amakom and Iheoma (2014) investigated the impact of migrant remittances on education and health outcomes of 18 SSA countries, employing the two-stage least square (2SLS) method. The findings suggested that remittances significantly affected health and education. The results also suggested that for every 10% increase in remittances, primary and secondary education outcomes increased by 4.2% and 8.8% respectively. This confirmed that migrant remittances remain an important factor in improving health and education outcomes. However, the above study failed to consider the role of financial development on the relationship between remittances and education. As such, this study departs from the existing empirical literature by focusing on the impact of remittances on education and health outcomes but also incorporates financial development and institutional quality into the findings. The existing studies also differ from the present study by using two-stage least square (2SLS) regression analysis and ignoring the unobserved heterogeneity across the sampled countries. Their work was limited to 18 SSA countries, making it a partial analysis of the remittances and education relationship. The present study advances this work by taking a larger sample size and employing GMM as a method of analysis. As a result, this study will better explain the link between remittances and education.

Arif et al. (2019) studied the impact of remittances on higher education using balanced panel data from 1994 to 2013 from the eight largest middle income group remittance recipient countries. They found that remittances play a significant role in the development of education. Another study by Hines and Simpson (2019) in Kenya found some evidence of a positive relationship between remittances and education spending. Migrant households who receive remittances from abroad tend to spend more on education. This finding suggested that remittances sent by migrants from abroad have a significant role in human capital investment.

Similarly, Tiza et al. (2019) investigated the impact of remittances on education attainment in Bangladesh using micro-level primary data. They found that remittances have a significant positive impact on average years of schooling and tertiary level education. They also highlighted that remittances have a strong impact on the tertiary education of men compared to women. Likewise, Acharya and Leon-Gonzalez (2019) studied the impact of remittances on the quality of education in Nepal using household data. They revealed that despite the fact that recipient households are low-income and spend the majority of their remittances on consumption, they spend three times as much on education and devote a considerable portion of their budget to it. In contrast, Bredtmann et al. (2019) examined the relationship between remittances and the brain drain of human capital using household survey data from five SSA countries. They found that there is significant relationship between remittances and the brain drain of migrants. However, they also highlighted that remittances counterbalance some of the negative impact of brain drain on origin countries.

Umar (2021) investigated the impact of remittances on human development in 30 SSA countries using the dynamic system GMM. The study found a significant and positive association between remittances and human development, suggesting that remittances improve budget constraints experienced by households and enhance the investment opportunities of a country. Therefore, the more remittance increases in the recipient country, the more human capital investment improves.

Nevertheless, this study in SSA neglected the growing importance of financial development on remittances and human capital investment. Huay and Bani (2018) investigated the relationship between remittances, poverty and the role of human capital in developing countries. They found that human capital, particularly education, weakens the impact of remittances on poverty reduction. This highlights that human capital has substitute role in the established nexus between remittances and poverty, indicating educational outcomes is a critical factor that is besetting the poverty-reducing effect of remittances.

In contrast, Gao et al. (2021) examined the relationship in Kyrgyzstan between remittances and human capital investment with instrumental variables and a fixed effects estimation approach. The empirical results indicated that remittances had a negative impact on human capital investment and educational outcomes, suggesting that “recipients spent more on durable goods and extended hours of child labor on farms as compensation for missing adult labor.”

The contradictory findings emanating from the existing empirical literature obviously indicate that debate on the relationship between remittances and human capital remains ambiguously inconclusive. Borja (2020) examined remittances, corruption and human development in Latin America and Caribbean countries. The results revealed that remittances contributed to human capital development as they improved mortality rates as well as increased school attendance. However, this study further found that corruption burdens the contribution of remittances on poverty reduction and human capital development. This means the impact of developmental impact of remittances is negatively influenced by the level of corruptions in the recipient countries. Most of the studies relied on household survey data which may not be sufficient in capturing the changes at the aggregate level of education investment. Therefore, capturing aggregate data on the impact of remittances on education investment is more crucial than changes in the recipient households’ investment.

2.2.2. Remittances and financial development

Financial sector development is a vital instrument for attracting higher remittances. A sound, robust and well-developed financial market system promotes remittance inflows and enhances Pandikasala et al. (2020) studied whether financial development drives remittance inflows in India. Using the ARDL estimation technique, they found that financial sector development had a significant positive impact on remittance inflows as remittance recipients used different financial services to save and invest these external funds in more productive sectors.

Donou-Adonsou et al. (2020) examined bidirectional causality between remittances and financial development using panel cointegration technique in SSA countries. The empirical findings revealed that there is a positive relationship between remittances and financial development in the long run. In poorly developed financial systems, transaction costs play an essential role in the flow of remittances, since high costs tends to discourage remittances. Reducing the price of financial services attracted a larger proportion of people willing to embrace financial services, thus encouraging remittance funds into these countries (Bolarinwa & Akinbobola, 2021). This implied that robust financial development facilitates lower transaction costs which, in turn, attracts higher remittance inflows to the recipient countries where migrant workers then send money to their relatives back home. Ha and Ngoc (2022) found that financial development in Vietnam made a positive contribution to human capital, asserting that well developed financial systems can help users to access better financial services that aid human capital development.

Economic scholars have also studied the complementary/substitutability role of financial development on the growth-boosting effect of remittances as well human capital investment. These studies have presented mixed results regarding the interaction between financial development and remittances. Ngoma et al. (2021) examined how remittances affect economic growth through financial development in Asia. Using Panel GMM, they revealed that remittances indirectly affect economic growth in the presence of a well-developed financial system. This complementary hypothesis asserts that when financial systems are robust, remittances are used to save and invest in productive sectors. This suggests that recipients are thinking beyond using remittances for consumption purposes and instead spending received money on financial services provided by domestic banks which in turn promotes growth. Bettin et al. (2012) found that a poorly-developed financial sector at home could create a trust deficit, making it too risky for migrants to send higher amount of money.

Olayungbo and Quadri (2019) investigated the role of financial development on the growth effect of remittances in 20 SSA countries. The authors used Pooled Mean Group and ARDL estimations and found a negative interactive effect of remittances and financial development in promoting economic growth, suggesting that financial development acts as a substitute indicator to impact growth. Giuliano and Ruiz-Arranz (2009) investigated the interaction between financial development and remittances on the growth effect in 100 developing countries using System GMM. The findings of the study showed that remittances enhance growth in countries where there is a less-developed financial system. Using a sample of 60 low- and middle-income countries from 1996 to 2017, Chuc et al. (2021) analyzed the combined influence of remittance inflows and financial inclusion on economic growth. Their findings suggested that financial inclusion, in general, may exacerbate the growth-boosting effect of remittances. They further suggested that the influence of remittances on growth may not be realized due to a lack of financial products.

Recent environmental and climate change literature has underscored the presence of good financial markets in abating environmental pollution and reducing emissions in developing countries. Zaidi et al. (2021) showed that financial inclusion among OECD countries accelerated energy consumption which subsequently increased carbon emissions and induced climate-related shocks. Hussain et al. (2021) argued that human capital and institutional quality promoted financial development. This implied that financial development is essential in order to promote environmental quality. Financial development allows countries to invest in green projects that are environmentally friendly (Sheraz et al., 2021). On the contrary, Yang et al. (2021) suggested that well-

developed financial systems induced harm rather than offered incentives for environmental sustainability. This indicated that there was no clear agreement on the effect of sound financial systems on macro-economic variables including growth perspectives, foreign direct investment, human capital development and environmental quality.

Despite this, there is growing interest in the impact of remittances on human capital as well as the influence of financial development in attracting higher remittance inflow. To the best of our knowledge, no empirical literature has studied the role of financial development in the link between remittances and human capital investment. This study explores the role of financial development in the remittances-human capital investment relationship.

3. Data and methodology

3.1. Model specification

To examine the effect of remittances on human capital investment, this study followed the model of Amakom and Iheoma (2014) which was modified to include financial development. The baseline model below is expressed as:

$$HC_{it} = \beta_0 + \beta_1 PREM_{it} + \beta_2 X_{it} + \eta_t + \mu_i + \varepsilon_{it} \quad (1)$$

Where HC denotes school enrolment, proxy for human capital investment, PREM is personal remittance to GDP, X_{it} is the vector of other control, η_t represents time-specific effect, μ_i represents country-specific effect and ε represents the error term, while i represents the observations of all members of the panel data at time t . The empirical model is fully presented as follows:

$$HC_{it} = \beta_0 + \beta_1 HC_{it-1} + \beta_2 PREM_{it} + \beta_3 FD_{it} + \beta_4 GDPC_{it} + \beta_5 GEE_{it} + \beta_6 INF_{it} + \eta_t + \mu_i + \varepsilon_{it} \quad (2)$$

Where;

HC = human capital investment proxied by gross secondary school enrolment

PREM = remittances proxied by personal remittances as a ratio of GDP

FD = financial development proxied by the domestic credit to private sector as a ratio of GDP

GDPC = economic growth proxied by GDP per capita

GEE = government expenditure proxied by government expenditure on education

INF = inflation proxied by consumer price index

In order to examine the role of financial development in the remittances and human capital investment relationship, equation (2) was extended with the interaction term between remittances and financial development, as expressed below:

$$HC_{it} = \beta_0 + \beta_1 HC_{it-1} + \beta_2 PREM_{it} + \beta_3 FD_{it} + \beta_4 (PREM_{it} * FD_{it}) + \beta_5 GDPC_{it} + \beta_6 GEE_{it} + \beta_7 INF_{it} + \eta_t + \mu_i + \varepsilon_{it} \quad (3)$$

While other variables are as previously defined in Equation (3.2), PREM*FD represent the interaction terms. The marginal effect of remittances on human capital investment, given the extent of financial development in the recipient country, is derived by taking partial derivatives of Equation (3):

$$\frac{\partial HC_{it}}{\partial PREM_{it}} = \beta_2 + \beta_4 FD_{it} \quad (4)$$

Therefore, if $\beta_2 > 0$ and $\beta_4 < 0$, remittances promote human capital investment only when there is a less-functioning financial system. However, if $\beta_2 < 0$ and $\beta_4 > 0$, it indicates that a well-functioning financial system would lead towards remittances promoting human capital investment and complementary among financial development and remittances. If both parameters (β_2 and β_4) are positive, then there is a complementary effect between remittances and financial development in promoting human capital investment. This means, a growth in either remittance and financial development would result in more human capital investment. However, if both parameters are negative, the relationship between remittances and financial development has a substitution impact in promoting human capital investment.

Dynamic Panel of Generalised Method of Moments (GMM) was used as the key estimation technique in this study. This GMM estimator is most appropriate and applicable for panel data having large cross-section observations and small time-series observations, whereas the sample countries of this study were larger than the time-series observations. The justification of selecting GMM estimator in this study was first due to its superiority over static panel estimators, namely the Pooled OLS model, Random Effect model and Fixed-effect model. The inclusion of the lagged dependent variable renders the coefficient estimate bias and the inconsistency, to that effect GMM address issues and the problems of endogeneity, specific effect, avoiding dynamic panel bias (Nickell, 1981), and the possibility of obtaining consistent parameter estimates even in the presence of measurement errors and endogeneity of regressors (Bond et al., 2001). Regarding the nature of these variables, which show the dynamic relationship among them, GMM estimator is preferred due to its ability to address the correlation between lagged dependent variables and the unobserved residuals of the model.

3.2 Data and description of variables

This study employed a sample of an unbalanced panel of 41 SSA countries to estimate the impact of remittances on human capital investment and the mediating role of financial development. The data range selected was between 1996 and 2016. The data for remittances and human capital investment model consisted of 12 observations for each country, taking on a three-year average basis during 1996 and 2016, generating a total of 205 observations. The justification regarding the duration of this study was based on the availability of data for the complete set of variables. For some SSA countries, data availability on remittances were not available for some years. Therefore, this study opted to use the average of three-years of data analysis to examine the impact of remittances on human capital investment. Most of the data used for this study was obtained from the World Development Indicators (WDI) of the World Bank while the financial development indicator was obtained from the Global Financial Development of the World Bank.

School enrolment secondary (% gross) was used as a proxy of human capital investment in this study. The variable is the ratio of total enrolment in secondary, regardless of age, to the population of the secondary age group. The data was obtained from the WDI of the World Bank. Following the empirical studies by Ogundari and Awokuse (2018) and Azizi (2018), the same proxy of the previous empirical literature concerning the impact of remittances on human capital investment was adopted.

This study used personal remittances to GDP which is defined as a sum of three constructed items in the IMF's Balance of Payment Statistics Yearbook (2009) which are workers' remittances, compensation of employees and migrant transfers. The data was taken from the WDI database. The choice of remittances to GDP as a measure of remittances was based on previous empirical studies such as Giuliano and Ruiz-Arranz (2009) and Ngoma and Ismail (2013). Remittances are expected to be positive as remittance funds can be used to finance the education of the migrant's family in recipient countries.

GDP per capita represents the measure of a country's economic output that reflects the income per head in a given economy. Countries with higher per capita income are expected to increase investment in education as that reflects good economic prospects and stability. It is assumed that GDP per capita will increase the investment of education. GDP per capita is an important indicator of economic development and a useful factor for a country's economic wellbeing in the remittance recipient country. The coefficient of GDP per capita is expected to be positive.

Government expenditure on education refers to public spending on education expressed as a percentage of total government expenditure on education in a country. The inclusion of this variable in the model is based on prior literature which emphasized that expenditure on education had a positive and significant impact on human capital formation (Amakom & Iheoma, 2014; Azam & Raza, 2016; Ngoma & Ismail, 2013). Expenditure on education is expected to be positively related to education investment.

Inflation is measured by the consumer price index (CPI) and reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals. Significant price changes are considered to have a deleterious impact on human capital investment and growth. The plausible implication is that a poor macroeconomic environment has a detrimental effects on human capital. Based on the assertions of previous studies, the link between inflation and human capital is negative because inflation would exhibit a negative effect on education.

Financial development refers to a set of institutions, financial markets, instruments and financial regulatory permit transactions, which provide the key functions of the financial sector in the economy. There are various indicators to measure financial development used in the literature. However, the ratio of domestic credit to the private sector to GDP was used in this study. This indicator of financial development captures the efficiency of the banking sector to evaluate and identify viable and profitable investment ventures. It is implied that a high ratio of this financial development indicator lowers transaction costs, increase in financial services and the development of financial intermediation. This indicator was also used by Olayungbo and Quadri (2019) and Giuliano and Ruiz-Arranz (2009). The coefficient of financial development can take a positive or negative sign. Based on the positive assertion, it posits that a well-developed financial sector may help direct remittances to investment in human capital and thus economic growth in the recipient country (Aggarwal et al., 2011; Mundaca, 2009). Therefore, the link between remittances and financial development is positive and has a complementary impact on human capital investment. On the other hand, negative hypothesis assumes that remittances help families to overcome financial constraints through enhancing the welfare of the recipients with less-functioning financial markets (Bettin et al., 2012; Giuliano & Ruiz-Arranz, 2009). As found by these studies, the relationship between remittances and financial development is negative and has a substitutability effect on human capital investment.

4. Results and discussions

Table 1 below shows the descriptive statistics of the variables used in analyzing the impact of remittances on human capital investment. The mean value of human capital investment is 42.324 having a standard deviation of 22.084. Personal remittances to GDP has an average value of 4.038, while its standard deviation is 6.781. GDP per capita shows an average value of 2.213 with a standard deviation of 5.459. The mean of inflation and government expenditure on education is 15.633 (standard deviation 91.217) and 16.323 (standard deviation 5.581) respectively. The mean value of financial development is 18.126 having a standard deviation of 23.186.

Table 2 the results of the correlation between the dependent variables, human capital investment and its independent variables are shown. Based on these results, remittances as a variable of interest in this study are shown to have a positive correlation with human capital investment. Inflation and government expenditure on education also have positive correlation with human

Table 1. Descriptive Statistics

Variable	Obs	Mean	Std.Dev.	Min	Max
Human capital	286	42.324	22.084	5.426	106.966
Personal remittances	259	4.038	6.781	.005	46.566
GDP per capita	312	2.213	5.459	−10.805	73.225
Inflation	296	15.633	91.217	−1.742	1490.523
Government education expenditure	231	16.323	5.581	4.928	30.319
Financial development	285	18.126	23.186	0.660	151.753

capital investment. The GDP per capita, and financial development shown to have negative correlation with human capital investment.

Table 3 represents the results of static panel data estimations. Table 3, columns 1–3 represent the static panel estimators; pooled ordinary least square regression (POLS, random-effects model (RE), and fixed effects model (FE).

The diagnostics tests were conducted to select a suitable model. First, the RE model was selected based on the Breach-Pagan test in which the p-value is the null hypothesis, which states that POLS is appropriately rejected. Secondly, the low p-value of the Hausman test indicates that the FE model is appropriate as the null hypothesis is rejected, which posits the FE model is better than the RE model. However, the FE model suffers from heteroscedasticity and first-order serial correlation as the evidence shows that Modified Wald and Wooldridge tests which check heteroscedasticity and autocorrelation respectively are statistically significant at the 1% level. The results obtained by this FE estimator are biased, leading to an endogeneity problem. In this regard, the dynamic panel estimation, which addresses this issue, should be applied.

We assumed that there was a significant positive impact of remittances on human capital investment within all three static models—POLS, RE and FE. The coefficient of remittances was positive and statistically significant at five per cent in POLS. There was a one per cent significant level in both random and fixed effect modelling. The result indicated that a one per cent increase

Table 2. Correlation Matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)
(1) Human capital	1.000					
(2) Personal remittances	0.050	1.000				
(3) GDP per capita	−0.143	−0.198	1.000			
(4) Inflation	0.026	0.097	−0.031	1.000		
(5) Government education expenditure	0.104	0.274	0.066	0.111	1.000	
(6) Financial development	−0.035	−0.019	0.505	−0.034	−0.033	1.000

Table 3. Static model of remittances and human capital investment

	(1)	(2)	(3)
	POLS	RE	FE
Personal remittances	0.045** [0.021]	0.069*** [0.025]	0.081*** [0.029]
GDP per capita	−0.044 [0.041]	−0.014 [0.072]	0.328* [0.174]
Financial development	−0.020 [0.050]	0.113** [0.057]	0.103 [0.069]
Inflation	−0.007 [0.044]	0.020 [0.039]	0.025 [0.040]
Gov't expenditure on education	0.175* [0.092]	0.256** [0.105]	0.277** [0.117]
Constant	3.465*** [0.372]	2.620*** [0.546]	0.203 [1.150]
Observations	287	287	287
R-squared	0.0549	0.0299	0.0002
BP LM test	197.60***	-	-
Hausman test	-	-	11.73*
Multicollinearity (vif)	-	-	1.28
Heteroskedasticity	-	-	19659.98***
Serial Correlation (F-stat)	-	-	13.064***

Note: Standard errors in brackets with significance levels *, ** and *** denote 10%, 5% and 1%, respectively. All variables are in logarithm form. BP and Hausman tests check for the appropriateness of RE over POLS and FE over RE, respectively.

in remittances led to an 0.08% increase in human capital. Accordingly, it indicated that remittances stimulate secondary school enrolment. However, there may not be a direct impact of the remittances on the children's decision to enroll at secondary school, but the additional income received from remittances will enable the parents to invest in the education of their children. Government expenditure on education indicated a positive and significant impact on human capital investment, whereas GDP per capita, financial development and inflation showed a negative effect in the POLS estimation. However, the FE estimation showed that these variables had a positive and significant impact on human capital investment. The contradictory results offered clear evidence of the inappropriateness of the static panel estimation in the link between remittances and human capital investment. Therefore, the main empirical result was based on the dynamic panel estimation in determining the link between remittances and human capital investment in SSA, as presented in Table 4.

The results of BP LM test above indicated that the p-value was significant at one per cent, leading to the conclusion that the random effect model was more appropriate than POLS and there were country-specific effects in the data. Since the Hausman test indicated that the p-value was significant at 10%, the null hypothesis was rejected and the appropriate model was fixed effects over random effects.

The difference generalized method of moments (DGMM) and the system generalized method of moments (SGMM) which refer to baseline dynamic panel estimations are reported in Table 4.4, columns 1–4. The significance of lagged education confirmed the applicability of dynamic estimation and the GMM approach including the difference and system developed by Arellano and Bond

Table 4. Dynamic model of remittances and human capital

	<i>Baseline model</i>		<i>Interaction model</i>	
	DGMM	SGMM	DGMM	SGMM
Lagged Human capital	0.523***	0.379***	0.431***	0.310***
	[0.051]	[0.097]	[0.058]	[0.086]
Personal remittances	0.005	0.025**	−0.216***	−0.215**
	[0.020]	[0.018]	[0.080]	[0.086]
GDP per capita	0.034	−0.036	0.092**	0.016
	[0.030]	[0.057]	[0.044]	[0.061]
Financial development	0.130***	0.142***	0.089*	0.099**
	[0.045]	[0.047]	[0.050]	[0.047]
Personal remittances × Financial development			0.077***	0.084***
			[0.026]	[0.029]
Inflation	0.176***	0.187***	0.170***	0.144***
	[0.016]	[0.024]	[0.022]	[0.030]
Gov't expenditure on education	0.152***	0.119**	0.184***	0.149***
	[0.045]	[0.051]	[0.040]	[0.043]
Constant		1.050		1.215*
		[0.771]		[0.683]
Observations	205	205	205	205
No. of instruments	25	27	26	27
No. of groups	41	41	41	41
Anderson-Hsiao: AR (1)	0.004	0.009	0.005	0.007
Anderson-Hsiao: AR (2)	0.331	0.414	0.275	0.256
Hansen test (p-val)	0.612	0.421	0.501	0.552
Time dummy	Yes	Yes	Yes	Yes

Notes: Standard errors are reported in brackets. The statistically significant levels at 10%, 5%, and 1% are denoted as *, **, *** respectively. All variables are in logarithm form.

(1991) and Arellano and Bover (1995) which circumvented the unobserved effects using instruments. The difference GMM estimator has significant shortcomings. It is inefficient and biased as it uses instruments obtained by difference equations which controls for time-invariant variables. Moreover, it has limited instruments to control for time-invariant variables because variables in level regressions which are constant over time are existent in the panel regression and are considered in the estimation. Therefore, this renders the difference GMM estimator to determine the corresponding coefficients (Blundell & Bond, 1998).

In order to overcome the potential biases and inefficiency related to the difference GMM estimator, the study employed the system GMM approach by providing unbiased and efficient estimates since it combined the regressions in levels and regressions in differences into a single system (Arellano & Bover, 1995; Blundell & Bond, 1998). Moreover, it used additional instruments obtained from the inclusion of lagged differences of independent variables which addressed the issues associated with the time-invariant variables.

Additionally, this study performed three tests to check the consistency of the GMM estimator. The high value of the p-value of the Hansen test of over-identifying restrictions suggested the existence of validity regarding the instruments under this study. The evidence showed the presence of first-order serial correlation as the null hypothesis, which stated that first-order serial correlation existed in the differenced residuals and is failed to reject. However, the main focus is on the second order AR(2) where it can be noted that all specifications for the sample passed the tests that serial correlation in the residuals is not of order two as indicated by the p-value in the AR(2) test. Also, the Hansen test did not reject the null that the instruments used are valid, therefore the models appear to be adequately specified.

Having confirmed the consistency of the system GMM model, the study next explained the impact of remittances on human capital investment in Table 4. Consequently, we found that remittances had a positive impact on human capital investment and that a unit increase in remittances was associated with a 0.025% (the baseline result of model 2) increase in the level of human capital investment in SSA (Figure 1). This result was consistent with previous empirical studies by Amakom and Iheoma (2014), Huay and Bani (2018), Azizi (2018), and Hines and Simpson (2019). These studies regarding the remittances-human capital nexus showed a positive relationship between remittances and human capital investment which implied higher remittances enhanced educational attainment. Remittance incomes help families who have limited financial resources to send their children to school. For that reason, remittance funds in SSA economies result in increasing per capita income and household expenditure and better access to education for children. If the governments have limited fiscal space to finance education for the school-age population, remittance funds are used as an alternative source of financing education—paying school fees and other associated costs. As a result, remittances improve human capital in the region. Our findings contradict Cattaneo (2012) and Gao et al. (2021) who found that remittances have a negative effect on human capital. They found that remittances are often used to buy food and other basic necessities, pay for medical expenditures and for building and improving the quality of homes. Recipients are prioritizing remittance incomes for consumption rather than investment in education. Recipient households may also believe that out-migration is a better investment than schooling.

Regarding the relevant control variables, the findings of the baseline of the system GMM, revealed that financial development and government expenditure on education were statistically significant at one per cent and five per cent respectively. The results revealed that a one per cent increase in financial development and government expenditure on education leads to a 0.142% and 0.119% increase in human capital investment in SSA respectively. This indicated that financial development and government expenditure on education played an important role in human capital investment in SSA countries. An increase in government spending tends to generate a positive effect on human capital investment as expected. This result is in line with the findings of Bolarinwa and Akinbobola (2021) and Pandikasala et al. (2020) who found that financial development is a crucial driver for remittance inflows. Robust financial development helps recipients to access better financial services such as saving and investment which promotes human capital investment. A better financial development system also decreases the cost of sending remittances which encourages migrants to send more money into destination countries. The lower the transaction cost of remittances, the higher the level of remittance inflows in the recipient country. Contrary to findings from Ngoma and Ismail (2013) and Ullah et al. (2019), government expenditure on education is also found to have a positive and significant relationship with human capital investment, because increased government spending on education increases access to education for children, thus promoting human capital development in the region.

GDP per capita and inflation have a negative and positive impact on human capital investment. Here, the system-dynamic GMM estimator gave a negative coefficient of 0.036 which meant that the GDP per capita decreased human capital investment in SSA but is not significant. Surprisingly, this result is contrary to the findings by Amega and Tajani (2018) that there was a negative

association between GDP per capita and education. One reason could be that the SSA countries' poor state of economic development may not be sufficient to invest in access to education. Most of these sampled economies have poor conditions of economic development and growth, which is a key factor besetting the human capital development in the region. The inflation coefficient has shown a positive and significant association with human capital investment. In this regard, it is unexpected that inflation could positively influence education as a poor macroeconomic performance would have a detrimental impact on human capital. This contradicts the findings of the recent research by Kamalu and Ibrahim (2021) who argued that inflation reduces purchasing power, increases the cost of production and distribution, adversely affecting human development.

Table 4 also shows that all specifications with the interaction term, the coefficients of remittance and financial development reflect the conditional effects of these variables on human capital investment. The interaction's coefficient is 0.084 which affects human capital investment of the system GMM outcomes and it is statistically significant at one per cent. This coefficient gives a valuable sign that the impact of remittances on human capital investment is more pronounced in the presence of financial development. Although the direct effect of remittances in the interaction model is negative, the main concern is the interaction effect and not the direct one. The findings suggest that financial development mitigates the negative relationship between remittances and human capital investment. Remittances increase school enrolment when the financial system is stronger. Our findings of the interaction between financial development and remittances on human capital corroborate the complementary hypothesis of Ngoma et al. (2021) and Bettin et al. (2012) which suggested that a well-developed financial system enhanced the impact of remittances on economic growth through investment channels. The possible reason for the complementarity of financial development is that in economies where the financial institutions, particularly the banking system, are sound and robust, remittance funds may complement bank credit or may act as collateral to gain access to it and, consequently, remittance senders could be encouraged to transfer money to their families in that hope that it will be used for productive outcomes such as human capital investment. Furthermore, a better developed financial system in the home country could reduce transfer costs. This, in turn, eases budget constraints of the households which could be spent on productive use. Our results differ from the research by Sobiech (2019) and Olayungbo and Quadri (2019) on the substitute role of financial development in the remittances-growth relationship. These studies found that well developed financial development such as efficient financial services does not matter for the inflow of remittances and its growth-enhancing effects.

4.1 Robustness checks

Robustness testing is an econometric technique for determining how different main regression coefficient estimates react when the regression specification is changed in some way, for example, by adding or removing regressors. If the coefficients don't change much from the main empirical results, it is taken to be evidence that the results of the study are robust and can be reliably interpreted (Lu & White, 2014). Therefore, to ascertain the robustness for the main results of this study, we relied on two different alternative variables of human capital investment to further check the true impact of remittances on human capital investment. They were secondary school enrolment for females (% gross) and secondary school enrolment for males (% gross).

The findings reported in Table 5 indicated that when secondary school enrolment of females was used as a proxy of human capital investment, there was a one per cent increase in remittances which could positively increase female secondary school enrolment by 0.027%. This suggested that remittances have a positive and significant impact on human capital investment at a one per cent level of significance.

Furthermore, when secondary school enrolment of males was used as an indicator of human capital investment, as shown by column two in table 4.5, there was a five per cent increase in

Table 5. Remittances and human capital investment in SSA countries

	HC1	HC2	HC3	HC4
	SGMM	SGMM	SGMM	SGMM
Lagged Human capital	0.354***	0.330***	0.732***	0.742***
	[0.048]	[0.041]	[0.017]	[0.020]
Personal remittances	0.027***	0.021**	0.050***	0.016**
	[0.008]	[0.010]	[0.012]	[0.008]
Financial development	0.038*	0.018	0.262***	0.172***
	[0.020]	[0.026]	[0.056]	[0.041]
Personal remittances × Financial development	-	-	0.040***	0.004
			[0.013]	[0.011]
GDP per capita	0.068***	0.109***	-0.007***	0.003
	[0.022]	[0.015]	[0.002]	[0.004]
Inflation	-0.012	-0.037**	0.021***	0.008*
	[0.020]	[0.018]	[0.006]	[0.004]
Gov't expenditure on education	-0.029	-0.057*	-0.079***	-0.019*
	[0.022]	[0.030]	[0.022]	[0.011]
Constant	0.241*	0.556***	0.952***	0.900***
	[0.124]	[0.168]	[0.101]	[0.068]
Observations	103	103	92	92
No. of instruments	25	25	27	27
No. of groups	27	27	26	26
Anderson-Hsiao: AR (1)	0.321	0.030	0.692	0.370
Anderson-Hsiao: AR (2)	0.152	0.525	0.464	0.365
Hansen test (p-val)	0.188	0.616	0.436	0.491
Time dummy	No	No	No	No

Notes: Standard errors in brackets * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. HC1 is the school enrolment, secondary, female which serves as the dependent variable. HC2 is the school enrolment, secondary, male which also serves as the dependent variable. All variables are in logarithm form.

remittances and a 0.021% increase in school enrolment. This means that remittances have a positive and significant impact on human capital investment at a one per cent level of significance. This underlined that a positive and significant relationship exists between remittances and human capital investment. The finding of the impact of remittances on human capital investment are robust and confirm earlier findings of the main regression model that remittances promote human capital investment in SSA countries. Columns three and four also illustrated the robustness check of human capital proxies on the interaction term between financial development and remittances. The results confirmed the existence of the interaction effect of remittance and financial development on human capital. However, the interaction term of model (2) was not significant.

5. Conclusion and policy recommendations

This study empirically examined the impact of remittances on human capital investment and how financial development influences the link between remittances and human capital investment. We

used the dynamic generalized method of moments (GMM) in a sample of 40 SSA countries for the period from 1996–2016. The results indicated that remittances impact on human capital investment, particularly education. Moreover, the coefficients of remittances and education as an indicator of human capital have significant positive values, suggesting that remittance inflows help to improve enrolment in education in SSA countries. There has been a strong positive trend in remittance inflows in SSA even though the region remains the lowest remittance recipient globally. The results are in line with those of relevant previous studies.

When the interactive variable, financial development, is introduced into the baseline model of remittances and human capital investment, it has a positive point estimate. We found a significant positive coefficient for the interaction term between remittances and financial development measured by the domestic credit to the private sector as a share of GDP. Given the education impacts of remittances and financial development, this finding suggested that remittances complement financial development in human capital investment. Thus, remittances have a significant investment effect on human capital in better financially developed countries and vice versa.

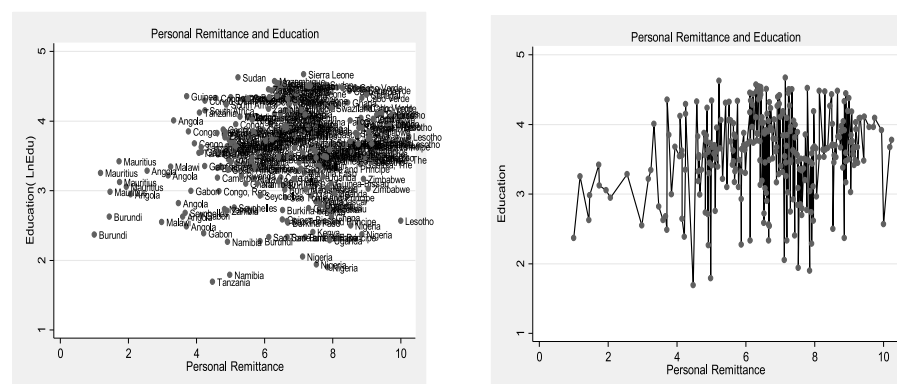
Findings from this study recommend a number of policy measures to foster remittances and promote greater human capital investment. They include:

First, governments should develop proactive macroeconomic policies that attract and ease the inflow of remittances into their countries. Higher inflows will help ease financial constraints and allow for productive long-term investment in human capital development. Second, the governments should allocate more public spending to education. This will complement the impact of remittances on access to education. Government spending should be prioritized to vulnerable groups who have less access to education. Third, there is also a need to improve the economic landscape of countries such as raising GDP per capita. Without developing robust economic activities, achieving skilled human capital formation will be a daunting task.

Fourth, governments should develop and enhance financial market structures such as developing robust domestic banking systems that can help facilitate remittance inflows and encourage both senders and recipients to transfer, save and invest remittance money into productive uses. Efficient banking services play a vital role in attracting remittance inflows and harnessing those transfers into more developmental outcomes.

Finally, governments should also undertake regulatory reforms that strictly enforce the use of formal financial channels when transferring remittances. This will allow senders and recipients to

Figure 1. Remittances and human capital investment.



shift from cheaper informal transfers. Improved financial services, financial instruments and payment systems are all important for increasing remittances inflows which could be funneled into optimal productive investments in SSA.

The findings of this study warrant further research into country-specific approaches to avoid the generalization of policy recommendations. Future research should also address other ways in which remittances may impact human capital as well as examining the gendered perspectives of the impact of remittances on education. The findings of this study should be interpreted with caution since each country's weight is the same in the regression analysis but the true weight of remittances is not calculated based on the number of people affected.

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Appendix. Data definitions, Summary of statistics, Sample of countries and Static panel results (OLS, Fe and Re)

Table A1. Summary of Sources of Data

Variables	Variable Definition	Data Sources
Personal Remittance as a share of GDP	Refers to the inflow of personal remittances expressed as a percentage of gross domestic product (GDP). Personal remittances consist of personal transfers and compensation of employees.	World Development Indicators (World Bank)
School enrolment, secondary (% gross)	Measures the ratio of total enrolment in secondary level education, regardless of age, to the population of the secondary age group.	World Development Indicators (World Bank)
School enrolment, secondary, female (% gross)	Gross enrollment ratio is the ratio of total enrollment for female, regardless of age, to the population of the age group that officially corresponds to the level of education shown.	World Development Indicators (World Bank)
School enrolment, secondary, male (% gross)	Gross enrollment ratio is the ratio of total enrollment for female, regardless of age, to the population of the age group that officially corresponds to the level of education shown	World Development Indicators (World Bank)
Government Expenditure on Education	Refers to public spending on education expressed as a percentage of total government expenditure on education in a country.	World Development Indicators (World Bank)
Domestic credit to the private sector as a share of GDP	Measures financial resources provided to the private sector by financial corporations such as through loans, purchases of non-equity securities, and trade credits and other accounts receivable that establish a claim for repayment	Global financial development
Inflation Rate	Inflation is measured by the consumer price index (CPI) and reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals.	World Development Indicators (World Bank)
GDP per capita	Represents the measure of a country's economic output that accounts for the number of people.	World Development Indicators (World Bank)



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