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Do Migrant Remittances Matter for Financial Development In Kenya?

Roseline Misati and Anne Kamau

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Do Migrant Remittances Matter for Financial Development In Kenya?

By Roseline Misati and Anne Kamau

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Abstract

The paper analyzes the relationship between remittances and financial development using the autoregressive distributed lag (ARDL) method based on Kenyan quarterly data from 2006 to 2016. Five different indicators of financial development are used in the study. The study used credit to the private sector, number of mobile transactions, value of mobile transactions, number of mobile agents and number of bank accounts. The results show a strong positive relationship between remittances and all the five indicators of financial development in the long run equations. The results imply that higher levels of remittances provide opportunities for opening bank accounts, enhancing savings and accessing financial systems for recipients besides exposing the unbanked to existing and new financial products. The results also confirm the potential advantage of embracing modern and advanced technology that facilitates international mobile transfer channels. Usage of international remittance transfer through mobile technology reduces costs by eliminating the need for physical branches and personnel to attend to walk-in customers that dominates traditional remittance business models besides offering remittance actors convenience and safety. There is therefore a policy window for the Government to leverage on remittances as a tool of financial inclusion and financial depth particularly through continued expansion of the regulatory space that accommodates wider usage of international mobile remittance transfer channels. Moreover, given the strong positive relationship between remittances and credit to the private sector and number of bank accounts, commercial banks and other players in the remittance market may also find it useful to develop customized products for migrants that can tap into their remittances. Financial intermediaries can for example consider providing better deposit interest rates to diaspora deposits compared to deposits in local currency and allowing usage of regular remittance flows as collateral for credit allocation among other incentives, to tap into the huge potential of money remitted by migrants to Kenya.

* Roseline Misati and Anne Kamau are affiliated to the Central Bank of Kenya.

1.0 Introduction

The potential role of remittances not only on growth but as a channel through which financial inclusion and financial deepening can be achieved cannot be overemphasized. Remittances are important both at the micro and macro levels.

Remittances which are private transfers sent by migrants to their families back home directly affect the incomes and livelihoods of households at a micro level. Several studies have confirmed that families that receive migrant remittances access better health facilities, have better education, high financial access and low poverty levels than households who do not receive remittances. Moreover, remittance flows through formal channels provide opportunities for encouraging savings, increasing deposits and deepening financial inclusion and development (Al-Tarawneh, 2016; Meyer and Shera, 2016; 2013).

Remittances to Africa steadily increased over the last decade leading to a reassessment of its importance against other capital flows in policy debates, academic circles and even among researchers. This gained renewed impetus following the global financial crisis when remittances proved to be the only resilient and steady capital flow to most developing countries. Remittances to Africa surged from US $ 56.8 billion in 2011 to US $ 66.9 billion in 2014 against a total amount of US $ 58.3 and US $ 54.5 in foreign direct investment and official development assistance, respectively, in 2014. This constitutes approximately 2 percent share of Africa's GDP. In Kenya, remittances have steadily increased at an average annual rate of 14.3 percent in the last one decade, rising from US $ 934 million in 2011 to US $ 1.73 billion in 2016, constituting 2.5 percent of GDP. Kenya is one of the top eight highest remittance-recipient countries in Africa after Nigeria, Egypt, Morocco, Tunisia, Ghana, Algeria and Senegal. Remittances to Kenya have been consistently increasing, recording higher levels than foreign direct investment and portfolio equity flows. Yet the statistics only reflect remittance flows through

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formal channels, which is believed to be grossly underestimated since migrants send money through informal channels and in-kind transfers that is often unrecorded.

Reflective of this, over the last decade, the perception that remittances is only a consumption smoothening device has changed. Research and policy debates have shifted towards considering remittances as a potential tool that can be harnessed for development. However, because traditionally, remittances was considered as an income to supplement consumption, not many countries in Africa have structures to channel it towards investment or economic growth. Even the private sector including commercial banks through which formal remittances are channeled, only recently started developing customized products for the migrants in bid to expand financial intermediation and extend investment opportunities to the diaspora. National Governments such as Kenya whose remittances now play a critical role in supporting foreign exchange reserves have also taken interest by developing a Kenyan Diaspora Policy in bid to streamline the diaspora into national development. In cognizance of the huge potential of 3 million Kenyans living abroad, constituting approximately 7 percent of Kenya's population, the Diaspora policy has incorporated leveraging on the potential of the diaspora towards development and developing a mechanism for informing Kenyans in the Diaspora of investment opportunities as one of its key components.

One arm of development through which leveraging can be maximized is increased financial deepening and inclusion arising from increased remittance flows. As summarized in Filippo et al., (2014), money transferred through financial institutions paves the way for recipients to demand and gain access to other financial products and services. Moreover, providing remittance transfer services allows bank and financial institutions to gather information about recipients and mitigate the adverse selection problem. In the same paper, it is also noted that remittance channels can be used to sell financial service package geared towards low income individuals. This debate takes on special importance in the case of Kenya where cross border remittance transactions has been extensively revolutionized through the utilization of technology in mobile to mobile transactions. Kenya is one of the countries used as an example in the world of what adoption of technology can do through its famous M-Pesa products. International remittance transfer services is one such product that has a huge potential to reach millions of people including low income and unbanked populations in the rural areas.
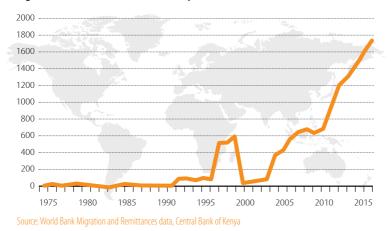
However, in spite of the potential impact of remittances on financial development, little empirical attention has been accorded to the remittances-financial development linkages in Africa and Kenya is no exception. Previous studies on migration and remittances have concentrated on remittances and growth ignoring the channels through which migration and remittances affect economic growth (Fayissa and Nsiah, 2010). Even the few studies

that have considered some channels through which remittances affect growth have mainly focused on investment and consumption channels ignoring the financial development channel. (Makori et al., 2015; Aboulezz, 2015; Mwangi and Mwendwa, 2015; Ocharo, 2014; Kiio, 2014). This study attempts to fill this gap by analyzing the relationship between remittances and financial development. This study contributes to existing work in at least three respects. First, to the best of our knowledge, no study has been conducted examining the remittances-financial development nexus in Kenya. Second, the paper uses more than one indicator of financial development including indicators of financial inclusion such as number of bank accounts and mobile transactions that, to the best of our knowledge, have not been used in previous studies. Third, the paper also utilizes the bound cointegration technique or the autoregressive distributive lag model (ARDL) that has not been utilized in previous studies using our data set. The ARDL is robust to small samples, is not sensitive to orders of integration of the variables of interest and is appropriate for single equation framework. Fourth, this study also examines if there is any reverse causality between remittances flows and financial development since exiting literature shows a possibility of such a relationship.

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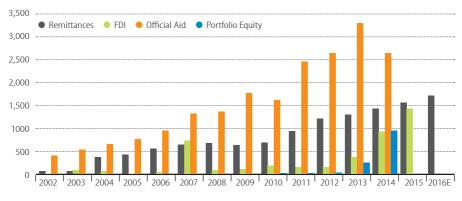# 2.0 Remittances Market in Kenya

In this section we present an overview of trends in the remittance market in Kenya. Figure 1 shows that remittance flows to Kenya picked in 2003 and has been growing steadily in the last one decade. The flows were stable even during the global financial crisis when other capital flows were volatile. In figure 2 we highlight the resilience of remittances against other capital flows.

Figure 1: Remittance inflows to Kenya (1975-2016)

Source: World Bank Migration and Remittances data, Central Bank of Kenya

Remittances to Kenya have been consistently increasing, recording higher levels than foreign direct investment and portfolio equity flows. Although official development assistance flows increased, their developmental impact is not directly tangible compared to remittances that flow directly to the beneficiaries with potential impact on health, education, small scale businesses and the real sector.
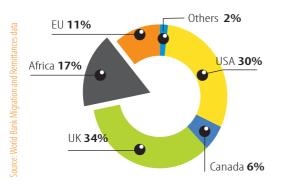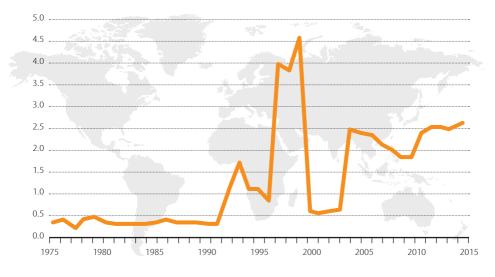
Figure 2: Capital inflows, Million US $

Moreover, several previous studies have shown that official development assistance does not necessarily translate to high economic growth rates. Official development assistance has a history of misappropriation at state and non-governmental levels, (Bodomo,2013). Furthermore, remittance flows through formal channels to African countries, Kenya inclusive, are believed to be grossly underestimated since migrants send money through informal channels and in-kind transfers that is often unrecorded.

Figure 3: Remittance inflows by sources to Kenya

Kenya receives the highest remittance flows from the United Kingdom, United States of America and Africa, constituting about 34 percent, 30 percent and 17 percent of total flows, respectively. These numbers indicate where focus should be laid in terms of bilateral agreements

to ease and enhance remittance flows as well as where the private sector, especially commercial banks, mobile companies and online remittance platforms, would concentrate to attract more remittance flows and enlarge their market territory. The Government would also focus on these concentration corridors in terms of incentives and conducive policies to harness the flows.

Figure 4: Remittances as a share of GDP

Remittance flows to Kenya constitute about 2.5 percent of gross domestic product based on 2015 numbers. The trends over time are shown in figure 4. However, in spite of the potential importance of remittance flows, the remittance market in Kenya and indeed elsewhere on the African continent is not devoid of challenges. Apart from inaccuracy of data due to remittance flows through informal channels, it is very expensive to send money to Africa with an average Cost of sending money at about 9 percent against a global average of 7.6 percent. This is 6 % above the target 10c of the sustainable development goals. The cost of sending money to Africa is high due to the exclusive regulatory framework, few rural pay out stations and low utilization of cheaper and modern technology, among other factors.
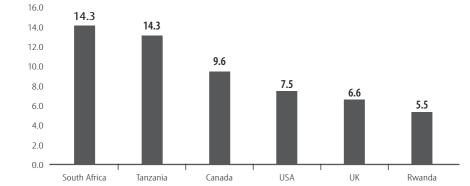
Figure 5. Cost of sending money ($200) to Kenya by corridor

Source: Remittance Price Worldwide and Send Money Africa

As an illustration of the magnitude of costs, we present the cost of sending money to Kenya for selected corridors in figure 5. The chart shows that it is more expensive to send more from within the continent than from outside the continent.

For example, the cost of sending US $ 200 from South Africa and Tanzania to Kenya is 14.3 percent and 13.1 percent, respectively, while sending the same amounts cost 6.6 percent from the United Kingdom.

Huge variations also exist across corridors as indicated by the cost of sending similar amounts of money from Rwanda recorded at 5.5 percent yet the neighboring Tanzania sends the same amount of money at double the cost. High remittance transfer costs not only encourage usage of informal channels with negative implications on the financial sector but it also dis-incentivizes migrants from sending higher flows of remittances.

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3.0 Literature Review

Many arguments linking remittances to financial development exist in the literature but most of them are leaned towards its potential to enhance financial inclusion especially for the bottom, unbanked and low income earners in developing countries.

One of the theories positively linking remittances and financial development is anchored in the financial literacy hypothesis. Proponents of this hypothesis argue that both remittance senders and recipients create demand for financial systems involved in international remittances and this can lead to incentive of either party or both to seek and interact with financial institutions who are involved in other financial products beyond remittances. This in turn increases financial awareness both for the sender and recipient and can lead to demand for other financial products by remittance recipients such as savings, insurance, mortgage, among others. Thus increasing possibilities in this manner for formal money transfer services could be a response to existing demand. The financial literacy view assumes that exposure and knowledge of financial services induce usage of formal banking services by remittance recipients, (Brown et al., 2013; Toxopeus and Lensink, 2008).

Karikari et al., (2016) further supports the positive relationship between remittances and financial intermediation by arguing that migrant transfers in excess of consumption expenditures are likely to be saved thus allowing recipient individuals the opportunity to be introduced to financial products and services leading to enhanced financial development. Related to these arguments are postulations on how remittances provide an alternative option to finance entrepreneurs who do not qualify for credit in mainstream commercial banks. These entrepreneurs may over time graduate to a "bankable" stage and influence commercial banks to compete for them. In the same line of argument, Ambrosius and Cuecuecha, (2016) provides a summary of linkages between remittances and financial access. Under this line of thought, remittances function as a substitute to credit in which

case, different behaviour of spending by remittance receiving households is explained within a theoretical framework of imperfect credit markets where remittances help poor households overcome liquidity constraints that restrict investment in human or physical capital.

On the supply side, considerable arguments contend that a regular flow of remittances facilitates creation of a credit history that establishes credit worthiness of the recipients and possibility of considering the current and potential remittance flows as collateral for credit allocation (Motelle, 2011; Guliano and Ruiz, 2009; Toxopeus and Lensink, 2008). This line of reasoning finds support in Anzoategui et al., (2014), who argues that remittances might increase household likelihood of obtaining a loan since processing remittance flows provides financial institutions with information on income of recipient households. This information might make financial institutions better willing and able to extend loans to otherwise opaque borrowers. Moreover deposits of remittance receipts in banks increases the loanable funds and thus banks' ability to extend credit to both remittance and non-remittance receiving households, (Brown et al., 2013).

Further arguments based on policy considerations contend that the government can encourage transfers through formal channels by removing taxes on income remittances, relaxing exchange controls and capital controls, allowing domestic banks to operate overseas, providing identity cards for migrants and providing financial products targeting the diaspora,

among other incentives. In cases where usage of formal financial institutions is constrained by lack of migration documentation, governments can consider entering into bilateral agreements to facilitate opening of bank accounts and usage of formal financial institutions. For example Mexico devised alternative forms of identification involving issuance of Matricula Consular to Mexicans that is acceptable in the USA consulates (Toxopeus and Lensink, 2008).

Contrastingly to some of the previous arguments showing positive linkages between remittances and financial development, Brown et al.,(2013) contends that it is possible that migrants would be distrustful of formal banking services due to other reasons apart from financial illiteracy, such as, avoidance of formal records of income flows occasioned by Anti-Money Laundering compliance requirements,. In this case, remittances may not be associated with opening of bank accounts. Other negative views on the remittances-financial development nexus are found in Muktadir-Al-Mukit and Islam, (2016), who summarizes the work of Aggarwal et al., (2006), among others, in which it is argued that increases in remittances may not necessarily increase credit to the private sector if banks prefer to hold liquid assets rather than lending or if they prefer to lend to the public sector instead of the private sector.

On the empirical front many studies have been done based on both secondary and primary data. Using primary data Li et al., (2014) show that people in households that receive remittances are more likely

to have savings account and to use a bank account than households that do not receive remittances. A summary of some of the empirical findings including methods used and countries covered are summarised in Table 1 below.

Table 1: Summary of International Empirical Evidence on remittances-financial development relationship

Year	Author/s	Country/ies	Data	Methodology	Findings
2016	Karikari et al.	50 Developing countries in Africa	1990-2011	Fixed Effects; Random Effects and Vector Error Correction Model	Remittances have a positive effect on financial development in the short run but a negative effect in the long run.
2016	Muktadir-Al-Mukit and Islam	Bangladesh	1976-2012	VAR and VECM	There is a positive relationship between remittances and credit disbursement in the long run. Bi-directional causality is also established in Bangladesh.
2016	Ambrosius and Cuecuecha	Mexico	Household survey data (2002; 2005)	Fixed effects and instrumental variables	There are positive effects of remittances on the ownership of savings account, existence of debts and borrowing
2015	Mbaye	Senegal	Household survey data (May-July 2009; April-June 2011)	Household fixed effects model	Receipt of remittances increases likelihood of having a loan in a household.
2014	Anzoategai et al.	Elsavador	1995-2001, four wave rural household level survey data	Fixed effects	Households that receive remittances are more likely to have a deposit account at a financial institution
2014	Ojapinwa and Oladipo	32 SSA countries	1996-2010	Dynamic panel GMM	Remittances affect financial development in a positive and significant way implying that remittances complement financial intermediation in SSA countries.

Year	Author/s	Country/ies	Data	Methodology	Findings
2013	Brown et al.	Developing countries	1970-2005	Panel Least Squares, 2SLS and Probit approaches	Remittances flows do not induce opening of bank accounts or increase in credit to the private sector
2011	Motelle	Lesotho		Vector Error Correction Model and Causality tests	Remittances have a long-run effect on financial development. Causality is established from financial development to remittances but not vice versa
2009	Giuliano and Ruiz-Arranz	100 developing countries	1975-2002	System GMM; OLS and Fixed Effects	Remittances provide alternative way to finance investment and help overcome liquidity constraints
2009	Beine et al.	66 developing countries	1980-2005	Dynamic generalized ordered logit model	A strong positive effect of remittances on financial openness.
2008	Toxopeus and Lensinki	Developing countries	2003	OLS	Remittance flows have a significant positive effect on financial inclusion in developing countries
2006	Aggarwal et al.	99 Developing countries	1975-2003	GMM	Impact of remittances on financial development is positive though marginal.

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4.0 Data, Variables and Methodology

The study uses quarterly data collected from the Central Bank of Kenya and the Kenya Bureau of Statistics covering the period 2006 to 2016. Data is selected based on availability in the frequency of our estimation.

We use bank deposits to GDP, credit to the private sector to GDP, no of bank accounts, indicators of mobile transactions (number of mobile transactions, value of mobile transactions and number of mobile agents) and number of bank branches as proxies for financial development and financial inclusion and as dependent variables. Remittances is regressed against each of the dependent variables separately. Our control variables include inflation, real GDP, exchange rate, interest rate and trade openness (Al-Tarawneh, 2016).

Various methods have been used in time series analysis of single equation frameworks but three approaches are more widely used. The most popular is the Engle and Granger two step procedure (Engle and Granger, 1987). Under this framework, the variables in the model are first tested for unit roots or order of integration to ensure they are of the same order of integration. Then a cointegrating test through OLS is conducted and the stationarity of the residuals from the cointegrating equation is tested (Tolcha and Rao, 2016; Bo, 2008). Stationary residuals imply cointegration and hence an error correction model constituting the residual from the cointegrating equation, lagged once, which is used as the error correction term is formulated. However, this approach does not work well when variables are more than two as there can be more than one cointegrating vector in such cases yet the method only provides one cointegrating relationship. Moreover, since it is a two-step regression involving estimation of residual series and another testing of unit root implies possibility of errors from first estimation being transferred to the final regression. The method also lacks power when considering finite

samples and it is prone to simultaneous equation bias. Further, the approach is not applicable when testing hypothesis concerning the actual cointegration defined in the long run regression equation in the first step of estimation. The second approach is the Johasen and it is most suitable in cases of multiple cointegrating vectors and a large sample size, (Koay and Choong, 2013; Mostafavi, 2012).

The autoregressive distributive lag model (ARDL) which is a linear time series model in which both the dependent and independent variables are related not only contemporaneously but across historical values as well, is the third method that is gaining preference over the other two due to its advantages. ARDL also referred to as bound cointegration technique is a least squares regressions using lags of the dependent and independent variables as regressors. ARDL allows application of cointegration tests to time series having different integration orders. It also has better statistical properties relative to Engle-Granger cointegration test because ARDL approach uses unconstrained error correction models and this approach also gives more reliable results in small samples relative to Engel-Granger and Johansen conteqration test. The ARDL also captures dynamic effects of both the dependent and independent variables, besides eliminating error serial correlation by including sufficient lags and allowing estimation of short run and long run simultaneously, (Nkoro and Uko, 2016; Karamelikli and Bayar, 2015; Datta and Sarkar, 2014; Alimi, 2014).

Following from previous studies, the basic general model is specified below:

$$FinD_t = \alpha_0 + \beta_1 Rem_t + \beta_2 X_t + \varepsilon_t ,\ldots, (1)$$

Where $FinD$ represents financial development variables, Rem represents remittance variables while X represents all the control variables in all the models. Equation 1 is then reformulated into a long run relationship represented in equation 2.

$$\gamma_t = LFinD_t - \alpha_0 - \beta_1 LRem_t - \beta_2 X_t + \varepsilon_t ,\ldots, (2)$$

Reformulation of equation 2 and equation 3 results in an ARDL specification in 4 below (Tung, 2015; Karamelikli, 2015)

$$\Delta LFinD_t = \alpha_0 + \beta_1 LFinD_{t-1} + \beta_1 LRem_{t-1} + \beta_n LX_{t-1} + \sum_{t-1}^{p} p_t \Delta LFinD_{t-1} + \sum_{t-1}^{p} \delta_t \Delta LRem_{t-1}$$

where $LFinD$ represents log of financial development variables, $LRem$ is the log of remittances while LX represent the log of the control variables in the model already described in previous paragraphs.

p, q and m are optimal lag lengths;

p_i, δ_t and τ_i are short-run dynamics of the ARDL model;

β_1, β_2, ..., and β_3 are long run multipliers;

Δ is the first difference operator;

α_0 is a constant term, and

ε_t is white noise error

According to previous studies, other factors affecting financial development include: real gross domestic product, trade openness, cpi, exchange rate and interest rate. In an error correction framework. We include trade openness (TOPEN) whose importance in fostering financial development has been identified in many previous studies. Increase in trade openness generate demand for new financial products including instruments for trade finance and for hedging of risks. At the same time, trade openness may cause macro level uncertainty and lead to unfavorable influence on the finance-development-economic growth linkage (Rehma et al., 2015; Raza, 2014; Antonio et al., 1994) The apriori sign for this variable is therefore ambiguous. Trade openness constitutes the total of exports and imports divided by GDP.

We also include consumer price index (CPI) measuring the average price of consumer goods and services bought by a household. Several studies show that high inflation erodes returns on savings leading to reduced incentives to save hence low number of savers and amount of savings. Consequently, the pool of

borrowing and credit allocation shrinks with negative implications on the financial sector. This challenge is aggravated in financial markets where collateral is required for efficient functioning of borrowing and lending since too little savings inhibit accumulation of collateral and impedes growth enhancing financial intermediation. Moreover, periods of high inflation are often followed by tight monetary policy implying high interest rates with the potential of leading to inefficient financial markets. High inflation also hampers long term contracting and hence induces financial intermediaries to maintain very liquid portfolio (see summaries in Akosah, 2013; Manoel, 2011). We expect a negative relationship between inflation and financial development.

The relationship between interest rate (INT) and financial development is entrenched in the work of McKinnon (1973) and Shaw (1973). The two authors argued that financial repression in the form of interest rate ceilings, high reserve ratios and directed credit lead to low savings and credit rationing and hence low financial depth in most developing countries. The liberalization theory that followed hinged on the premise of real rate of interest adjusting to equilibrium levels and thereby enabling expanded savings and real supply of credit with positive implications on financial deepening. We used the deposit rate to capture the effect of interest rate liberalization with expected positive sign since interest rate deregulation was meant to increase yields in deposit rates resulting in increased savings and hence financial depth.

The relationship between economic growth and financial development is positive based on the demand-following theories which postulate that, as the real sector develops, increased demand for financial services induces growth in the financial sector. As the economy grows, it generates additional and new demand for financial which brings about a supply response in the growth of the financial system. Lack of financial institutions therefore is an indication of the lack of demand for their services, (Sahoo, 2013; Huang, 2011; Al-Naif, 2012; Ghosh and Banerjee, 1998; Stammer, 1972; patrick, 1966).

Equation 4 represents the standard way of specifying an unrestricted error correction model capturing both short run and long run relationships among the variables in the study. We then test the null hypothesis, $H_o : \beta_1 = B_2 = ... = \beta_n = 0$ (Long run relationship does not exist) against the alternative $H_o : \beta_1 \neq B_2 \neq ... \neq \beta_n \neq 0$ (Long run relationship exists) for the long run relationship among variables. Rejection of the null hypothesis implies that there is a long run relationship among variables. We test the

hypothesis by comparing the F-statistics obtained from the Wald-test with the critical values for small samples (between 30-80 observations) provided by Nayaran, (2005). Nayaran (2005) generated two different sets of critical values for each level of significance. Lower critical bound values are calculated based on the assumption that all the variables in the regression are I(0) while upper bound critical values are calculated based on the assumption that all of the variables in the regression are I(1). The two sets of critical value provide critical value bounds for all classification of the regressors into purely I(1), purely I(0) or mutually cointegrated. (Nkoro and Uko, 2016; Karamelikli and Bayar, 2015). The long run relationship is exists when the F-statistics exceed the critical value band. If the computed F-statistic is larger than the upper bound value, the null hypothesis is rejected implying existence of cointegration while if the computed F-statistic is lower than the lower bound value, the null hypothesis is accepted indicating absence of cointegration.

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5.0 Discussion of Findings

In this section, we present unit root tests results in table 5.1. Then we estimate the ARDL model as well as the long run model with different dependent variables in each equation.[1]

We consider five dependent variables representing financial development. Five different equations will be estimated using five different financial development indicators. We use credit to the private sector (CRED), bank deposits as a share of GDP, number of bank accounts, number of bank branches and value of mobile transactions as separate dependent variables in five separate equations. The results for the long run models and error correction models are presented in table 5.5 and 5.6, respectively.

5.1   Unit Root tests

In this sub section, we present the unit root tests and ARDL findings based on different indicators of financial development as dependent variables. Although, unit root tests are not required in ARDL models, the unit root tests are carried out to ensure that the variables considered in our models are either I (0) or I(1) since inclusion of I(2) variables can lead to the collapse of the system and it renders the computed F-statistics provided by Pesaran et al., (2001) and Narayan(2005) invalid, (Nkoro and Uko, 2016; Sharaf, 2014). We transform all our variables into logs denoted by L in the equations and using Augmented Dickey Fuller (ADF) test in **table 2**, we establish that all variables are either I(1) or I(0) at the 1 percent significance level, thus satisfying the condition for using ARDL model.

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1.   We also conducted causality tests and the results largely show unidirectional relationship from remittances to financial development for most of the financial development indicators. For brevity purposes and since the tests do not change the key conclusions of the paper, we have not reported the causality results in the paper.

Table 2: Unit root tests

Variable	At level	At first difference	Order of intergration
RGDP	-4.92	-	I(0)
CRED	-3.13	-5.10	I(1)
DEPGDP	-3.20	-7.44	I(1)
TOPEN	-3.59	-	I(0)
ER	-3.48	-5.62	I(1)
Lending	-1.665	-5.884	I(1)
INT	-1.22	-3.64	I(1)
CPI	-2.78	-4.64	I(1)
REM	-2.82	-11.66	I(1)

×× RGDP= real GDP ; Cred=credit to the private sector; Depgdp= bank deposits as a share of GDP; Int =deposit interest rate; CPI=inflation; ER-Exchange rate; Topen=trade openness; Rem= total remittances; Lending=lending interest rates.

5.2   Cointegration tests

We conducted five cointegration tests based on the five different dependent variables but we only present the results that exhibit long run relationships among the variables. In **table 3**, credit to the private sector was considered as the dependent variable in testing for the presence of cointegration or long run relationship among variables. We conducted the F-test by restricting the coefficients of one period lagged level of the independent variables equal to zero. In table 5.2, the results show an F-statistics of 5.28 which is higher than the upper bound and lower bound values signifying presence of cointegration among the variables. In **table 4 and 5**, we replaced credit to the private sector with the value of mobile transactions and number of bank accounts as other indicators of financial development/inclusion, respectively. In both cases we obtained an F-statistic that is higher than the upper bound values at 5 percent and one percent statistically significance levels for value of mobile transactions (Mob) and number of bank accounts, respectively. We therefore make similar conclusions of presence of long run relationships among variables in both cases.

Table 3: Credit to the private sector is the dependent variable

Variables	F-Statistics		Cointegration
(CRED, RGDP, TOPEN, ER, CPI, REM, INT)	5.283*		Cointegration
Critical values	Lower Bound		Upper Bound
1 %	3.595		5.225
5%	2.643		4.004
10%	2.238		3.461

Table 4: Value of mobile transactions is the dependent Variable

Variables	F-Statistics		Cointegration
(MOB, RGDP, TOPEN, ER, CPI, REM, INT)	5.08*		Cointegration
Critical values	Lower Bound		Upper Bound
1 %	3.644		5.464
5%	2.676		4.130
10%	2.260		3.534

However our results of the F-test changed when we substituted credit to the private sector with deposits to GDP and number of bank branches as indicators of financial development. In this case, our results were inconclusive with an F-statistic of 3.47 when the dependent variable is deposits to GDP and 3.42 when the dependent variable is number of bank branches, which is lower than our upper bound values at 5 percent and 1 percent significance levels. The values lie in between the lower bound and upper bound values provided by Narayan, (2005) indicating inconclusive results.

Table 5: Number of bank accounts is dependent variable

Variables	F-Statistics		Cointegration
(ACC, RGDP, TOPEN, ER, CPI, REM, INT)	5.260*		Cointegration
Critical values	Lower Bound		Upper Bound
1 %	3.595		5.225
5%	2.643		4.004
10%	2.238		3.461

5.3 Econometric results of the long-run model

In this section, we present the coefficients of the long run equations for the credit to the private sector, value of mobile transactions and number of bank accounts equations. Although we did not report the Wald-test results for the number of mobile agents and number of mobile transactions, we use them separately as dependent variables replacing value of mobile transactions in each case and report the long run results in **table 6**. Accordingly, in **table 6**, we report results of five different models from columns 2-6, where we use five different dependent variables as indicators of financial depth and financial inclusion.

Table 6: Estimated Long Run Coefficients

Independent variables××	Coefficient (The dependent variable is credit to the private sector)	Coefficient (The dependent variable is Value of mobile transactions)	Coefficient (The dependent variable is Number of mobile agents)	Coefficient (The dependent variable is Number of mobile transactions)	Coefficient (Number of bank accounts)
$RGDP$	0.6069(4.61)***	7.15E-07(0.17)	0.0129(0.63)	0.0414(1.36)	0.7153(8.12)***
$Topen$	2.3219(2.14)**	5.469(0.56)	2.5584(2.70)***	3.1390(2.44)**	0.5784(5.86)***
ER	0.0142(4.50)***	5.28(1.82)*	5.3733(3.46)***	0.0766(2.70)**	-0.2202(-1.14)
CPI	-0.0008(-0.24)	0.0322(1.00)	-0.0665(-3.18)***	-0.0378(-1.21)	-0.0008(-0.29)
Int	0.0454(0.44)***	-2.653(-2.93)***	-0.9905(-1.56)	-0.149(-1.90)**	0.0106(0.11)
Rem	0.5416(5.30)***	2.293(2.43)**	1.4333(2.93)***	1.3524(2.02)**	0.2700(3.81)***
R^2	0.97	0.81	0.91	0.84	0.95

For all the coefficients the t-statistics are in parenthesis; *, **, *** denote 10%, 5% and 1% significance levels, respectively. ×× RGDP= GDP; Int =deposit interest rate; CPI=inflation; ER-Exchange rate; Topen=trade openness; Rem= total remittances.

The relationship between remittances is positive and significant in all the models presented in **table 6**. This implies that remittances are important for financial depth and financial inclusion since the relationship is maintained regardless of the indicator for financial development used. In column 2 where we have used credit to the private sector, the positive coefficient of remittances implies that higher levels of remittances boost savings and therefore facilitate higher credit to the private sector. Similar interpretation is

applicable to the relationship between remittances and number of bank accounts in column 6. This result is not surprising since remittances flows provide opportunities for opening bank accounts and accessing financial systems for recipients, particularly, in areas where banks serve as main remittance paying agents. Moreover, remittances received have the potential of exposing new financial products to both banked and unbanked remittance recipients. These results corroborates the findings of Fromentin, (2017); Karikari et al., (2016) and Aggarwal et. AL., (2011), among others.

In column 3-5 where we have used proxies for mobile remittance transfers, the results seem to suggest that higher remittances boost the values of mobile transactions, number of mobile transactions as well as number of agents involved in mobile transfer. These strong positive relationship seem to imply that more remittances are being channeled through mobile technology and that if migrants take advantage of the low costs and convenience offered by mobile transfer channels, it is possible to increase remittances through formal channels and hence deepen financial inclusion, especially in the rural areas. The fact that coverage of mobile usage is huge in the rural areas enhances the potential for remittances to have a greater impact on financial inclusion in areas where formal services through banks are limited.

Moreover, mobile to mobile remittances also save costs of travel and man hours that would otherwise be wasted in queues in traditional set ups. These saved costs can in turn boost remittance flows. The positive relationship between all indicators of mobile transactions and remittances further reflect the enabling regulatory environment that has led to the growth and acceptance of online remittance platforms such as skrill and Worldremit that facilitate international remittance transfer.

The results show that the level of economic activity represented by real GDP positively affects financial development but the coefficient is significant in only two models where credit to the private sector and number of bank accounts are used as dependent variables. The results conform to the demand pulling hypothesis of financial development postulated by Patrick, (1966). The relationship between trade openness and financial development is also positive as expected and significant in all the models except one. This result supports the theory that trade openness increases demand for new financial products including instruments for trade finance and for hedging of risks. The coefficient of interest rate is positive and significant as expected in column 2 where we have used credit to the private sector as the dependent variable. However, when we replace credit to the private sector with value of mobile transactions and number of mobile transactions, the sign changes

to negative with a significant coefficient. The plausible explanation for this negative relationship between deposit interest rate and mobile transactions would be that, as the commercial bank deposit interest rates increases, most of it is kept in bank accounts rather than in mobile accounts. Thus higher bank deposits attract more savings towards the commercial banks rather than in mobile accounts where they earn no returns. The coefficient of inflation has the expected negative sign but it is not significant in all the models except where we have used number of mobile agents as the dependent variable.

Table 7: Econometric results for the error correction model

Independent variables××	Coefficient (The dependent variable is in credit to the private sector)	Coefficient (The dependent variable is in the value of mobile transactions)	Coefficient (The dependent variable is in number of mobile transactions)	Coefficient (in the number of bank accounts)
$\Delta RGDP$	0.1350(2.81)***			0.0402(1.03)
$\Delta RGDP_{t-1}$		2.3510(1.81)*		
ΔER	0.3030(3.16)***			-0.0511(-0.62)
ΔER_{t-1}			-3.2015(-2.44)**	
ΔRem	-0.0497(-1.75)*	-0.3592(-0.8108)	-1.8052(-3.55)***	
ΔRem_{t-1}			-1.9484(-3.20)***	0.0440(2.01)**
ΔRem_{t-2}	-0.0542(2.26)**		-1.1626(-2.29)***	
$\Delta Topen$	1.0226(3.52)***	10.3785(2.74)***	6.0101(2.09)**	0.5069(2.09)**
$\Delta Topen_{t-1}$		7.6800(2.11)**		
$\Delta Topen_{t-2}$		7.2356(1.92)*		
ΔCPI				-0.0002(-0.23)
ΔCPI_{t-1}		-0.0355(-1.62)		
ΔCPI_{t-2}	-0.3348(-21.65)			
ECM	-0.1117(-2.47)***	-0.3977(-5.72)***	-0.3950(-5.18)***	-0.0947(-2.13)**
R^2	0.50	0.56	0.65	0.25

For all the coefficients the t-statistics are in parenthesis; *, **, *** denote 10%, 5% and 1% significance levels, respectively. ×× RGDP= GDP; Int =deposit interest rate; CPI=inflation; ER-Exchange rate; Topen=trade openness; Rem= total remittances

Table 7 presents the results of the short run model and the error correction term. The error correction term represents the speed of adjustment of the dependent and independent variables to their long-run equilibrium following any shock. The coefficient measures the proportion of the last period equilibrium error that is corrected for in the current period. The coefficient is negative and statistically significant in all the estimated models implying convergence in the long-run dynamics of the variables. In column 2, the error correction term imply that 11 percent of the last period disequilibrium is corrected in the current period. In case of a shock, it takes nearly ten quarters for the dependent variable and independent variables to restore their long run equilibrium relationship. In column 3 and 4, about 39 percent of the last period's

disequilibrium is corrected in the current period. In this case, it takes about two and half quarters for equilibrium relationship between the variables is restored. In the last column, about 9 percent of the last period disequilibrium is corrected in the current period while it takes about 10 quarters for equilibrium relationships among the variables to be restored.

The results also show that remittances have a negative effect on financial development and financial inclusion in the short run. This can be explained by arguing that initially when migrants move, they focus on sending money for consumption but with time once their families are stable, possibilities of savings and increased deposits occur which is visible in our long run results.

6.0 Conclusions

Over the last two decades, remittance flows steadily increased to developing countries necessitating a review of the dominant traditional view that this form of capital flow is private and is only important in smoothening consumption at household levels. Thus, research focus on the possible role of remittances on various macro dimensions ranging from the balance of payment through boosted forex reserves, increased financial inclusion and development through increased savings and enhanced bank deposits, and economic growth through increased diaspora investment dominated the last one decade.

This study examined the relationship between remittances and financial development using the ARDL cointegration technique on quarterly data for Kenya covering the period 2006 to 2016. The study considered credit to the private sector, indicators of mobile transactions, number of banks accounts, number of bank branches and commercial bank deposits to GDP as dependent variables. The results reveal sensitivity to the indicators used for financial development. They showed cointegration relationships among variables when credit to the private sector, indicators of mobile transactions and number of bank accounts were used as dependent variables. However, no long run relationship was visible when deposits to GDP and number of bank branches were used as dependent variables.

In the long run models, we therefore considered only those equations that indicated cointegration among the variables of interest. The results of the long run models showed strong positive linkage between remittances and financial development regardless of the indicators selected for financial development. The relationship was maintained when credit to the private sector, value of mobile transactions, number of mobile agents, number of mobile transactions and number of bank accounts was used dependent variables. These results of the remittances-financial development linkage imply that there is potential for remittance flows to encourage opening of bank accounts, enhance savings and influence credit allocation in Kenya. This is likely to have a positive impact

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on financial depth and inclusion by exposing the unbanked to existing and new financial products through the usage of mobile technology as a channel of international remittance transfer and promoting opening of bank accounts.

These results show a policy window for not only reducing remittance transfer costs by expanding the regulatory space for more international remittance payment platforms but also increasing remittance flows and financial inclusion. It may therefore be important to promote policies that encourage the usage of modern and cheaper technology in the remittance transfer business. Given the importance of remittances in credit allocation, commercial banks may find it useful to increase tailored products for migrants to tap into the huge unexploited potential of the diaspora that can increase their deposit base, enhance savings and credit creation. These would include offering higher interest rate on deposits of remittances compared to local currency deposits to encourage opening of diaspora accounts in local banks as well as considering regular remittance flows as collateral for credit allocation.

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