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\*Corresponding author: Kenneth A. Tah, Stetson School of Business and Economics, Mercer University, Macon, GA 31207, USA  
E-mail: [tah\\_ka@mercer.edu](mailto:tah_ka@mercer.edu)

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## FINANCIAL ECONOMICS | RESEARCH ARTICLE

# Remittances and financial access: Evidence from Sub-Saharan Africa

Kenneth A. Tah\*

**Abstract:** This paper empirically investigates the effects of remittances on access to financial services in 26 Sub-Saharan African countries over the period 2004–2015. We find that remittances have a significantly positive impact on financial access in Sub-Saharan Africa. This finding remains true in least squares regressions and with Arellano-Bond Dynamic Panel Estimation that accounts for the endogenous relationship between remittances and financial access and that controls for any bias arising from the lagged dependent variables, as well as using an alternative measure of financial access.

**Subjects:** International Finance; International Economics; Finance & Economics; Statistics for Business

**Keywords:** remittances; financial access; Arellano-Bond Dynamic Panel Estimation

### 1. Introduction

The need and importance of remittances have increased considerably over the last two decades. In its simplest form, remittances are the funds a migrant sends to their country of origin, typically to family members. These funds have substantial impacts on the developing world. In an estimation by the World Bank (2016), international remittances in 2015 totaled to 601 billion USD. Sub-Saharan Africa received the lowest amount of the six developing regions of the world with a total of 33 billion. Nigeria was the only Sub-Saharan country on the 25 top recipient countries list for 2015. Although the Sub-Saharan region receives the lowest remittance amount, their inward flows have increased every year (except during the 2009 financial crisis). In 2000, remittance inflow was 4.6 billion, then in 2007 it was 12.7 billion, in 2010 it was 21.5 billion and finally, in 2015, it was 33 billion. Aggarwal, Demiguc-Kunt, and Peria (2011) showed that remittances to developing countries have become the second largest type of inflows right after foreign direct investments (FDI). Previous research documents that remittances have a positive effect on the economic growth in Sub-Saharan Africa.

### ABOUT THE AUTHOR

Kenneth A. Tah is an Assistant Professor of Finance at Mercer University's Stetson School of Business and Economics (SSBE). The author's research interests focus on the dynamics and efficiency of financial and capital markets, and asset backed securitization.

### PUBLIC INTEREST STATEMENT

Remittances are the funds a migrant sends to their country of origin, typically to family members. Unbanked recipient of remittances may demand safe storage of surplus money from banks and nonbank financial institutions, alongside other financial products and services. It could also be that recipients of remittances may demand services at closer proximity. Accordingly, if financial institutions respond to such demand, we would expect increase access to finance as remittances increased. With the focus on Sub-Saharan Africa, remittances are found to promote access to finance.

The problems of Sub-Saharan Africa are very unique. The region suffers from pervasive poverty, inequality, and a high infant mortality rate. Large portions of the population in Sub-Saharan Africa operate in the cash-based informal economy. They remit money, save money, and access loans through nonregulated and non-supervised financial services. Driven by the belief that remittances are mostly used for consumption, an overwhelming amount of research on the effects of remittances has been performed on micro-level variables such as poverty, inequality, and infant mortality. However, an equally large amount of research has shown that in addition to consumption, remittances are used for investment goods. Accordingly, some research has been devoted to studying the effect of remittances on macroeconomic variables such as per capita GDP and financial development. The overwhelming conclusion is that remittances are associated with economic benefits. Remittances would be able to reach their full potential through a decrease in poverty, decrease in inequality, and an increase in investments, allowing for greater economic development in Sub-Saharan Africa.

Despite the growing importance of remittances, the relationship between remittances and financial access has not been sufficiently studied. To our knowledge, only one study has considered the effect of remittances on access to finance in Asia-Pacific developing countries. Inoue and Hamori (2016) document that remittances help to enlarge branch networks in Asia and Oceania countries. Inoue and Hamori (2016) noted that unbanked recipients of remittances may demand safe storage of surplus money from banks and nonbank financial institutions, alongside other financial products and services. It could also be that recipients of remittances may demand services at closer proximity. Accordingly, if financial institutions in Sub-Saharan Africa respond to such demand, we would expect increased access to finance as remittances increased, and hence a positive relationship between the remittances/access to finance nexus.

A relevant question for this community is whether a rise in remittances has led to increased access to formal financial services. In this study, we focus on the implication of remittances on the financial system of Sub-Saharan Africa. Therefore, apart from examining the impact of remittances on economic development, this study empirically analyzes the impact of remittances on financial access in Sub-Saharan Africa. Reverse causality may be possible with increased financial access leading to increased the inflow of remittances. Accordingly, we employed both least squares regression and Arellano-Bond Dynamic Panel Estimation that accounts for the endogenous relationship between remittances and financial access.

More precisely, we empirically investigate the effect of remittances on financial access in Burkina Faso, Burundi, Cameroon, Democratic Republic of Congo, Cote d'Ivoire, The Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Liberia, Malawi, Mali, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, South Africa, Sudan, Swaziland, Togo, Uganda, and Zambia, over the period of 2004–2015. Interestingly, results obtained in this study indicate that remittances have a significantly positive impact on financial access, even after controlling for per capital GDP, economic openness, human capital formation, inflation and institutional quality. Additional results suggest that economic development and formation of human capital have raised access to formal financial services in Sub-Saharan African.

The rest of the paper is structured as follows: Section 2 presents a brief literature review. Section 3 presents sources of the data and methodological issues. Section 4 presents the results of the empirical analysis, and Section 5 concludes and gives perspectives for policy.

## 2. Literature review

The literature on remittances can be broadly divided into household micro-level investigations and its effects on macroeconomic aggregates. The micro-level investigation is motivated by the belief that remittances are mostly used for consumption by the remitters family. Using the Ethiopian Urban Socio-Economic Survey, Beyene (2014) documents that receiving remittances is positively influenced by the number of kids, adults, and secondary school graduates, but is

negatively affected by the number of household members employed and the number of household members who have completed only primary education. Gupta, Pattillo, and Wagh (2009) used poverty surveys of 76 countries to show that for every 10% increase in the inflow of remittances, there is a 1% fall in headcount poverty and the poverty gap. Gubert, Lassourd, and Mesple-Soms (2010) ran a Heckman test on household data from Mali to compare inequality levels and current poverty rates. They document that remittances reduce poverty rates and inequality. Anzoategui, Demirgüç-Kunt, and Pería (2014) used household-level survey data from El Salvador to analyze the impact of remittances on the likelihood that households use financial services, such as deposit accounts and loans. They find that remittances have a positive effect on financial inclusion through the use of deposit accounts, and an insignificant robust effect on the demand for and use of loans.

On the other hand, research on the effect of remittances on macroeconomic aggregates is motivated by the belief that potential long-term development of remittances arises when there is money left over after basic needs are met. Adams and Klobodu (2016) documents that for Sub-Saharan countries that are stable, and have democratic governments, remittances have a positive effect on economic growth. Lartey (2013) finds remittances have a positive effect on economic growth; however, this effect increases as the level of financial development increases. Cooray (2012) examines the impact of migrant remittances on financial sector size and efficiency for a sample of non-OECD countries. He finds a positive effect between remittances and financial sector size for countries with low government ownership of banks, and a positive effect between remittances and efficiency for countries with high government ownership of banks. Ajilore and Ikhode (2012) utilized the Auto-Regressive Distributed Lag (ARDL) to investigate the short and long-run effects of remittances on financial development in five sub-Saharan African countries. Their measures of financial development are liquid liabilities of the financial system to GDP, and the ratio of credit to the private sector to GDP. They document that in four out of the five countries considered, there is a long-run relationship between remittances and financial development. Aggarwal et al. (2011) obtained similar results using bank deposits to GDP, and bank credit to GDP, as a proxy for financial development. Inoue and Hamori (2016) analyzed the impact of remittances inflows on access to finance for 38 Asia and Oceania countries. They document that remittances help to enlarge branch networks in Asia and Oceania countries.

This study follows Inoue and Hamori (2016) to investigate the effects of remittances on access to financial services in 26 Sub-Saharan African countries over 2004–2015. Our results support the findings of Inoue and Hamori (2016) that remittances have a significantly positive impact on financial access. Our result is obtained from both least squares regressions and Arellano-Bond Dynamic Panel Estimation. Unlike Inoue and Hamori (2016) who show no relation between the formation of human capital and access to finance for Asia and Oceania countries, we document that formation of human capital has raised access to formal financial services in Sub-Saharan African.

### 3. Data and model specification

We use data from 2004 through 2015 for 26 Sub-Saharan African countries, accounting for 286 observations. The data on financial access are obtained from the Financial Access Survey of the International Monetary Fund<sup>1</sup> and data on remittances and control variables are obtained from the World Development Indicators of the World Bank.<sup>2</sup> Next, we present the model whose objective is to test for the influence of remittances on financial access. First of all, we estimate the following pool ordinary least square (OLS) equation.

$$FinancialAccess_{i,t} = \alpha + \beta_1 Remittances_{i,t-1} + \gamma Z_{i,t-1} + v_{i,t} \quad (1)$$

$\beta_1$ , and  $\gamma$ , reflect the extent to which changes in the relative factors of the model contribute to changes in the dependent variable, wherein  $v_{i,t}$  is the error term for country  $i$  in year  $t$ . The dependent variable  $FinancialAccess_{i,t}$  is a measure of access to formal finance measured by two

bank variables in demographic and geographic measures. The first is the natural logarithm of the number of commercial bank branches per 100,000 adults (*FinancialAccess1*), and the second is the natural logarithm of the number of commercial bank branches per 1,000 km<sup>2</sup> (*FinancialAccess2*). Using the number of bank branches as the measure of financial access is attractive due to little missing observations and previous literature confirms that they are representative indicators (e.g. Inoue and Hamori 2016; Burgess and Pande 2005; Beck, Demirgüç-Kunt, and Martínez Pería 2007)

Our main independent variable in this study is Remittances (*Remittances*), which are personal remittances received and are defined as the percentage of GDP. This study controls for other factors which could likely influence access to formal finance by introducing  $Z_{i,t-1}$ , a vector of control variables.<sup>3</sup> We control for GDP (*LGDP*) which is the logarithm of per capita GDP in constant 2010 U.S. dollars and denote the level of economic development. We would expect a positive relationship between economic development and the demand for more formal financial services. We also control for economic openness (*OPEN*), which is the sum of exports and imports as a percentage of GDP. We expect a positive relationship between economic openness and access to formal finance because economic openness leads to trade expansion, and therefore exporters and importers would demand access to formal financial services. We also control for the levels of human capital formation (*School*), which denotes the primary school enrollment ratio. A well-developed human capital would demand access to formal finance services. We control for inflation (*inflation*), which is the annual percentage change in the consumer price index (CPI). When there is inflation, people tend to expand their demand for physical assets rather than financial assets to hedge against their asset erosion. So, inflation would result in less demand for financial assets. Accordingly, we would expect a negative relationship between inflation and access to formal financial services.

Lastly, we control for institutional quality (*Quality*), which is a measure of government effectiveness. This World Bank governance indicator reflects the perceptions of the quality of public services, the quality of civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. The estimate ranges from approximately -2.5 (weak) to 2.5 (strong) governance performance. We expect a positive relationship between institutional quality and access to formal finance.

Though we aim to analyze the effect of remittances on financial access, Anzoategui, Demirgüç-Kunt, and Pería (2014) study on financial inclusion in El Salvador suggests that financial access might result in reduced costs of sending and receiving remittances. Additionally, access to finance might provide funds for migration, and as a result, increase remittances. To address this potential endogeneity problem, we employ the dynamic panel GMM estimator developed by Arellano and Bond (1991):

$$FinancialAccess_{i,t} = \alpha + \beta_1 FinancialAccess_{i,t-1} + \beta_2 Remittances_{i,t-1} + \gamma Z_{i,t-1} + v_{i,t} \quad (2)$$

In estimating the equation, we combine the standard set of equations in first-differences with lagged levels as instruments. We test if these instruments are valid, i.e., lack of serial correlation with the estimators, by using the Hansen overidentifying test.

## 4. Empirical results

### 4.1. Descriptive statistics

In this paper, we use a panel data set from 26 Sub-Saharan Africa countries, namely Burkina Faso, Burundi, Cameroon, Democratic Republic of Congo, Cote d'Ivoire, The Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Liberia, Malawi, Mali, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, South Africa, Sudan, Swaziland, Togo, Uganda, and Zambia over the period of 2004–2015. Tables 1 and 2 presents summary statistics and cross-correlation between key

**Table 1. Summary statistics**

Variable	Description	Mean	Min.	Max.	Std. Dev.
FinancialAccess1	The number of commercial bank branches per 100,000 adults	6.239	0.021	121.182	20.22
FinancialAccess2	The number of commercial bank branches per 1,000 km <sup>2</sup>	4.42	0.122	24.338	4.455
LGDP	Per capital GDP in constant 2010 U.S. dollars	2.961	2.312	3.976	0.421
INFLATION	The annual percentage change in the consumer price index	7.721	-3.099	37.393	6.557
OPEN	The sum of exports and imports as a percentage of GDP	71.739	23.729	321.632	34.099
REMITTANCES	Personal remittances, received (percentage of GDP)	3.222	0.001	25.12	4.323
SCHOOL	The primary school enrollment ratio	99.525	47.224	146.507	21.314
QUALITY	Government effectiveness	-0.638	-1.746	1.044	0.592

variables. On average, remittances correspond to more than 3% of the GDP in our sample. While a simple correlation matrix could be misleading, the cross-correlation matrix shows a strong correlation between remittances and financial access. The correlation matrix also shows a positive association between economic development (*GDP*) and financial access, economic openness (*Open*) and financial access, human capital formation (*School*) and financial access, as well as between institutional quality (*Quality*) and financial access. The association between inflation and financial access showed mixed results. In our regression model, we would systematically investigate the effects of remittances on financial access using econometric techniques that control for other factors, and possible endogeneity of remittances.

#### 4.2. Empirical results using ordinary least square

Table 3 presents the results showing the effect of remittances on financial access. In the first model, we used FinancialAccess1 as a measure of financial access. It should be noted that FinancialAccess1 is the logarithm of the number of commercial bank branches per 100,000 adults. The results show positive and significant coefficients of remittances (0.049), implying that increases in remittances are directly proportional to increased financial access. This confirms that remittances are in fact a determinant of access to formal financial services. Next, we used an alternative measure of financial access, the FinancialAccess2, which is the logarithm of the number of commercial bank branches per 1,000 km<sup>2</sup>. The results show a positive and significant coefficient of remittances (0.024), again confirming that remittances result in financial access. With regard to control variables, the estimated coefficients of GDP are positive and significant at the 1 percent level, suggesting that increases in the level of economic development result in increases in financial access. In terms of the effect of education on financial access, the estimated coefficients of schools are positive and statistically significant. This suggests that the formation of human capital has a significant effect on financial access. This finding is consistent with Atkinson and Messy (2013) emphasis on the importance of financial education to promote financial inclusion. With regards to the effect of institutional quality on financial access, the estimated coefficients of institutional quality are positive and statistically significant. Our results for the effects of economic openness and inflation on financial access are not strong enough to promote access to finance.

**Table 2. Cross-correlation table**

	Financial Access1	Financial Access2	REMITTANCES	LGDP	OPEN	SCHOOL	INFLATION	QUALITY
FinancialAccess1	1							
FinancialAccess2	0.691	1						
REMITTANCES	0.148	0.111	1					
LGDP	0.367	0.714	-0.189	1				
OPEN	0.155	0.294	0.203	0.206	1			
SCHOOL	0.434	0.155	-0.108	-0.005	0.053	1		
INFLATION	0.002	-0.080	-0.154	-0.086	-0.023	0.139	1	
QUALITY	0.515	0.652	-0.241	0.696	0.081	0.172	-0.157	1

**Table 3. Empirical results using the pool OLS**

	<b>FinancialAccess1</b>	<b>FinancialAccess2</b>
<i>Remittances</i>	0.058*** (6.659)	0.027*** (7.072)
<i>LGDP</i>	0.199** (2.630)	0.501*** (9.393)
<i>OPEN</i>	-0.013 (-0.126)	0.001 (1.550)
<i>School</i>	0.013*** (7.486)	0.002*** (3.005)
<i>Inflation</i>	0.009 (1.07)	0.003 (1.189)
<i>Quality</i>	0.597*** (6.675)	0.232*** (5.955)
<i>Constant</i>	-1.757*** (-3.744)	-1.283*** (-6.275)
Number of Observations	237	237
Adjusted R2	0.480	0.656

Notes: Robust t-statistics are shown in brackets. \*\* and \*\*\* denote significance at 5 percent and 1 percent, respectively.

#### 4.3. Empirical results of Arellano-Bond Dynamic Panel Estimation

Table 4 presents the results of the Arellano and Bond (1991) estimation of Equation (2). Our aim with this regression is to obviate the endogeneity problem as we evaluate the effects of remittances on financial access, proxied by the logarithm of the number of commercial bank

**Table 4. Empirical results using the dynamic GMM**

	<b>FinancialAccess1</b>	<b>FinancialAccess2</b>
<i>FinancialAccess1 (-1)</i>	0.576*** (32.672)	
<i>FinancialAccess2 (-1)</i>		0.584*** (21.977)
<i>Remittances</i>	0.010*** (3.407)	0.024** (2.032)
<i>LGDP</i>	0.851*** (7.854)	0.573*** (4.776)
<i>OPEN</i>	0.001 (1.602)	0.001* (1.677)
<i>School</i>	0.003*** (3.129)	0.001** (2.067)
<i>Inflation</i>	-0.001 (-1.415)	-0.003 (-0.051)
<i>Quality</i>	0.022 (1.348)	0.035 (0.962)
Number of Observations	174	174
J-statistics	15.227	18.005
p-value	0.579	0.388

Notes: Robust t-statistics are shown in brackets. \*\* and \*\*\* denote significance at 5 percent and 1 percent, respectively.

branches per 100,000 adults, and the logarithm of the number of commercial bank branches per 1,000 km<sup>2</sup>. The independent variables in the model include the lagged values of financial access to control for autocorrelation. Additional independent variables are remittances, the natural logarithm of GDP, economic openness (Open), human capital formation (school), inflation and institutional quality. We combine the standard set of equations in first-differences with lagged levels as instruments, and an additional set of an equation in levels with lagged first-differences as instruments in order to assess for endogeneity. We also evade the problem of too many instruments (Roodman, 2009) that could arise in our study by restricting the number of lagged instruments to be less than the number of cross-sectional units. Moreover, we use the Windmeijer (2005) finite-sample correction to the standard errors in the two-step estimations. Both regressions have significant first-order autocorrelation, 0.576 for FinancialAccess1 and 0.584 for FinancialAccess2. The over-identifying restriction tests shown by the Hansen *J*-statistic and its corresponding *p*-value do not reject the null hypothesis of overidentified restrictions. Accordingly, the model specification is empirically supported. First, we present the results of Equation (2) in Table 4, in which the measure of financial access (FinancialAccess1) is the logarithm of the number of commercial bank branches per 100,000 adults. As expected, the coefficient of remittances is highly significant and positive (0.010), meaning that remittances are directly proportional to financial access. Second, we present results in which the measure of financial access is the logarithm of the number of commercial bank branches per 1,000 km<sup>2</sup> (FinancialAccess2). Again, the coefficient of remittances is positive and significant (0.024), meaning that remittances result in access to formal financial services. These results are consistent with the results presented in Table 3. With regards to the control variables, GDP is significantly and positively related to financial access, consistent with the results obtained in Table 3. Again, as expected the coefficient of school is very significant, confirming that the formation of human capital seems to raise access to formal financial services. The coefficients of inflation are estimated to be negative, but not statistically significant; therefore, increased inflation may not have a significant effect on financial access, which is also consistent with results presented in Table 3. The coefficient of openness is not significantly related to financial access which is consistent with results presented in Table 2. The coefficient of institutional quality is not significantly related to financial access in contrast to results presented in Table 2. The reason for this may be due to the endogeneity problem, which is treated effectively in the Arellano-Bond dynamic panel model.

## 5. Conclusion

Several studies have exploited the economic effects of remittances in developing countries. The view that remittances can also promote financial inclusion in developing countries has recently been gaining attention, however, evidence that remittances have an effect on financial access in Sub-Saharan Africa is very thin. This is surprising, given remittances play a significant role in Sub-Saharan African economies. This study applied two methods of estimation, the pool least square regression and the Arellano-Bond Dynamic Panel Estimation, to analyze the effect of remittances on financial access in Sub-Saharan Africa countries, namely Burkina Faso, Burundi, Cameroon, Democratic Republic of Congo, Cote d'Ivoire, The Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Liberia, Malawi, Mali, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, South Africa, Sudan, Swaziland, Togo, Uganda, and Zambia, over the period of 2004–2015. The estimated results show that remittances have a significantly positive impact on financial access in both methods of estimation. Previous research on Sub-Saharan Africa shows that remittances decrease poverty and inequality, and increase investment, thus, allowing for greater economic development in Sub-Saharan Africa. We compliment previous studies by documenting that one such economic development is the increase in formal financial services as a result of increase remittances.

For policy, governments of countries in Sub-Saharan Africa should direct effort at stimulating the flow of remittances. Of the six developing regions, Sub-Saharan Africa receives the lowest amount

of remittances. Remitters are faced with high costs and fees, so policies should be put in place to create easy and cost-efficient transfers for remitters.

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#### Competing Interests

The author declares no competing interest.

#### Author details

Kenneth A. Tah  
E-mail: [tah\\_ka@mercer.edu](mailto:tah_ka@mercer.edu)  
Stetson School of Business and Economics, Mercer University, Macon, GA 31207, USA.

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#### Notes

1. Financial Access Survey of the International Monetary Fund website: <http://data.imf.org/?sk=E5DCAB7E-A5CA-4892-A6EA-598B5463A34C&ss=1390030109571>.
2. The World Development Indicators (World Bank) (<http://databank.worldbank.org/data/views/variableSelection/selectvariables.aspx?source=world-development-indicators>).
3. We obtained all control variables from The World Development Indicators (World Bank) (<http://data.worldbank.org/data/sviews/variableSelection/selectvariables.aspx?source=world-development-indicators>).

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