Remittances and Financial Inclusion: What Do We Learn from African Countries?

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Abstract

In policy discussions, it has frequently been claimed that migrants' remittances could be a 'catalyst' for access to financial services for receiving households. This study examines empirically the role of migrant remittances as a determinant of financial inclusion in Sub-Saharan African (SSA) countries using panel data over the period 2004 to 2019. This is an important issue considering the literature that has documented the effects of financial inclusion on inclusive growth and poverty reduction. Eight different indicators of financial inclusion were used: Bank branches and Automatic teller machines (ATMs) per 100 000 adults, the aggregate level of deposits and credits provided by banks, the number of microfinance institutions (MFIs), the value of deposits and loans provided by MFIs, and the number of active borrowers per MFI. Results using the dynamic Generalized Method of Moments (GMM) show a positive effect of remittances on the level of financial inclusion. These effects are more significant for microfinance institutions indicators than for those of traditional banks. This suggests that remittances provide recipients the opportunity to open bank accounts, increase their savings, and access the financial system while allowing also the unbanked to access existing and new financial products such as those from microfinance institutions. As a result, remittances are emerging as a determinant of financial inclusion in SSA. They can potentially help to expand microfinance institutions since the profile of the recipients of remittances often matches those of their clients. Our findings provide insights into the potential for capitalizing on the benefits of African migration through remittances by implementing and promoting financial inclusion policies that focus on financial institutions appropriate to the Sub-Saharan context.

Key Words: Financial inclusion, remittances, Africa

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I. Introduction

Africa is now the world's second-fastest-growing region after Asia concerning the annual gross domestic product (GDP) growth rates over the last decades. Despite this economic growth, several observations are emerging today about the fact that this growth is not translating into social inclusion and improved living conditions (Ngepah, 2017). For development-finance authors such as Levine (2005); Demirguc-Kunt et al. (2017), one of the levers the continent could rely on to promote inclusive growth is the financial inclusion of all population categories. A financial system that can provide different services at different stages of economic development to ensure continued inclusive growth. Speaking of financial inclusion, Africa is still lagging behind other regions of the world (Demirgüç-Kunt and Klapper, 2012; Guérineau and Jacolin, 2014). According to recent surveys published by Global Findex (2017), in Sub-Saharan Africa, the average bank penetration rate is 20% compared to nearly 100% in Organisation for Economic Co-operation and Development (OECD) countries and 63% in the rest of the developing countries. As a result, the trend today is for countries to adopt more commitments to financial inclusion, considering that financial development that stifles access and effective use of financial services by economic agents would be counterproductive.[2]
Financial inclusion is not fully different from financial development. But the latter occurs when financial instruments, markets, and intermediaries improve information and transaction costs and, as a result, can better perform the five financial functions (Levine, 2005) while the former is a dimension of the latter (Sahay et al., 2015)

The arguments for financial inclusion in development as outlined by the authors are clear: it facilitates the efficient allocation of productive resources and reduces the cost of capital. In addition, access to appropriate financial services significantly improves day-to-day financial management, increases the mobilization of savings for investment, expands the class of micro-entrepreneurs, and enables more poor people to invest in themselves, thereby creating employment that can help Africa development (Sarma and Pais, 2011). From the above, there is no doubt that the direction of the financial landscape has changed in recent years in developing countries and the focus has now shifted from financial development in general to

[2] The World Bank provides support to governments in their strategy to fight financial exclusion as well as sub-regional central banks such as the Central Bank of West African States

financial inclusion. In particular, a financial system that ensures that the performance of economic growth on the continent is inclusive and sustainable (Johnson and Arnold, 2012).

Financial inclusion refers to all initiatives that make financial services available, accessible, and affordable to all population segments. It goes beyond improving access to credit to include improved access to savings and insurance products and access to financial education. It is also a well-functioning financial system that enables households and businesses to engage more actively in the economy while protecting the rights of users. Financial inclusion is a fairly recent concept, but it is also very complex and multidimensional. It encompasses a variety of aspects related to the accessibility, availability, use, and efficiency of financial services offered and available to economic agents (Sarma, 2008). It is provided mainly in Africa by banks and credit institutions such as microfinance institutions to remove constraints related to access to bank credit and the effective use of the latter at lower costs African Development Bank (2013), considering that the financial system in African countries is centered on banks and microfinance. Recently, another dimension of financial inclusion has emerged, namely access to mobile banking or "mobile money." It has revolutionized the context of financial inclusion in Sub-Sahara African countries, through the widespread use of smartphones and the internet, which allow people to have a mobile bank account on their phone to carry out transactions (receive or send money) without going through traditional bank branches. The other components of the financial system are either developing (in the case of markets) or undergoing restructuring. Financial exclusion in Sub-Sahara Africa is actual. This situation maintains by ricochet the population depletion, especially for women and youth. Exclusion also affects small companies, thus contributing to the regression of the development of local communities.

While it is clear that inclusive growth requires access to financing, there is no doubt that this financing today goes beyond internal financing, driven by banks, microfinance, and credit agencies, to international funding for development. In this context, migrant remittances have also become an important resource for African country’s economies. It complements Official Development Assistance (ODA) and Foreign Direct Investment (FDI) and tends to surpass them (WDI, 2019). For this reason, Africa is now part of those regions of the world that are experiencing strong migration dynamics, with 40 million Africans living outside their country of birth, according to the United Nations Department of Economic and Social Affairs (DESA, 2020). World Bank estimations show that these financial flows from migration reached about USD 548 billion in 2019, far exceeding ODA and FDI, which amounted to USD 166 billion and USD 534 billion, respectively. Despite a slight downturn following the Covid-19 pandemic,

at the macroeconomic level, remittances are becoming an important, stable, and reliable source of external financing for African economies. They also allow households and economic agents to build up savings, which allows them to access capital and smooth out their resource constraints on production needs. At the microeconomic level, remittances have the particularity of reaching households directly to contribute to an increase in their resources, which will be allocated to investments, improvement in living conditions, and even a reduction in inequalities in access to bank credit in the countries. Abundant literature has therefore focused on the macro and microeconomic impacts of remittances. These studies have particularly focused on the role that remittances could play in human capital accumulation (Garcia-Fuentes and Kennedy, 2009; Docquier et al., 2012), economic growth, and financial development (Coulibaly, 2015).

However, very few studies have analyzed the potential role of remittances on economic activity through the promotion of financial inclusion in migrants' countries of origin, as a result of the financial sector activities (supply of and demand for financial services), whether with banks, microfinance institutions, or mobile money bankings. On the one hand, remittances are likely to impact the performance of banking and microfinance institutions, which are key players in financial inclusion in Sub-Saharan Africa (SSA). The margins taken from migrants' funds will meet their dual objectives (financial sustainability and social purpose) for microfinance. For banks, remittances could enable them to build a profile of potential future clients. The better they perform, the more they can freeze the credit constraints on households, which will become more relaxed. This will lead to easier access to credit in these countries and their effective use. In addition, the migrants who send the money encourage the recipient to contact the institution through which the money is sent, suppose that institution is a bank or microfinance offering additional financial products. In that case, this interaction can create demand for products such as bank account opening, savings, credit, mortgages, insurance, enhance financial literacy, and build a healthy financial backlog with these institutions. Through the inflow of remittances, the bank gains insight into the client's income and expected future funds, thus indicating the potential creditworthiness of the recipient, as a constant (future) flow of transfers can be used to repay loans, thus reducing the client's risk profile (Anzoategui et al., 2014).On the other hand, given that remittances have the particularity of going directly to households who use them for consumer spending, including the purchase of smartphones, internet packages, the receipt of these funds can encourage demand for mobile financial services, thus promoting the activities of mobile money providers broadening their business base for a larger tax base, and in turn the possibility of private investment, domestic demand raising, human capital formation, and self-

sustaining financial education. Moreover, unlike cash transactions, remittances channeled directly through mobile bank accounts can encourage demand for these accounts, enhance transactions conducted via mobile platforms, and help include a larger portion of the population in the financial system for an improvement in the household's standard of living (Munyegera and Matsumoto, 2016).

Therefore, this study aims at analyzing the role of remittances on the dimensions of financial inclusion in SSA countries, particularly on the performance of banks and microfinance institutions (MFIs). This paper builds on the literature that analyzes the macroeconomics effect of remittances on financial development, but with a greater focus on financial inclusion, which is currently the focus of debate, particularly its effects on enhancing inclusive growth in developing countries in general and Sub-Saharan Africa in particular. By emphasizing the role of remittances in promoting financial inclusion through two main financial intermediaries, banks and MFIs, our analysis is more comprehensive. In contrast to the existing literature (Aga and Peria 2014; Ojefu and Ogebe, 2019), which is limited to banks as financial inclusion indicators, we go further by introducing MFIs because we consider that doing so would exclude a specific category of the population from the analysis. Thus, we have paid particular attention to these gaps by considering several alternative indicators to capture financial inclusion more comprehensively. Moreover, we contribute to the literature that considers that African international migration is not a fatality for the origin economies. It can also be beneficial through, among other things, such as the remittances it generates. Concretely, our contribution to the literature is in two folds. This study will contribute to the existing literature in Sub-Saharan Africa on the issues of maximizing the benefits of African migration and the relationship between remittances and financial inclusion by highlighting MFIs. It also proposes to highlight heterogeneities depending on the service provider (banks versus microfinance), based on the fact that MFIs are closer to the vulnerable and rural populations who are in general the remittances recipients, than the traditional banks in the fight against financial exclusion in Sub-Saharan Africa. MFIs are mostly intended for low- and middle-income households, which are most excluded from the banking system in Africa, hence the interest in adding MFIs services. In sum, we introduce news indicators of financial inclusion, use a methodology and a macroeconomic approach that is not yet widely used to our best known in the relation between remittances and financial inclusion in SSA.

To achieve our objectives, this study will be structured as follows: the first part will be devoted to a literature review on the link between remittances, banks, and MFIs. The second part will

present the data used to analyze the relationship between remittances and financial inclusion, followed by stylized facts about our study period. Finally, we will lay out an empirical framework to investigate the effect of remittances on financial inclusion, followed by a discussion of the results and robustness measures that will conclude the study.

II. Related Literature: Migrant Remittances, Financial Development, and Financial Inclusion in Developing Countries.

(i) Remittances and financial development

The literature analyzing the macroeconomic effects of remittances has long focused on the link between remittances and economic growth and poverty. The results of this literature have been mixed. On the one hand, it shows that remittances have no significant impact on the growth of recipient economies (Acosta et al. 2007; Chami et al. 2009) while on the other hand, some publications emphasized that remittances promote economic growth (Giuliano et Ruiz-Arranz, 2009; Adams et Cuecuecha, 2013; Lim et Simmons, 2014). But these results remain conditioned by the level of financial development, the quality of the institutions in the recipient countries, the composition of the samples, and the estimation methods used. In that way, the relationship between remittances and financial development has been put forward and has also given rise to extensive literature that provides controversial results. As mentioned by Aggarwal and al. (2011); Karikari and al. (2016), remittances positively impact financial development in the short run by allowing households to access bank credit. To the extent that remittances appear to be more stable than other foreign capital flows and counter-cyclical. They can as well increase banks' loanable funds, promote the development of banks, and promote domestic credit. Olayungbo and Quadri (2019) reach similar conclusions on a sample of 20 sub-Saharan African countries from 2000-2015 using Pooled Mean Group (PMG). On the other hand, Bettin and Zazzaro (2012), taking into account the interaction between remittances and banking efficiency, find that remittances are complementary to financial development rather than promoting the financial system. Similar results were obtained by El Hamma (2019) using the instrumental variables method to address possible endogeneity of remittances to assess the relationship between remittances and financial development based on a study of a sample of 14 countries in the Middle East and North Africa. At the same time, by relaxing household financial constraints, these transfers may reduce household demand for loans and reduce financial sector development. With this in mind, Coulibaly (2015) demonstrated in a sample of 19 Sub-Saharan African countries from 1980 to 2010 that remittances have no significant impact on financial

development. He uses the Seemingly Unrelated Regressions (SUR) method to demonstrate that there is no evidence to support the idea that remittances promote financial development in SSA countries, and that financial development does not seem to be a relevant determinant of remittances received in these countries either. Ambrosius and Cuecuecha (2016) find a negative effect on the demand for financial services from banks of remittances recipients, thus constraining financial development. The results of Karikari et al. (2016) confirm this finding when they demonstrate a negative impact of remittances on long-term financial development in a sample of 50 African countries from 1990-2011. From the above, it is clear that there is still no consensus on the impact of remittances on the financial development of recipient economies and especially on African economies.

Therefore, the questions that arise are: Is it appropriate to talk about financial development in Sub-Saharan Africa? Could this lack of consensus be due to the indicators used to measure financial development, given that the financial system in Sub-Saharan Africa is mainly driven by banks, microfinance institutions, and mobile banking?

Financial development is often measured in the literature by variables such as bank credit to the private sector, credit ratio to the private sector to GDP, and broad money to GDP (M2). (Beck and al., 2000; Gupta and al., 2009; Nyamongo and al., 2012; Coulibaly, 2015). These different variables are somewhat formal proxies for the state of a country's financial system. Moreover, Gregorio and Guidotti (1995) emphasized that the main channel of transmission and assessment of the financial system should be the productivity of investment and not its initial volume measured by bank credit. Furthermore, these financial development indicators in Africa are generally low, reflecting a very weak formal financial system. Yet, remittances are mostly funds for low-income households (sometimes transiting through informal channels) who are mostly excluded from the mainstream banking system and even from financial markets. All of these factors could be reasons for the mixed results of the effects of remittances on financial development in SSA. In addition, following the adoption of the Millennium Development Goals (MDGs) in 2000 by the United Nations and the Sustainable Development Goals (SDGs) in 2015, which considered financial inclusion as a key foundation for development, have gradually prompted Sub-saharan African governments to work towards a more inclusive financial system. From now on, we will talk more about financial inclusion than financial development. Promoting financial inclusion has become a major objective for most African economies. The financial inclusion project in Sub-Sharan Africa aims to increase access to finance for micro, small and medium enterprises to ensure sustainable private sector financing for job creation for youth. Indeed, these countries, in particular, have been focusing on financial inclusion as a lever

for economic and social development. This has prompted researchers to reorient their research, and over the past few decades, they have been working to assess the role of remittances in promoting financial inclusion. To this end, the following section provides a synthesis of this literature. We first present the theoretical assumptions that support the relationship between financial inclusion and remittances, and then we present the results of major empirical studies on the topic. In particular, we distinguish those that have addressed the relationship between remittances and microfinance institutions.

(ii) Remittances and financial inclusion

Recent developments in the literature have yielded few studies on the determinants of financial inclusion and its relationship with international migration and remittances in particular. This justifies the lack of theoretical studies on remittances as determinants of financial inclusion. Yet, theoretically, Schumpeter (1912) emphasized the primary role of financial institutions, in this case, banks, who, target financial entrepreneurs, encourage technological innovation, capital accumulation and thus stimulate economic growth. Thus, financial development stimulates growth by increasing the investment rate and by allocating capital to the most productive projects. For Levine (1997), financial intermediaries must facilitate financial transactions, provide risk coverage and diversification of assets. Hence, the efficiency of the financial system stimulates growth by reducing transaction costs while ensuring that capital is allocated to the most profitable projects. To do this, the financial system must be inclusive to allow all segments of the population to have access to financial services. Johnson and Arnold (2012); Demirgüç-Kunt et al. (2017), and Dissaux (2019) demonstrate that an inclusive financial system promotes inclusive and sustainable growth. They point out that once the financial system can provide services according to the population's needs, this will encourage growth. This positive impact on growth will depend on the number of people using these services. The higher the number, the higher the growth rate. With this in mind, the literature has been looking at the potential determinants of the efficiency of this financial system. And remittances have emerged as a way to promote the activity of financial institutions, the main actors in this inclusive finance.

Theoretically, remittances can impact the activity of its providers and promote inclusive finance in several ways. Anzoategui et al. (2014) identify two channels through which remittances can affect financial inclusion. First, remittances may create a need for financial services among recipient households and make them eligible to access savings products offered by financial

institutions. Second, remittances would increase the likelihood for recipient households to obtain loans. Indeed, by reducing the information asymmetry between lenders and borrowers, financial institutions would be more willing to lend to remittances recipients. This can improve the activities of these institutions and the financial inclusion of these households.

The empirical literature has taken two main directions. The first is the analysis of the direct effects of remittances on financial inclusion. Most of the works conclude that remittances positively impact financial inclusion on the one hand and a negatively or neutral impact on the other. Much of these works are conducted in a South American context and at the microeconomic level. Reasons for the positive effects of remittances on financial inclusion includes that the increased income of recipient households leads to an increase in demand for financial services (Ambrosius and Cuecuecha, 2016), the promotion of financial literacy that ultimately leads to financial inclusion, and the reduction of information asymmetry risk that increases the creditworthiness of remittance recipients with lenders (Yoshino et al. 2017). Ambrosius and Cuecuecha (2016) show from a survey of Mexican households that remittances encourage informal financial services more than services from banks. Households that reported receiving migrant remittances made greater use of deposit accounts with credit unions and savings cooperatives and formed tontines and village savings banks. The results of the Bangake and Eggoh (2020) study confirm these findings. Demirgüç-Kunt et al. (2011) also show that remittances, by stimulating household demand, contribute to a significant increase in financial depth, particularly the number of bank branches and the number of deposits in banks. In the same vein, in El-Savador, Anzoategui et al. (2014) use household survey data to examine the effect of migrant remittances on household use of savings and credit products from formal financial institutions. They find that although remittances positively impact financial inclusion by promoting the use of deposit accounts, they do not have a significant effect on the demand for and use of credit from banks. They support their results by showing that by relaxing credit constraints, remittances could reduce the need for financing from banks while increasing the demand for savings instruments. Most of the existing work in Africa is also microeconomic. Kassim and Tomoya (2014); Munyegera and Matsumoto (2016) show a positive and significant effect of remittances on the probability of requesting and using mobile money that translates into an improvement in household living standards in Uganda. In parallel to this study, Aga and Peria (2014) show that remittances significantly influence the probability of opening an account with a banking institution. Ajefu and Ogebe (2019) come to the same conclusions by proving that in Nigeria, receiving remittances increases the likelihood of using financial banking

services such as opening deposit accounts and mobile money services. In contrast, Uchenna et al. (2015) use logistic regression to analyze the link between remittances and financial inclusion and provide empirical evidence that remittances do not increase the demand for banking services among recipients.

At the macroeconomic level, improved data on financial inclusion has allowed for the occurrence of a few rare studies on the link between remittances and financial inclusion in recent years. But in the context of Sub-Saharan Africa, there are no macro-level studies on this issue to our knowledge.

Nevertheless, in a larger sample of 38 countries in Asia and Oceania between 2001 and 2012, Inoue and Hamori (2016) conducted a study analyzing the macroeconomic impact of remittances on banks' financial services. They provide empirical evidence that remittances contribute to expanding the domestic network of commercial banks. Similarly, in a sample of 61 developing countries, Machasio (2018) also finds that remittances positively impact financial inclusion by increasing the financial inclusion index by about 2.49 percent. In contrast, Gautam's (2019) results question the ability of remittances to boost the level of financial inclusion in developing countries. His study covers 107 developing countries. He shows that remittances lead to a significant decline in deposit accounts in banks. On the other hand, they do not significantly affect the level of credit from these institutions. Based on the banks as the only actor in financial inclusion, it is clear that in developing countries, especially in poor countries, households receiving remittances are mostly excluded from the banking system. This could explain the negative effect that the author finds. Therefore, it would be more interesting to go further in the analysis by looking at other financial service providers' closeness to low-income populations to get a more comprehensive view of the macroeconomic impact of remittances on financial inclusion. This is the question that this study addresses in the context of Sub-Saharan Africa.

The second direction taken by the empirical literature is to analyze the effects of financial inclusion in the relation between remittances and economic growth. Most notably, Orozco and Fedewa (2006) show a strong potential for financial inclusion to enhance the beneficial effect of remittances on countries' economic growth. Chuc et al. (2021) come to similar conclusions by analyzing financial inclusion as a transmission channel between remittances and economic growth. They conclude that by increasing household financial inclusion, remittances positively impact economic growth in 60 low- and middle-income countries over the period from 1996 to

2018. Their results show that financial inclusion, in general, could exacerbate the growth-stimulating effect of remittances. This is because the actual use of financial services by recipients could boost this effect. Nyamongo et al. (2012) also come to the same conclusion. They conclude that promoting an inclusive financial sector would reduce the number of unbanked populations and encourage the effective use of products for productive investment, which would positively affect growth.

(iii) Remittances and microfinance institutions

The exclusion of low-income households from financial services is widely recognized as a barrier to growth and poverty reduction in developing countries (Jalilian and Kirkpatrick, 2002; Beck et al. 2007; Honohan and Beck, 2007). The value of microfinance is that it provides hope for a better life (living better) by reducing economic vulnerability, increasing people's capabilities and initiative, and federating around them the imperative of strengthening relationships. The contribution of MFIs to development is found at the economic, political, and social levels. Despite this interest, the above-mentioned empirical studies focus more on remittances in the traditional banking sector as covered by official data. Generally, they do not include information on MFIs, even though they are, on average, both socially and geographically "closer" to remittances recipients than traditional banks. MFIs have considerable experience serving low-income clients with characteristics similar to those of remittance recipients, and they are often located in rural areas where traditional banks are not present. Therefore, a few studies point to the combination of remittances with MFIs services is particularly promising for the financial inclusion project (Sander and Barro, 2003; Orozco and Hamilton, 2005; Hastings, 2006; Ambrosius, 2011). In a study based on Mexican household data, Ambrosius and Cuecuecha (2016) find a significant and positive correlation between remittances and ownership of savings and credit accounts with cooperatives and village credit unions but not with commercial banks and formal institutions. Anzoategui et al. (2014) demonstrate that remittances have favored the use of savings and deposit accounts with MFIs and banks in El-Salvador. Nevertheless, despite this empirical evidence, the potential of remittances to foster inclusive finance for low-income households by MFIs in Africa has been and remains largely unexplored. Hence the interest of our study is to fill the gap in the literature.

III. Data and Empirical Strategy

This section will conduct an analysis that will highlight the impact of remittances on financial inclusion in Sub-Saharan Africa. Indeed, financial inclusion and financial development seem to be strongly correlated, to the extent that financial development is sometimes used as a broader indicator of financial inclusion. Also, the effect of remittances on financial inclusion may depend on the country's financial system structure. However, in the presence of financial inclusion, the financial development indicator (M2 or credit to the private sector) is not included in the model because we are interested in the inclusiveness of the financial sector in Africa, which has been an issue in vogue in recent decades. Moreover, knowing the countries in our sample, we assume that these countries have on average the same financial system structure given that only 43% of adults aged 15 and above have a bank account in sub-Saharan Africa, with a significant gender disparity, and with a significantly underdeveloped financial market (Global Findex, 2017). Therefore, the main focus will be on the contribution of remittances to the promotion of financial inclusion indicators, which we believe are more likely to promote a more inclusive financial system, thereby making it more appropriate to the Sub-Saharan context.

3.1. Data

The study covers a panel of 32 Sub-Saharan African countries spanning between 2004 and 2019, for which data are available. Moreover, the financial inclusion concept was propelled in the 2000s in these countries, which justifies the choice of our study period. Data were extracted from the Financial Access Survey (FAS) for the main banking indicators of financial inclusion; from the Microfinance Information Exchange, Inc., Market database (MIX market) for data on Microfinance Institutions and from the World Development Indicators (WDI) for remittance flows and control variables such as gross domestic product per capita, population growth rate, level of education and trade openness.

The variable of interest concerns remittances. It is measured as the personal remittances of emigrants received by countries of origin relative to GDP. Personal remittances include all the transfers either in cash or kind sent by migrants and individuals in the country of origin. The definition provided by the World Bank, which we will describe as "strict", states: "Personal transfers represent all current monetary transfers received by resident households and sent by a

non-resident household. They, therefore, include all current transfers between residents and non-residents." This narrower definition has the advantage of better targeting migrants' transfers by excluding other flows and also accounts for remittances from non-salaried individuals.

To measure financial inclusion, the literature emphasizes that the measurement indicators are multiple and varied. They range from service supply indicators to demand indicators. The supply of financial services is mainly assessed by two indicators: the overall demographic penetration rate and the overall geographical penetration rate of banks. Demand is captured by indicators related to the actual use of financial services, which include the number of bank accounts, the number of deposit accounts with financial institutions, the value of loans granted by these institutions, as well as the means of payment, such as the number of credit and debit cards AfDB (2013). Referring to the work of Sarma (2008) we also identify other dimensions of inclusive finance that are mainly used in the financial inclusion literature. Availability and accessibility of financial services or supply (measured by the number of bank branches and ATMs per 100,000 adults and per 1000 km2 and the number of bank accounts as a percentage of the total population). Financial services use or demand (measured by the volume of credit and deposits in banks as a percentage of GDP and the number of debit and credit cards per 100,000 adults). Mobile banking (measured by the number of mobile money accounts and the value of mobile and internet banking transactions as a percentage of GDP). It is mainly on these latter dimensions that our study will focus on.

Thus, the financial inclusion variable in this study will essentially take the following dimensions: On the one hand, we mobilize indicators such as the number of bank branches per 100,000 adults, ATMs per 100,000 adults, the value of deposits, and the volume of loans broken down by banks (Financial Access Survey database). And on the other hand, the number of MFIs, the number of active borrowers in an MFI, the volume of deposits, and the value of loans are broken down by these microfinance institutions (Mix Market database).

The objective is to present the effects of Remittances on financial inclusion through two main financial actors in sub-Saharan Africa. These are commercial banks and microfinance institutions. These two agents are the main actors in the financial inclusion process in these countries supported by mobile banking providers, essentially telecommunication companies.
Commercial banks are essentially the financial institutions that embody the formal financial system of a country. They are the primary providers of deposit, savings, and credit services of a specific value to a population category.

Microfinance is by definition aimed at low-income populations and those excluded from the banking system. It is essentially the provision of low-value financial services such as savings, loans, insurance services, and financial education. Microfinance is growing and becoming a significant component of most financial systems, particularly in SSA countries. In the work of McKinnon and Shaw (1973) on finance for development, microfinance is considered an important tool for a country's economic development. Access to financial services is essential to encourage entrepreneurship among low-income populations to ensure financial independence and raise their income above the poverty line. MFIs provide finance to the poor by granting loans without collateral but rather based on trust and proximity, as these clients do not usually have assets. Most MFIs operate at the local level and use a relationship-based lending system to obtain information about their clients and build client loyalty (Schreiner, 2002). In sub-Saharan Africa in particular, MFIs are increasingly present and operate mainly in rural areas that are difficult to access and where banks are not particularly present.

3.2. Transmission Channels

We theoretically highlight two main channels through which remittances will influence the level of financial inclusion. Remember that the issue of financial inclusion is part of the theory of financial intermediation and its impact on economic development.

First, we have the income channel to explain the mechanism between remittances and financial inclusion. It is glaring that, by increasing household income, remittances could create a need for financial services such as savings among recipient households and make them eligible to access the various financial products offered by financial institutions. As a result, there will be an improvement in the indicators of inclusive finance in the migrant's home economy as financial intermediaries will have to respond to the demand induced by the influx of remittances. Secondly, through the investment channel, remittances would increase the likelihood of recipient households' chances of credit from financial intermediaries. In fact, by reducing information asymmetry problems between lenders and borrowers, financial institutions would be more willing and able to lend to remittances recipients so that they can finance projects. This will be possible because, by maintaining a deposit book with them, the institutions have a certain amount of information that allows them to know the profile of the potential borrower. This can therefore improve the activity of these institutions and promote

the financial inclusion of these households. Particularly at the level of commercial banks, by stimulating demand and effective use of services by households, remittances would contribute to increasing the demographic and geographic penetration of banks. We hypothesize that remittances will positively impact the opening of deposit accounts and on access to credit by commercial banks for a certain category of economic agents.

At the level of MFIs, where the particularity of our study lies, remittances will essentially contribute to the reinforcement of the social and financial performance of these institutions whose main objective is to promote microcredit to the poor. Unlike previous studies such as (Aga and Peria, 2014; Coulibaly, 2015; Ogebe and Ajefu, 2019), which only focus on bank penetration and credit provided by commercial banks as an indicator of inclusive finance and financial development, we introduce the contribution of MFIs to financial inclusion in SSA. Certainly, by using MFIs performance variables as an indicator of financial inclusion, we expect to capture the effect of Remittances on demand for financial services (savings and credit) among all other categories of the population, especially among those excluded from the banking system but who also participate in the economic activity of the countries in our sample. This is because these MFIs' performance variables capture information on clients who are excluded from the banking system. Therefore, limiting ourselves to the banking system variables as an indicator of inclusive finance seems relevant to us, but it remains less comprehensive and less inclusive. There may be a loss of information on the capacity of Remittances to promote inclusive finance in sub-Saharan Africa. The additional information that these indicators provide is on the inclusive aspect of financial development. They provide information on financial practices among the poor and those excluded from the banking system and financial markets. The main reason behind the choice of this approach is that remittances, contribute to the performance of MFIs, indirectly contribute to the promotion of financial inclusion of poor populations. This is because the more efficient MFIs are, the more sustainable they are, and the more sustainable they are, the more they will be able to meet the needs of economic agents. This hypothesis is inspired by the results of the study by Ambrosius and Cuecuecha (2016).

The performance of MFIs is captured firstly by the scope of their activities which counts the number of clients served by the MFI. This is usually measured in the number of active borrowers (Schreiner, 2002). Next, outreach counts the volume of deposits collected and the number of deposit accounts opened. Deposits are important because, although all poor people (the majority of MFIs clients) can make deposits and save to facilitate consumption and invest

later, they are not all creditworthy. Thus, deposits reinforce the incentives for sustainability and duration of savings. Depositors avoid some MFIs if they are not sure of their financial viability because they fear that they will not get their deposits back. To have deposits, an MFI must have the confidence not only of donors, investors, and regulators but above all of its clients. And finally, by depth, which considers the type of client through the level of social income, which is usually measured by the average size of loans granted to beneficiaries (Barry and Tacneng, 2014). These three main indicators are practical tools for MFIs and stakeholders to assess these institutions' social and financial performance. In this study, we use these three indicators to measure the demand for financial services from MFIs and add the number of MFIs per country to capture the supply of services or penetration. On these four indicators, we expect a positive impact of remittances flows. Assuming that the performance of an MFI condition its capacity to last over time to allow its clients to have stable income over the long term, the mechanism remains the same as that of the banks. Still, the effect is likely to be more amplified given the similarities between the profiles of MFIs clients and most remittances beneficiaries.

A plausible explanation could be that remittances allow beneficiaries to save cash, which is reflected in demand for deposit accounts. It also allows them to access other potential products such as financial education services, establishing tontines and village funds that are not available in banks, or payment or even credit. These demands, in turn, could be met by increasing the supply of financial services by promoting the viability of MFIs. In this way, remittances could improve the accessibility of their beneficiaries in rural areas or not to financial services. Consequently, remittances appear to ease the financing constraints of recipients with traditional banks by enabling them to access credit with MFIs, given that it is based on a relationship of trust that MFIs grant credit.

Our empirical analysis of the impact of remittances on financial inclusion is also based on the literature analyzing the determinants of the use of financial services by households. Theoretically, Zeller (1995) shows that access to credit and savings increases household utility by smoothing consumption. He also shows that the demand for savings and credit is a function of household income, hence the interest in remittances as an additional household income and one of the benefits of African migration. Empirically, authors such as Pal (2002); Barslund and Tarp (2008) in studying the factors that stimulate demand for formal and informal financial services, highlight the role of education level and household size as a key determinant of demand for financial services. Hence the introduction of control variables in the model.

While the demand for financial services is influenced by household income, the GDP growth rate, which is an indicator of the economic situation of a country, can also be correlated with the financial system. In this case, it may have a positive effect on the level of financial inclusion. In addition, income level could cause migration, as some individuals leave their home countries in search of a better life for themselves and their families. Thus, GDP per capita may also be correlated with remittances. For the education variable, it is likely to be positively related to the use of financial services. We consider that the level of education can promote the understanding of the usefulness of savings and credit instruments. Thereby also facilitating the use of these services. The size of the population is likely to have an impact on financial inclusion. The demand for financial services can be an increasing function of population size. Gupta et al. (2009) highlight trade openness and population size as drivers of migration. Therefore, these variables are likely to impact the level of remittances and the demand for financial services.

3.3. Some descriptive statistics

This section presents the correlation between remittances and some financial inclusion indicators, as well as descriptive statistics. Financial inclusion is captured by supply and demand indicators for financial services at the bank and MFIs level.

Over the period considered (see Table A.1 of appendices), the average level of remittances is 3.249% of GDP, reaching nearly 20% in some countries such as Senegal, Togo, Gambia, Liberia, and Cabo-Verde. This significant share of these funds suggests that they can impact economic and social activities by facilitating access to financial services for the poorest populations. Globally, financial inclusion indicators have shown an increasing trend between 2004 and 2019. The level of bank penetration, characterized by the geographic and demographic penetration of banks, has also evolved. This suggests that for every 100,000 adults, there are on average seven bank branches. Nevertheless, this level of banking is still low compared to other regions of the world. Moreover, banks are subject to prudential and regulatory restrictions and cannot include all population categories in these countries. This explains the need to involve other providers such as MFIs and mobile banking agencies. At the level of MFIs, we also see a clear evolution in the number of MFIs. On average, we count 14 MFIs for a maximum of 102 institutions. It should be noted that these statistics only concern the head offices or headquarter companies and not the agencies and branches, which are

generally deployed throughout the country. In terms of indicators of demand for financial services from banks, on average, they have granted loans representing almost 19.75% of GDP. MFIs granted loans representing 3.031% of GDP, with outstanding deposits with these institutions representing on average 0.536% of GDP compared to 32.50% in commercial banks. If we focus only on the contribution of these indicators of MFIs activity to GDP, microfinance institutions appear to be ineffective because their contribution to the variable that triggers growth remains low. However, given that GDP is not sufficient to characterize the level of economic development, other indicators that take into account the link between the activity of microfinance institutions and development must be taken into consideration. Moreover, the volume of deposits and the value of loans are indicators of the social performance of MFIs (Hartaska, 2005). The value of these loans allows us to see that MFIs are serving the poorest, which would also explain their low contribution to GDP. The objective is not to measure the contribution of MFIs to GDP but rather their ability to include poor people in the financial system by offering services adapted to their needs. To do this, they must be financially viable. We hypothesize that remittances can contribute to this financial viability for these institutions to achieve their objectives of promoting inclusive finance. Since some studies pointed out that the combination of remittances with microfinance services and products is particularly promising for the financial inclusion project (Hastings, 2006; Orozco, 2008). However, the dynamics of financial inclusion indicators remain characterized by high individual and temporal variability. The values obtained for the other control variables remain well within the average trends suggested by most studies (Beck et al. 2000; Gupta et al. 2009; Bahadir and Valev, 2015; Coulibaly, 2015; Ajefu and Ogebe, 2019).

The apparent correlation (See Table A.3) between remittances and financial inclusion indicators partially confirms the assumptions we made in the transmission channels. In general, we find that the inflow of remittances is positively correlated with the supply of and demand for financial services. The negative correlation with bank demographic penetration can be explained by the fact that the profiles of remittances recipients and MFIs clients are more probably similar than banks clients. However, the correlation between the different financial inclusion indicators can be explained by the multidimensionality of the concept of inclusive finance itself. As a result, financial inclusion can not be captured through a single indicator. Typically, in rural and peripheral urban areas, MFIs will play a determining role in draining the effects of remittances on the use of and access to financial services, while in urban areas it will

be more commercial banks. This correlation refers more to a phenomenon of complementarity rather than substitution.

3.4. Empirical Model Specification

To test the transmission channels mentioned above, we use a methodology inspired by the work of Aggarwal et al. (2011). Thus, the regression equation takes the following form:

$$\boldsymbol{IFI_{it} = A + \alpha IFI_{it-1} + \beta Rem._{it} + \delta Z_{it} + \mu_i + \varepsilon_{it}}$$

Where IFI_{it} is a financial inclusion indicator (in this analysis, we mobilize eight financial inclusion indicators), $Remi_{it}$ is the share of migrant remittances in country i at time t, Z_{it} the matrix of control variables, μ_i the individual country fixed effects and ε_{it} the error term.

To estimate the dynamic panel model, we will use the generalized method of moments (GMM) system proposed by Blundell and Bond (1998). The rationale for choosing the dynamic model is that the level of financial inclusion at the t period may depend on its level at the previous period. The current year's process may be affected by the previous process. If financial intermediaries have implemented mechanisms to promote financial inclusion in the last period, this will likely affect financial inclusion in the next period. It may take some time for the practices established to affect people's financial practices. Moreover, financial exclusion is a phenomenon that has a certain persistence over time to reach a total or optimal level of inclusion and cover all segments of the population. Hence the need to take into account its dynamics in the regression equation. Thus, a static panel would have the limitation of not taking into account the inertia of the financial inclusion process. At the same time, the relationship between remittances and financial inclusion may not be one of cause and effect but of reverse causality. Thus, this reverse causality, factors affecting remittances, financial inclusion, the other control variables, and measurement error may be potential sources of endogeneity. Moreover, introducing a lag of the dependent variable as an explanatory variable creates a correlation between the error term and the lag of the financial inclusion variable. To deal with these potential endogeneity biases and consider the dynamics introduced in the model, we will use the method of generalized moments in a system that is one of the robust estimators appropriate for this type of specification. One of the advantages of this estimator is that it combines the level equation and the first difference equation by using internal and external instruments to the

model. It also remains one of the appropriate estimators for dynamic panel models with a time dimension that is short enough and smaller than the individual dimension.

IV. Empirical Results

4.1. Baseline Results

Table 1. reports the system GMM-based estimates of the effect of international remittances on financial inclusion in Sub-Saharan countries, particularly on the access and usage of financial services. In fact, the means implemented in developing countries to reintegrate excluded populations into the financial sphere may be different from those in developed countries. In developing countries, financial inclusion is mainly achieved by establishing financial institutions and adapted financial services such as microfinance, postal operators, fintech, and mobile banking. To this, the column [1]-[4] demonstrates the effects of remittances on banking services and penetration, and that of the MFIs is reported in the column [5]-[8].

Resorting to the number of ATMs per 100,000 adults as a proxy for the demographic penetration of commercial banks, our empirical results revealed a positive impact of remittances on financial inclusion. This result corroborates those of Demirgüç-Kunt et al. (2011), who also demonstrate that remittances are likely to affect commercial banks' demographic and geographic penetration. The coefficient associated with remittances in this first specification is positive and significant at the 10% level. The same is true for the specification that considers the number of bank branches per 100,000 adults as a proxy for the demographic penetration of commercial banks. Then, the availability of banking services does not necessarily reflect their accessibility. Furthermore, access to financial services is not synonymous with the use of financial services. Further testing was done to view the effect of remittances on indicators of access and usage of these services. The results show a positive impact of remittances on credit offered by banks and the value of deposits collected. However, these results remain statistically significant only at the 10% threshold for the indicator of access to bank credit and not significant for the value of deposits collected. Nevertheless, they confirm that the previously mentioned hypotheses regarding the transmission channels are in line with a particular part of the literature. Unlike Ajefu and Ogebe (2019), and Aga and Peria (2014), who showed that the receipt of remittances increases the likelihood of households applying for and accessing bank savings and

credit services in Nigeria. Gautam (2019) questions the ability of remittances to boost financial inclusion in developing countries in general by using banking variables alone as an indicator of financial inclusion. Coulibaly (2015) comes to similar conclusions and shows no evidence to support the idea that remittances promote access to bank credit in SSA countries. As the literature remains mixed on the ability of remittances to promote financial inclusion in developing countries, we introduce other indicators of financial inclusion. The aim is to question the relevance of positioning banking variables only, as the principal financial inclusion indicators as it has been done in previous studies and make a new contribution. Doing so, we introduce new indicators such as MFIs activity.

For these specifications, we also find a positive impact of remittances on the level of financial inclusion. In particular, the value of the coefficients associated with the interest variable becomes stronger in all specifications with a significance level of 1% overall, in contrast to what we obtained for commercial banks. This positive and significant impact that we observe can result from the similarity between the profiles of the MFIs' clients (generally poor clients with no capital for the guarantees) and most of the remittance recipients (Orozco and Hamilton, 2005; Ambrosius, 2012; Ambrosius and Cuecuecha, 2016). In addition, MFIs are present in rural and urban areas that are difficult for commercial banks to access. As a result, they are likely to attract remittance recipients who are excluded from the banking system. This makes the services offered by these institutions more accessible to this category of the population. Hence, the positive and significant impact on access and usage indicators such as the value of deposits, the number of active borrowers, and the volume of loans disbursed by MFIs. In reality, remittance recipients who maintain regular deposit accounts with these MFIs become eligible for loans because this regularity is likely to reduce information asymmetry problems between lenders and borrowers. Concerning the demographic and geographic penetration of MFIs, the response to this demand induced by the influx of remittances will allow these institutions to deploy their activity in other territories and to other populations, given that the literature considers that these financial inclusion indicators also will enable us to assess the performance and viability of MFIs (Hartaska, 2005). All our results are consistent with the literature (Anzoategai et al. 2014; Aggarwal et al. 2011). Particularly those of Ambrosius and Cuecuecha (2016), who demonstrate a positive impact of remittances on loan demand by informal channels and the opening of deposit accounts in non-bank financial institutions.

We find an overall positive effect of education level, population size, and trade openness on financial inclusion indicators for the control variables. Although the coefficients associated

with the different variables are not all statistically significant on the eight specifications, these results are perfectly in line with the existing literature on the determinants of the level of financial inclusion in a country (Beck et al. 2005; Gupta et al. 2009). Concerning the GDP per capita variable, it also appears to be a determinant of financial inclusion level. However, its non-significant negative impact on the number of MFIs (column 5) could be explained by the fact that GDP per capita is a proxy for a country's economic situation, and its increase over time may affect the deployment of MFI activities. And let's consider that economic growth can be accompanied by an increase in per capita income. It could be that this growth can change the needs of economic agents and, consequently, turn to other financial providers.

Moreover, authors such as Dossou (2003) and Korem (2007) consider no significant correlation between MFIs activity and economic growth. For these authors, GDP per capita is insufficient to characterize the level of economic development. Therefore, this approach suggests other indicators of economic development on which it proposes to establish the link with the expansion of microfinance institutions. Because, beyond their function as financial intermediaries, many microfinance institutions play a social intermediation role through grouping people, building self-confidence, providing financial training, and managing skills within a group. It would be limiting to restrict the analysis of the relationship between remittances and financial inclusion by MFIs to GDP per capita alone.

Table 1. Baseline Results

	Dependent variable : Financial inclusion index							
	ATMs/100000ad [1]	Branch_Bank/100000ad [2]	Value_Deposits_Bank/GDP [3]	Loans_banks/GDP [4]	Number_MFIs [5]	Actives_Borrowers_MFIs/PO	Loans_MFIs/GDP [7]	Value_Deposits_MFIs/GDP [8]
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Dep. variable (lagged)	0.790***	0.670***	0.878***	0.858***	0.795***	0.612***	0.820***	0.406***
	(0.013)	(0.090)	(0.099)	(0.066)	(0.022)	(0.099)	(0.022	(0.039)
Remittances	0.018*	0.008	0.019	0.152*	0.056***	0.164***	0.060***	0.130**
	(0.010)	(0.014)	(0.019)	(0.083)	(0.009)	(0.048)	(0.007)	(0.058)
GDP_per_capita	0.323***	0.320**	0.070	1.222	-0.101	0.172	0.001	0.352
	(0.057)	(0.130)	(0.067)	(1.452)	(0.138)	(0.139)	(0.143)	(1.192)
Trade_openness	0.001	0.006*	0.000	-0.024	-0.002	0.004*	-0.000	-0.005
	(0.001)	(0.004)	(0.000)	(0.018)	(0.002)	(0.002)	(0.001)	(0.015)
Population (Log)	0.083*	0.233	0.001	0.696	-0.103	0.046	0.147*	0.086
	(0.043)	(0.163)	(0.014)	(0.920)	(0.167)	(0.119)	(0.079)	(1.022)
School enrollement/Human capital index	0.005***	0.007***	0.001	0.004	-0.007	0.002	0.008	0.020
	(0.002)	(0.003)	(0.001)	(0.012)	(0.007)	(0.008)	(0.006)	(0.017)
Constant	-4.180***	-6.984*	-0.329	-17.597	3.675	1.400	-3.874**	-8.212
	(1.204)	(3.913)	(0.547)	(19.069)	(2.352)	(2.619)	(1.531)	(8.188)
Observations	256	294	287	342	263	261	289	206
Countries	26	27	26	29	25	27	25	25
Nb. of instruments	17	10	11	15	19	11	22	17
Arellano–Bond (AR 1, p-value)	0.007	0.021	0.003	0.006	0.002	0.001	0.023	0.007
Arellano–Bond (AR 2, p-value)	0.612	0.198	0.334	0.182	0.272	0.232	0.232	0.236
Hansen (p-value)	0.241	0.326	0.900	0.460	0.217	0.529	0.675	0.437

Notes :

(1) Robust (asymptotic) standard deviation in brackets based on Windmeijer (2005) correction in finite sample, ***Significant at 1%, **Significant at 5%, *Significant at 10%.

(2) Hansen is the overidentifying restrictions test for GMM estimators and AR(2) is the second-order correlation test for error terms (p-values or significance levels are reported).

(3) In all specifications, the null hypothesis for lack of first-order (AR(1)) serial correlation in the first-differenced error terms is rejected, while not rejected for the second-order (AR(2)).

(4) In addition, the robust (toheteroskedasticity and autocorrelation) Hansen's p-value validates the over-identification restrictions. variables can be safely used as instruments.

All of these statistical tests validate the econometric method and the lagged

(5) All of these statistical tests validate the econometric method and the lagged variables can be safely used as instruments. This applies for all regressions in the paper

4.2. Robustness Checks

To test the robustness of our results, we performed estimations to check the sensitivity of the coefficient associated with the variable of interest. Doing so, we undertake two robustness exercises.

First, we test the sensitivity of the results of the baseline specification to additional potential determinants of financial inclusion, including the level of inflation and the institutional quality index (Data comes from the World Bank databases). These variables are considered in the literature as possible determinants of financial inclusion (Gupta et al., 2009; Giuliano and Ruiz-Arranz, 2009; Inoue and Hamori, 2016). Some studies have also emphasized the role of non-economic factors in financial inclusion among developing countries (Detragiache et al, 2005; Berdiev et al, 2013). They can be considered to have a stronger capacity to positively influence the business environment, lead to a lower perception of risk in the country and induce a shift in the orientation of investment transfers. They take on values from -2.5 to +2.5, with a higher level indicating more good governance efforts. We test this by including the control of corruption and Political Stability as additional control variables. The results indicate that even when the significant effect of the institutional quality index on financial inclusion in Sub-Saharan Africa is taken into account, remittances still have a positive and significant impact on financial inclusion indicators particularly on those promoted by MFIs. It means that if there are more qualified institutions, the remittances can promote an inclusive financial system, though these variable's limited-time series availability restricts our observations less than those reported in Table.1 concerning the baseline results. (See Table.2). Concerning the inflation rate, the results also show that inflation has a positive or negative impact on financial inclusion but that the coefficient on remittances remains positive. One explanation could be that, on one side, inflation can be a brake on credit demand since it sometimes guides investors' decisions. Thus, there may be a negative effect of this variable on some indicators of financial services, such as credit, by both banks and MFIs. On the other side, the positive relationship between remittances and financial inclusion remains positive, probably because remittances can be sometimes countercyclical. Therefore, during periods of high inflation, migrants will be inclined to send more money to their families, and this increase may generate a need for financial services, such as opening a savings account. Furthermore, Katona (1975) argues that inflation increases agents' uncertainty, leading to increased savings. These results are similar to baseline findings

and are also in line with previous studies (Giuliano and Ruiz-Arranz, 2009; Ambrosius and Cuecuecha, 2016; Tu Chuc and al, 2020).

Table 2. Robustness Check: Adding More Control Variables

Dependent variable : Financial inclusion index								
	ATMs/100000ad [1]	Branch_Bank/100000ad [2]	Value_Deposits_Bank/GDP	Loans_banks/GDP [4]	Number_MFIs [5]	Actives_Borrowers_MFIs/POP [6]	Loans_MFIs/GDP [7]	Value_Deposits_MFIs/GDP [8]
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Dep. variable (lagged)	0.790***	1.044***	0.948***	0.959***	0.862***	0.540*	0.772***	0.344***
	(0.025)	(0.015)	(0.122)	(0.043)	(0.037)	(0.326)	(0.035)	(0.057)
Remittances	0.005	0.002	0.025	0.144**	0.037***	0.185***	0.082***	0.179***
	(0.008)	(0.018)	(0.029)	(0.073)	(0.011)	(0.042)	(0.015)	(0.057)
GDP_Per_Capita	0.315***	-0.372**	0.008	-0.623	0.246	0.300*	-0.242	1.023*
	(0.057)	(0.182)	(0.068)	(0.657)	(0.421)	(0.172)	(0.304)	(0.528)
Trade_openness	0.004***	-0.001	0.001	-0.058***	0.001	0.007	0.004	-0.061***
	(0.001)	(0.004)	(0.001)	(0.021)	(0.002)	(0.007)	(0.005)	(0.011)
Population (Log)	0.227***	0.326	0.023	-1.339***	-0.332	0.043	0.561**	-1.627***
	(0.041)	(0.305)	(0.031)	(0.434)	(0.245)	(0.277)	(0.275)	(0.430)
School enrollement/Human capital index	0.003**	0.015**	0.000	-0.001	-0.002	-0.001	0.017**	-0.002
	(0.001)	(0.006)	(0.001)	(0.015)	(0.004)	(0.007)	(0.008)	(0.013)
Inflation	-0.003	0.034***	0.005	0.006	0.036**	-0.040	-0.050**	0.013
	(0.004)	(0.005)	(0.012)	(0.019)	(0.016)	(0.075)	(0.021)	(0.018)
Control_of_Corruption	0.226***	0.376***	0.049	0.529	0.034	-0.945*	-1.071	0.085
	(0.052)	(0.111)	(0.077)	(1.453)	(0.103)	(0.562)	(0.740)	(0.354)
Political_Stability	0.009	0.026	0.001	0.081	0.104***	0.119	0.306	0.524*
	(0.038)	(0.141)	(0.020)	(0.326)	(0.033)	(0.458)	(0.211)	(0.271)
Constant	-6.278***	-2.244	-0.416	31.057***	2.964*	0.324	-10.385***	17.249**
	(0.991)	(5.114)	(0.622)	(11.255)	(1.604)	(5.674)	(3.749)	(6.795)
Observations	220	257	250	307	248	192	157	130
Number of Country	23	24	23	27	24	21	18	20
Arellano–Bond (AR 1, p-value)	0.045	0.000	0.008	0.085	0.002	0.017	0.024	0.087
Arellano–Bond (AR 2, p-value)	0.615	0.393	0.336	0.164	0.126	0.469	0.319	0.239
Hansen (p-value)	0.344	0.246	0.725	0.466	0.691	0.826	0.927	0.360
Nb. of instruments	23	24	13	19	13	13	14	12

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Second, in order to take into account, the heterogeneity of the sample, we have excluded first the top five countries that received more remittances over the period under consideration (Senegal, Togo, Gambia, Liberia, Cabo-Verde). These countries are also ranked among the top remittance-receiving countries in the world by the World Bank. Moreover, in our sample, we find that the share of remittances in the GDP of these countries is on average more than 10% of GDP. This is nevertheless a significant share. The idea is to verify that these are not the ones that drive the results. Second, we differentiate between countries with initially high levels of financial inclusion and others by also excluding them from the sample to check whether the effect of remittances remains the same or not. This involves excluding Kenya, Senegal, and South Africa. The results reported in table A.4. and A.5. in appendices, show that the coefficients associated with remittances are positive and still strong and significant at 1% for MFIs (columns [5], [6], and [8]) and some indicators of bank penetration (columns [1], [2]and [4]). Therefore, our baseline findings remain valid even when taking into account the heterogeneity of the sample.

V. Conclusion

As the importance of African international migration has grown, substantial studies have flourished examining migration's impact on various aspects of Africa's development. One issue that has received little attention is the macroeconomic effect of these migration dynamics on financial inclusion through remittances from migrants to their origin countries. This issue is important given the growing evidence that financial inclusion has many beneficial effects on economic agents.

In this paper, we empirically examined the relationship between remittances and financial inclusion in Sub-saharan African countries. In particular, we have highlighted the effect of remittances on access and use of financial services. Relying on the popular system-GMM estimator of Blundell and Bond (1998) to address the potential endogenous issues and based on panel data, the paper finds that international remittances have a positive and significant effect on financial inclusion. Remittances have a positive impact on the demographic penetration of financial institutions on the one hand and the access and use of financial services by economic agents on the other hand. In contrast to the previous literature, which focuses only on the

banking system, we also consider other formal financial institutions in Sub-Saharan Africa, such as microfinance institutions. By making this distinction, the results show that remittances have a more significant effect on the financial services offered by these MFIs than on those of commercial banks. These results may be attributable to a possible mismatch between the demand for financial services among remittance recipients from low-income households and the supply from banks. Thus, remittances appear to be a possible determinant of an inclusive and sustainable economic system as they will allow MFIs to be more efficient and complement the work of banks in the financial inclusion process in Africa. The financial viability and social performance of microfinance institutions depend on the deposits and loans they collect and the number of clients they serve.

As a result and given that Sub-Saharan African governments are focused on improving financial inclusion in their country and maximizing the benefits of migration, this study can be interesting for policymakers in remittances-receiving countries. Our study concurs with previous findings and calls for improved, more inclusive access to financial services in terms of policy recommendations. Because of the pressing financing needs to finance structural investments in sub-Saharan countries and improve people's lives, our study can guide countries that have implemented or are in the process of implementing financial inclusion policies. As the promotion of a financial system adapted to African needs is necessary, remittances appear to be one determinant of financial inclusion. But the mismatch between the financial services provided by banks and the requirements of remittances recipients leads us to suggest that it would be more than beneficial to promote institutions that are better able to provide financial services to remittance-receiving households in particular to African households in general. Since linking remittances to additional financial services can generate social or economic changes within or outside households. Because remittances are additional income, they can ease the financing constraints of these recipients, allowing them to finance productive investments. Similarly, a large and adequate financial system through financial intermediation will facilitate the financing of high-impact economic and social projects, which Africa needs, especially in the current context of coronavirus (Covid-19) pandemic when it is more than necessary to build strong and resilient economies. Better access to basic services such as current accounts, credit, savings products, and insurance would allow the poor to increase their income and become more resilient. In sum, we say that African migration should be seen as a potential determinant for financial inclusion. It would be beneficial to put in place a financial system that promotes and encourages (in terms of cost and legality) remittances from African migrants.

Concerning potential future research, there are indeed some avenues for research. For a complete macroeconomic analysis of the effects of remittances on financial inclusion in Sub-Saharan Africa, it would be interesting to analyze the impact of remittances on the use of mobile banking services and to see if would improve living conditions. Mobile banking is a kind of digital financial service that sub-Saharan countries are increasingly turning to today, as it allows any individual without exclusion to make financial transactions with just a cell phone number. Except in some countries such as Kenya, where a smartphone is required to access a wider range of mobile banking services.[3] Typically, Sub-Saharan Africa is at the forefront of mobile banking, with one-fifth of the adult population having a mobile money account (Global Findex Report, 2017). The region's experience also shows that these accounts open up the possibility of accessing more sophisticated digital services, such as loans and insurance, prepaid solar energy subscriptions, or even tax payments. Thus, relying only on traditional financial services may not capture the true state of financial inclusion and the role of migration as a determinant. We emphasize this point, but the scarcity of data does not allow us to include this indicator of financial inclusion for our macroeconomic study over the sample period. It should also be noted that in some Sub-Saharan African countries, mobile banking is still in its infancy. So, we leave this research question for future work.

[3] In Kenya, the success of M-PESA has revolutionized the financial system. It is a microfinance system for money transfer and payment by cellphone and smartphone, launched in 2007 by Vodafone for Safaricom and Vodacom.

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Appendices

Table A.1: Descriptive Statistics

Variables	N	Mean	Std.Dev.	Min	Max
Bank_branch_100000_adults	426	7.030	10.21	0.137	55.07
ATM_100000_adults	380	11.683	17.514	0	89.993
Value_Deposits_banks/GDP	406	32.50	31.20	2.544	169.3
Loan_banks /GDP	484	19.753	18.920	0.935	106.260
Number of MFIs	373	14.03	15.23	1	102
Actives_borrowers_MFIs/POP	339	23.726	91.429	0	1096.90
Loan MFIs/GDP[4]	357	3.031	25.45	0	387.1
Value_Deposits_MFIs/GDP	260	0.536	6.899	0	111.3
Remittances/GDP	509	3.249	3.835	0	21.81
GDP_per_capita	503	4485.541	5274.214	751.664	27521.17
Inflation	484	7.417	8.030	-8.975	63.295
Trade_opness	479	72.329	47.228	16.141	347.997
Population	512	2.29e+07	3.25e+07	82475	2.01e+08
Primary school enrollment	407	102.493	22.860	42.138	149.307
Control_of_corruption	480	-0.646	0.606	-1.559	0.970
Political_stability	480	-0.549	0.840	-2.665	1.038

[4] Since the data on microfinance transaction volumes were in local currencies, we had to convert them to U.S. dollars to standardize.

Table A.2: Sources and Definitions of Data

Variables	Definition	Sources
ATMs /100,000 adults	Automated teller machines (ATMs) (per 100,000 adults)	IMF, FAS 2019 Dataset
Bank branches/ 100,000 adults	Number of commercial bank branches per 100,000 adults	
Value_deposits_Banks/GDP	Outstanding deposits with commercial banks reported to GDP	
Number_MFIs	Number of microfinance institutions	Mix Market 2019 Dataset
Value_deposits_MFIs/GDP	Outstanding deposits with microfinance institutions (% of GDP)	
Actives_Borrowers_MFIs/POP	Number of actives borrowers with microfinance institutions (% of population)	
Loans_MFIs/GDP	Gross loan portfolio (% of GDP)	
Loans_banks/GDP	Domestic credit to private sector by banks (% of GDP)	World Bank's World Development Indicators (WDI, 2019)
Remittances	Personal remittances received (% of GDP)	
GDP_per_capita	Real GDP per capita	
Population	Total population	
Trade openness	Sum of total imports and exports (% of GDP)	
Inflation	Inflation, average consumer prices	
School enrollement/Human capital index	Primary school enrollement	
Control_of_Corruption	Control of Corruption captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests.	World Bank's WorldWide, 2019 Dataset
Political_Stability	Political Stability and Absence of Violence/Terrorism	

Table A.3. Correlation Table

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	Sources
Remittances [1]	1									WDI
Branch_Bank/100000ad [2]	0.0690	1								FAS
ATMs/100000ad [3]	-0.0582	0.818***	1							FAS
Value_Deposits_Bank/GDP [4]	0.105**	0.598***	0.624***	1						FAS
Loans_banks/GDP [5]	0.0487	0.490***	0.732***	0.814***	1					WDI
Number_MFIs [6]	0.112**	0.0724	-0.0444	0.153**	0.116**	1				Mix market
loan_MFIs/GDP [7]	-0.0395	0.0319	0.0400	-0.00561	-0.0281	0.117**	1			Mix market
Deposit_MFIs/GDP [8]	0.0314	-0.0617	-0.0792	0.0865	-0.0461	0.150**	0.126**	1		Mix market
Actives_Borrowers_MFIs/POP [9]	0.0782	0.581***	0.380***	0.134**	-0.000195	-0.158**	-0.0363	0.186**	1	Mix market

***p<0.01, significant at 1%, **p<0.05, significant at 5%, *p<0.10, significant at 10%.

Table A.4. Robustness check: excluding Senegal, Togo, Gambia, Liberia, Cabo-Verde

	Dependent variable : Financial inclusion index							
	ATMs/100000ad [1]	Branch_Bank/100000ad [2]	Value_Deposits_Bank/GI	Loans_banks/GDP [4]	Number_MFIs [5]	Actives_Borrowers_MFIs/POP	Loans_MFIs/GDP [7]	Value_Deposits_MFIs/GDP [8]
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Dep. variable (lagged)	0.794***	0.753***	0.922***	0.932***	0.849***	0.566***	0.850***	0.652***
	(0.017)	(0.025)	(0.122)	(0.020)	(0.017)	(0.085)	(0.022)	(0.042)
Remittances	0.045***	0.069***	0.032	0.009	0.034*	0.253***	0.010	0.157***
	(0.015)	(0.020)	(0.026)	(0.077)	(0.019)	(0.080)	(0.029)	(0.035)
GDP_Per_Capita	0.286***	0.176***	0.050	1.045	-0.096***	0.310	-0.353	1.002*
	(0.073)	(0.050)	(0.070)	(0.670)	(0.034)	(0.195)	(0.219)	(0.565)
Trade	0.001*	0.089	-0.000	0.012	-0.001	0.000	0.012**	-0.022**
	(0.001)	(0.078)	(0.001)	(0.008)	(0.002)	(0.004)	(0.005)	(0.009)
Population (Log)	0.068	-0.023	-0.008	0.252	0.037**	-0.032	0.445**	-0.869***
	(0.056)	(0.025)	(0.016)	(0.363)	(0.019)	(0.104)	(0.183)	(0.305)
School enrollement/Human capital index	0.008***	0.003***	0.000	0.041***	0.001	0.001	0.001	-0.002
	(0.002)	(0.001)	(0.001)	(0.014)	(0.001)	(0.007)	(0.004)	(0.006)
Constant	-3.995**	-1.428	-0.112	-16.106*	0.340	2.388	-5.862***	6.902***
	(1.681)	(1.067)	(0.484)	(9.083)	(0.270)	(2.899)	(2.104)	(1.924)
Observations	207	231	231	281	230	170	144	122
Number of Countries	21	22	22	24	22	20	17	18
Arellano–Bond (AR 1, p-value)	0.033	0.047	0.011	0.051	0.004	0.065	0.023	0.094
Arellano–Bond (AR 2, p-value)	0.245	0.238	0.364	0.340	0.406	0.428	0.169	0.252
Hansen (p-value)	0.384	0.384	0.860	0.276	0.355	0.654	0.819	0.330
Nb. of instruments	17	18	11	20	19	11	12	17

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table A.5. Robustness check: excluding Kenya, Senegal, South of Africa

	Dependent variable : Financial inclusion index							
	ATMs/100000ad [1]	Branch_Bank/100000ad [2]	Value_Deposits_Bank/G	Loans_banks/GDP [4]	Number_MFIs [5]	Actives_Borrowers_MFIs/POP [6]	Loans_MFIs/GDP [7]	Value_Deposits_MFIs/GDP [8]
L.lnATMs_100000_adults	0.808***	0.816***	0.919***	0.939***	0.826***	0.535***	0.736***	0.602***
	(0.013)	(0.016)	(0.047)	(0.023)	(0.020)	(0.099)	(0.044)	(0.085)
TFM	0.016**	0.012***	0.016	0.099***	0.027***	0.199***	0.071*	0.175***
	(0.006)	(0.005)	(0.014)	(0.023)	(0.010)	(0.033)	(0.037)	(0.028)
lGDP_PPP	0.354***	0.086	0.032	0.687	-0.395***	-0.365	0.365	0.363
	(0.052)	(0.057)	(0.027)	(0.713)	(0.092)	(0.422)	(1.031)	(1.222)
lTrade	-0.022	0.133**	0.000	-0.025***	0.042	0.004*	-0.004	-0.030**
	(0.039)	(0.053)	(0.000)	(0.004)	(0.082)	(0.002)	(0.010)	(0.014)
lPOP	0.015	0.007	0.005	-0.401**	0.181***	0.078	-1.604	-0.356
	(0.022)	(0.025)	(0.020)	(0.197)	(0.057)	(0.244)	(1.033)	(0.761)
SEPG	0.005***	0.005***	0.000	-0.009	0.001	0.006	0.047*	0.007
	(0.002)	(0.001)	(0.000)	(0.019)	(0.001)	(0.014)	(0.027)	(0.008)
Constant	-3.157***	-1.577**	-0.151	4.579	0.033	5.165	18.530*	2.600
	(0.849)	(0.786)	(0.335)	(5.277)	(0.943)	(3.199)	(10.931)	(5.811)
Observations	182	214	207	262	214	144	199	115
Number of Countries	20	21	20	24	21	18	20	17
Arellano–Bond (AR 1, p-val	0.03	0.015	0.014	0.039	0.004	0.036	0.043	0.032
Arellano–Bond (AR 2, p-val	0.575	0.236	0.284	0.337	0.310	0.642	0.196	0.331
Hansen (p-value)	0.328	0.269	0.589	0.453	0.549	0.784	0.369	0.482
Nb. of instruments	17	18	11	20	19	12	12	14

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1