THE GLOBAL FINANCIAL CRISIS (GFC) AND REMITTANCES RECEIVED IN AFRICA: ANY LESSONS FOR COVID-19?

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Abstract
We estimated the effect of the GFC on remittances into 8 SSA countries from 1999 to 2019 using the Fixed Effects (FE) model. Results showed that the GFC had a positive and significant effect on remittances. Per capita income of migrant home country exerted a negative but insignificant effect on remittances, while per capita income in remittance source country had a positive and significant effect; the effects of exchange rate and inflation on remittances were positive and negative, respectively, but insignificant. Findings showed the effect of the GFC on remittances is robust to remittance measures and large country sample size.

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1. Introduction

For Low and Middle Income (LMI) countries, remittances have come to represent their largest foreign exchange earner. It has exceeded Official Development Assistant (ODA) and inched close to Foreign Direct Investment in 2018 (World Bank, 2019). The importance of remittances to many LMI countries is seen in the proportion of their Gross Domestic Product (GDP) it accounts for. This fact is obvious in some countries in Sub-Saharan Africa (SSA). For countries such as Liberia, Comoros, The Gambia, Lesotho, Senegal and Cabo Verde, remittances represent 24.6 percent, 20.2 percent, 20.0 percent, 17.4 percent, 10.3 percent and 10.2 percent of their GDP, respectively (World Bank, 2016). The World Bank (2019) had predicted that remittances inflow to LMI countries would reach $551 billion, $574 billion, and $597 billion in 2019, 2020 and 2021, respectively. However, following the pronouncement of the coronavirus (the official name of which is COVID-19) pandemic in 2020 by the World Health Organization (WHO), the World Bank revised remittance expectations to lower figures for 2020 in LMI countries, projecting that remittances to LMI countries would fall by about 20% to $445 billion from the initially projected $574 billion (World Bank, 2020).

As with the COVID-19 outbreak, the Global Financial Crisis (GFC) affected financial flows across the world and in LMIs; according to Milesi-Ferretti and Tille (2011), one of the effects of the GFC was its contributing to lowering international capital flows, remittances accounting for ¾ of such capital flows from the US and Western Europe into SSA (IMF, 2010). Potential reduction in its flow, following the GFC, may be resulting from the shock to the labour market the crisis caused. This effect is a result of laying off millions of workers, cuts in wages, work hours and other benefits of those who still kept their jobs (Verick, 2011). The extent to which this, actually, affected the ability of migrants in most GFC affected countries to remit to households in most-remittance-dependent countries in Africa remains to be seen. The extent to which the GFC affected remittances to LMIs and the insight that may be gleaned from this, as the world grapples with the COVID-19 pandemic, is the crux of this study. The GFC started in the financial sector in the US but spread to the real economy/estate sector. It started in the US sub-prime mortgage market, and spread to the real economy through the financial system, both in the US and throughout the world. Before the economic crisis of the COVID-19 pandemic, the GFC was said to have precipitated the worst recession in history since the Second World War (Verick, 2011).

While studies, by authors such as Nyamongo, Misati and Kipyegon (2012), Adams and Klobodu (2016), Makun (2017), Meyer and Shera (2017) Kadozi (2019), and Sobiech (2019), have all evaluated the remittances-growth nexus in Africa and other LMI and developing countries; other authors, such as Gupta, Patillo and Wagh (2009), Adams and Cuecuecha (2013), Akobeng (2015), Inoue (2017), Vacaflores

(2017), and Wagle and Devkota (2018), have studied the effect of remittances on poverty. However, given the observation of Bakrania and Lucas (2009) that fragile states in SSA were more susceptible to financial shocks, given their dependency on remittances, it is worth studying the remittance effect of the GFC on SSA economies that may be rendered fragile if their receipt of remittance declines, as it represents a significant proportion of their GDP. Besides the GFC, studies have been carried out on the effects of different crises on economies in Africa. For example, the Tunisian revolution (the beginning of the Arab Spring) of the early 2000s necessitated the investigation into its impact on remittances received, undertaken by Edelbloude, Sers and Makhlouf (2017). Their study found that the Arab Spring induced more remittances into Tunisia; in Pakistan, Ghorpade (2017) found that domestic conflict decreased the likelihood of household-received remittances but increased in households with the lowest food expenditure quantile. Other studies, such as that by Shapiro and Mandelman (2016), examined the effect of fluctuations in remittances on the labour market and aggregate macroeconomy in Mexico; Opperman and Adjasi (2018) studied the effect of remittance volatility on the development of the financial sector in SSA, and Tachibana *et al* (2019) studied the effect of remittances in countering the negative effects of the 2015 earthquake in Nepal. These studies have not dealt with the effect of a financial crisis of the GFC type on remittances into Africa, and more specifically, on economies in SSA for which remittances are a significant portion of their GDP.

This study focuses on the effect a crisis of an economic/financial nature has on remittances into SSA countries for which it represents a significant portion of the GDP, and the lessons that can be drawn on the possible impact of the economic fallout of the COVID-19 pandemic on the region. More specifically, we hope to find the effect of the GFC on remittances received in sampled SSA countries. The rest of the paper is organized as follows: The next section discusses some related empirical studies. Section 3 gives theoretical considerations on determinants of remittances. In section 4 we give details of data used and methodology adopted, while in section 5 we evaluate findings from the study, including a robustness check. Finally, section 6 contains our concluding remarks and lessons from/implications of the COVID-19 pandemic, based on estimation results.

2. Empirical Literature

While empirical literature on the effect(s) of the GFC on remittances is sparse, it is even more so concerning the countries of focus in this study. While this review concentrates on the specific effect of the GFC on remittances, we also attempted to highlight the impact of other socio-political events on remittances received by recipient countries.

Gupta (2005), in a study on India, found a strong relationship between the economic conditions of remittance source countries and remittances returned. The study further showed that remittance was countercyclical in the receiving country. Using the OLS estimation technique, the study found that factors, such as political uncertainty, interest rates, exchange rate depreciation, were not important determinants of remittances into India.

Schiopu and Siegfried (2006) presented a comparison of the altruistic and investment motives of migrants' remitting funds. The paper examined the bilateral flows of remittances from 21 Western European countries to 7 European Union neighbours using panel data. The study found that the altruism motive for sending remittances (in which case remittances increased, the poorer the receiving country, relative to the sending country) was more significant than the investment motive.

Ruiz and Vargas-Silva (2009) evaluated the effects of the GFC on migrant remittances into Latin America between 2007 and 2008 using the Spearman and Standard Correlation Coefficients. Findings from the study showed that the GFC had a negative relationship with inward migrant remittances.

Jha, Sugiyarto and Vargas-Silva (2009) evaluated the effect of remittances into Asia in the face of the GFC. Their findings revealed that, while the crisis had caused immediate negative effect on inward remittances, the effect did not run into the long run.

Mohapatra and Ratha (2009) noted that remittances into developing countries dropped from US$336 billion in 2008 to US$316 billion in 2009. This decline was more acute in countries where migrants' destination was not diversified.

The study by Barajas *et al* (2010) estimated the effect of the global financial crisis on the economy of Africa through its effect on remittances. A panel of 44 countries was selected to estimate a reduced form equation with remittance as an exogenous variable, after estimating a remittance determination equation. Findings from the study showed that home countries from which migrants move more to Europe suffered more from the global financial crisis than home countries whose migrants move to other African countries.

Selim (2010) studied the effect of the GFC on migration and remittances in Bangladesh from a survey of 217 households with at least one member of their family living or working abroad in August 2007 and September 2008. The global financial crisis had a negative effect on inward migrant remittances, to the extent that there was a 6.4% fall in remittances received by households in Bangladesh.

Acosta, Baez, Beazley, Murrugarra (2012) estimated that, in El Salvador, remittances fell by 8.5% from $3.5 billion in 2009, following the GFC. The study reported that this was the first decline in remittances in 20 years. They found a strong correlation between remittances into El Salvador and the US GDP, and between employment in the US and remittances in El Salvador. Furthermore, the study also reported that inward remittances suffered a negative effect following the 2007-2008 international food and commodities crisis, by accentuating poverty and wiping out the gains from previous effects of remittances.

Rajan and Narayana (2012), in a study on the effect of the global financial crisis (GFC) on migration and remittances from GCC to South Asian countries, estimated that remittances flow from the GCC into South Asia following the global financial crisis remained stagnant or had a mild increase. This may have resulted from the fall in the value of the currencies of South Asian countries, as the US dollar appreciated following the crisis. The study surveyed 50 returning migrants from GCC to four South Asian countries.

Naudé and Bezuidenhout (2012) studied the effect of the GFC on remittance flows in 23 SSA countries from 1980 to 2007, using the GMM estimation technique. Findings from the study showed that remittances were not significantly affected by the global financial crisis, despite the negative effect.

Diaz and Soydemir (2013) examined the effect on Mexican migrant remittances of the 2007-to-2009 housing market crisis in the US. The study spanned the period January 1995 to June 2008. Adopting a vector autoregressive (VAR) estimation technique, the study found that the rise in foreclosures in the US housing market had a significantly negative effect on remittances sent by Mexican migrants.

Naudé and Bezuidenhout (2014) investigated the impact on migrant remittances in 23 SSA countries, from 1980 to 2007, of natural and man-made disasters, and financial crises like the GFC of 2008/2009. Using the GMM estimation technique, the study found that remittances were negatively, but not significantly related to financial crises, especially of the GFC type. This negative relationship is hinged on the underdeveloped financial system in remittance receiving countries.

Bonjuka, Xhema, Dervishi and Limani (2017) studied the relationship between unemployment in Germany, Italy and Switzerland and remittances into Kosovo. While there was a negative relationship between unemployment in Germany and Italy and inward remittances into Kosovo, rising unemployment rates in Switzerland did not affect remittances into Kosovo between 2008 and 2010.

In a country like Mexico where lots of remittance are received from the United States, Sidaoui, Ramos-Francia and Cuadra (n.d.) noted that the global financial crisis and the resultant negative effect it had on labour market in the US, resulted in declining remittances received by Mexico.

A recent study by Olayungbo and Quadri (2019), using the pooled mean group estimation (PMG) technique, found that remittances and financial development had a positive effect on economic growth in the short and long-run in a panel of 20 SSA countries. This study, and that of Barajas *et al.* (2010), have used remittances to target economic growth, whereas this study targets remittances with determinants such as exchange rate and per capita income, besides the global financial crisis.

The World Bank (2020) estimated that remittance flows into Low-and Middle-Income (LMIC), as a result of the COVID-19 pandemic, would fall by about 20% in 2020, after it had exceeded the inflow of foreign direct investment

(FDI) in 2019. Two factors were recognized as potentially going to bring this about, namely, decline in domestic economic conditions of remittance source countries, such as Russia, which has seen economic fortunes decline with falling oil prices, and depreciation of currencies of remittance source countries against the US dollar. For SSA, the study predicted a 23.1% decline in remittance inflow following loss of jobs in construction, hospitality, and services (where majority of SSA migrants work), as a result of the economic impact of the crisis. This study is valid for migrants who choose Russia as their destination. Migrants in the countries sampled for this study mostly migrate to Europe, hence, the experiences of migrants in Russia and Europe may not be the same.

In the study by Bisong *et al* (2020)which are an integral part of development finance, proved relatively resilient during the 2008 financial crisis and the 2014 Ebola epidemic. However, they are currently under threat by the COVID-19 pandemic. Lockdown measures implemented in host countries have caused many migrants to lose their jobs, consequently reducing remittance flows to developing countries. In 2020, the World Bank estimates a historical decline in global remittances of US$110 billion, with sub-Saharan Africa (SSA, it has been projected that the decline in remittances, as a result of the effect of the COVID-19 pandemic in some selected African countries like Nigeria, Kenya and Ghana, may have a negative effect on welfare. While these countries may be large numbers of recipients of remittances, they may withstand a shortfall in such inflow being bigger economies than some of the other countries selected for this study, such as Liberia, The Gambia and Lesotho.

Scanning though literature, we find that most studies on the effect of financial crises - like the GFC - on Africa lumped up countries into developing, SSA or single countries. To the best of our knowledge, no study exists that focuses on the effects of the GFC on remittances in countries for which remittance is most significant in terms of GDP percentage. The present study is unique in that it isolates those countries in Africa for which inward remittances are a substantial part of their economic output and tries to learn what insight the GFC could give to the potential impact of the COVID-19 pandemic on such economies. The studies by Naudé and Bezuidenhout (2012, 2014) may have attempted to estimate the impact of financial crises on remittances into SSA, but these studies did not recognize the heterogeneity in GDP significance of remittances to the various countries selected. Further-more, we hope to compare the outcome of our study to the findings by Naudé and Bezuidenhout (2012, 2014) after extending the timeframe beyond the 2007, when they stopped, and focusing, more specifically, on the global financial crisis effect on remittances into most-remittance-dependent economies in SSA, against the effect on remittances received after natural disasters, financial crises and other conflicts, as presented in Naudé and Bezuidenhout (2012, 2014).

3. Theoretical Considerations

Theoretically, Arun and Ulku (2011) categorized the determinants of remittances into three groups, depending on their motives, namely: altruism, self-interest and satisfying requirements on inter-temporal contractual agreements.

3.1 Altruism

The altruistic determinant of remittances was advanced by Johnson and Whitelaw (1974), whose study considered the reasons for remitting by urban dwelling Kenyans to rural areas. Altruistic remittance was possible because the urban dwellers considered rural areas as an extension of their lives – that is where their wives and children live. Therefore, migrants have a permanent tie to the remittance receiving country or region. Altruistic determinants of remittance include income. Johnson and Whitelaw (1974) posited that there was a negative relationship between income and amount remitted. In his study, Fonchamnyo (2012) posited that remittances to countries in SSA was positively and significantly related to altruism (income differential between host and receiving countries); negatively related to home country per capita income and positively and significantly related to a developed financial sector.

However, Poirine (1997) argued that the implicit loan theory applied more to real life events – supplementing the consumption of rural families, while altruistic reasons for remittances worked well when remittances are invested in capital projects. The study argued that altruism, as a reason for remitting, occurs better when migration is internal within a poor country because the return to emigration remittance is less than the return to internal immigration remittance.

3.2 The Self-interest theory

The self-interest theory of remittances posits that migrants remit when they do not find investment opportunities in their host country or are unwilling to invest. Thus, "an obvious place to invest, at least part of his assets, is in the home country by buying property, land, financial assets, and so on. These assets may earn a higher rate of return than assets in the host country although their risk profile can also be greater. In turn, the family can administer, during the emigration period, those assets for the migrant, thus acting as a trusted agent." (Addison, 2004, pp. 7).

3.3 Inter-temporal Contractual Agreement

This theory of remittances states that households in origin countries send one or more family member abroad so that they may be able to hedge against adverse economic situations. However, under this arrangement, migrants are able to remit to the country of origin if the macroeconomic volatilities of the host country are not correlated with those of the home country, in which case the migrant will remit to allow smooth consumption and investment for the household in the home country (Rehm, 2012).

Other theories of remittances include the motive to bequest, where remittances occur when the migrant remits to increase the family wealth, making the family increase their capacity to inherit wealth. Finally, the target earning theory posits that migrants move to a new country for a limited number of years, within which they earn income that is channelled to specific objectives, such as buying consumer durables, building houses or starting a business (Rehm, 2012).

4. Data and Methodology

This study will be framed around the inter-temporal contractual agreement theory of Lucas and Stark (1985), in which remittances are placed within the context of adverse economic conditions, despite uncorrelated macroeconomic volatility of home and host countries. It is to hedge against these adverse economic conditions that family members pool resources to send one of them abroad. The GFC falls within such adverse economic conditions that may potentially affect the ability of migrants to remit. According to Calì and Dell'Erba (2009), it is important to account for the role of the GFC as a determinant of remittances in the selected countries because of the possible effect of a crisis to the wage-earning potential of migrants and their ability to keep their jobs. It is equally important to capture the effect of the GFC, as it mirrors (albeit not completely) the economic fallout of the current COVID-19 pandemic. While the economic consequences of the GFC were more severe in developed economies, those of the COVID-19 pandemic were global and their effects potentially more severe than those of the GFC due to a simultaneous negative impact on consumers' demand and producers' supply. It is important to note that this study is not attempting to equate the economic effect of COVID-19 to that of the GFC; however, both events have affected the ability of people to keep their jobs and earn income, thus potentially affecting the ability of migrant workers to send remittances.

4.1 Characteristics of data

For the study, secondary data on remittances, per capita income of migrant home country, exchange rate, inflation and per capita income of remittance source countries were drawn from the World Development Indicator (WDI), while the global financial crisis was proxied with a dummy variable – 0 before the GFC (1999 to 2008) and 1 thereafter (from 2009 to 2019); this is similar to the approach by Girgin *et al.* (2017). The data scope was from 1999 to 2019. This corresponds to a period when remittances to SSA grew very rapidly, and for which data can be found for all countries sampled. Data was originally sought for the 10 largest remittance-to-GDP countries in SSA, according to the World Bank (2016). These countries are also described by Massa and te Velde (2008) as highly-remittance-dependent. They are Liberia (24.6 percent), Comoros (20.2 percent), The Gambia (20.0 percent), Leso-

tho (17.4 percent), Senegal (10.3 percent), Cabo Verde (10.2 percent), Togo (8.8 percent), São Tomé and Príncipe (8.0 percent), Mali (7.4 percent), Guinea-Bissau (6.2 percent). Two outliers (Mali and Senegal), however, were dropped (see section 4.3 for a discussion on this).

The panel data for this study is unbalanced. Data on remittances at level and its share of GDP was not available for Liberia from 1999 to 2003, Comoros and for The Gambia from 1999 to 2002. Data on remittance share of GDP for Sao Tome and Principe was not available for 1999 and 2000. There were missing data points in per capita income, exchange rate and inflation for several countries and several years. Only data on per capita income of remittance source countries is balanced. Table 1 summarizes the characteristics of the variables adopted for this study.

Table 1. Characteristics of data

Variable	Definition	Measurement	Source	Mean	S.D
Remittances (REM)	"Personal transfers and compensation of employees. Personal transfers include all current transfers in cash or in kind between resident and non-resident individuals, independent of the source of income of the sender. Compensation of employees refers to the income of border, seasonal, and other short-term workers who are employed in an economy where they are not residents and of residents employed by non-resident entities." WDI (2019)	At level (for main analysis) in line with Naudé and Bezuidenhout (2012) and Remittances-to-GDP ratio (for robustness) in line with Fonchamnyo, (2012)	WDI (2019)	2.13e+08	2.13e+08
Global financial crisis (GFC)	The global financial crisis occurred in 2008/2009.	Dummy binary variable that takes on 0 for periods before the GFC (1999 to 2008) and 1 thereafter (2009 to 2019)	Authors	.5714286	.4978439
Per capita income	Per capita income is the gross domestic product (GDP) per person in the remittance	Constant 2010 US Dollars	WDI (2020)	950.1743	318.5861

(PCI)	receiving country				
Exchange rate (EXR)	The annual average (of monthly averages) of local currency to the US dollar	Rate	WDI (2020)	255.6776	245.4619
Inflation (INF)	Persistent rise in general prices of goods and services.	Annual percentage change in consumer Price Index (CPI)	WDI (2020)	96.54315	29.07488
Per capita income of remittance source country (PCIX)	Per capita income is the gross domestic product (GDP) per person in the remittance source country	Constant 2010 US Dollars	WDI (2020)	16716.97	17321.42

Source: Compiled by Authors 2020

4.2 Econometric Methodology

Panel data analysis will be used in this study. Time series observations will be sourced across the 8 cross-sections.

The model to be estimated is given as:

$$ln\,REM_{it} = \beta_0 + \alpha_0 GFC_{it} + \alpha_1 ln\,PCI_{it} + \alpha_2 ln\,EXR_{it} + \alpha_3 INF_{it} + \alpha_4 ln\,PCIX_{it} + \varepsilon_{it} \quad (1)$$

Where $ln\,REM_{it}$ is the dependent variable, while, GFC_{it}, $ln\,PCI_{it}$, $ln\,EXR_{it}$, INF_{it} and $ln\,PCIX_{it}$ are independent/exogenous variables. The main independent variable, *GFC*, is expected to negatively or positively influence remittances received. Its influence will be negative if adverse economic conditions in migrant host countries is positively related to those of the migrant home countries, as espoused in the inter-temporal contractual agreement theory reviewed in section 3.3. Its effects are expected to be positive if migrants who have strong ties to their home countries still choose to remit to their families despite positively correlated home and host country harsh economic conditions. Besides, they rely on the social safety net of the host country to smoothen out their consumption. Control variables – *PCI, EXR, INF* and *PCIX* were selected based on studies such as those by Olubiyi and Kehinde (2015), Aydas, Metin-Ozcan and Neyapti (2005) and Fonchamnyo (2012). According to Fonchamnyo (2012), the relationship between the per capita income (PCI) of remittance recipient countries and remittances received is expected to be negative; by implication,

the wealthier an economy becomes, the lesser it attracts remittances. According to Olubiyi and Kehinde (2015), a depreciation in domestic exchange rate (EXR) (domestic currency vis-à-vis the US dollar) leads to a fall in remittances received. Yet, a depreciating domestic exchange rate may signal adverse domestic economic conditions, which may raise remittance inflows. Following Aydas, Metin-Ozcan and Neyapti (2005), rising inflation (INF) is evidence of unsound economic policy in the home country, which significantly and negatively affects remittance inflows. In addition, the effect of inflation on remittances could be negative if the motive for remitting is investment but positive if the motive is to meet family needs. Apart from GFC, control variables – exchange rate and inflation, especially – reflect the instability of the home economy about which the inter-temporal contractual agreement theory predicts that it is related to remittances received. PCIX is a variable that represents the per capita income of remittance source countries. The inclusion of the variable PCIX in equation (1) is in accordance with Barajas *et al* (2010) and Schiopu and Siegfried (2006), who identified it as a key determinant of inward remittances. According to these studies, the higher the income of remittance source countries, the higher the remittance received from those countries. In this study, remittance source countries are identified as the top migrant destination countries for migrants from SSA. Table (2) presents the countries selected for the study (including those chosen for robustness checks) and their top migrant destinations.

According to Thorpe (2010), estimating equation (1) by using the pooled OLS is appropriate when there is insignificant country (cross-section) or time effects, thus rendering the slope and intercept constant. Given that there are likely to be considerable country and/or time effects in the model, not accounting for them may render the pooled OLS estimator inconsistent as the error will be correlated with the observation. To fix this problem of heterogeneity, either fixed effects (FE) or random effects (FE) is employed.

To understand the assumptions about the residual term made by the FE and RE estimators, we have to re-write equation (1) by decomposing ε_{it} into $v_i + u_{it}$ so that we have

$$ln\,REM_{it} = \beta_0 + \alpha_0 GFC_{it} + \alpha_1 ln\,PCI_{it} + \alpha_2 ln\,EXR_{it} + \alpha_3 INF_{it} + \alpha_3 lnPCIX_{it} + v_i + u_{it} \quad (2)$$

In equation (2), v_i represents the country fixed effects and u_{it} a random term. In a random effects model, v_i is not fixed for each cross-section, and it is not the same across time: it is a random variable. According to Allen and Giovannetti (2010), the RE model is more efficient than FE, but less consistent than FE. Yet, to settle on the choice between RE and FE, we will have to carry out the Hausman test. The hypothesis that is tested in the Hausman test is:

H_0: Random effects estimator is correct
H_1: Fixed effects estimator is correct

Table 2. Top Migrant destinations of selected countries (first 8 for main analysis and last 12 added for robustness)

S/N	Country	Top migrant destination country
1	Liberia	Guinea
2	Comoros	France
3	The Gambia	Spain
4	Lesotho	South Africa
5	Cabo Verde	Portugal
6	Togo	Ghana
7	São Tomé and Príncipe	Portugal
8	Guinea-Bissau	Portugal
9	Senegal	France
10	Mali	Cote d'Ivoire
11	Ghana	Nigeria
12	Nigeria	United States
13	Congo, Democratic Republic	The Republic of Congo
14	Uganda	Rwanda
15	Madagascar	France
16	Burkina Faso	Cote d'Ivoire
17	Kenya	United Kingdom
18	Malawi	Zimbabwe
19	Eswatini	South Africa
20	Rwanda	Congo, Democratic Republic

Source: Compiled by authors from World Bank (2016)

Note: The top migrant destination for Uganda is South Sudan. However, due to data paucity for South Sudan, it was dropped from the analysis for the next country - Rwanda.

4.3 Stylized facts
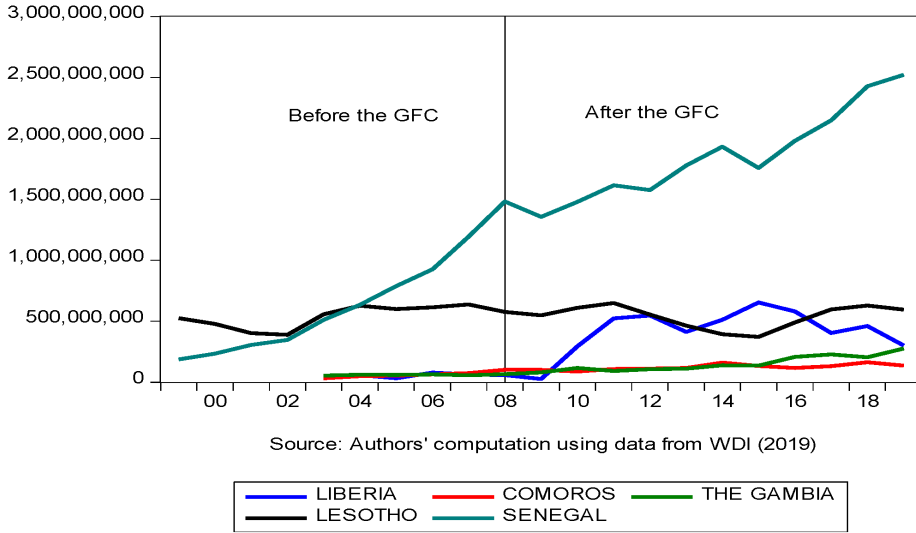
Fig.1 Personal Remittances Received (REM) in $'000

Source: Authors' computation using data from WDI (2019)

Fig.2 Personal Remittances Received (REM) in $'000

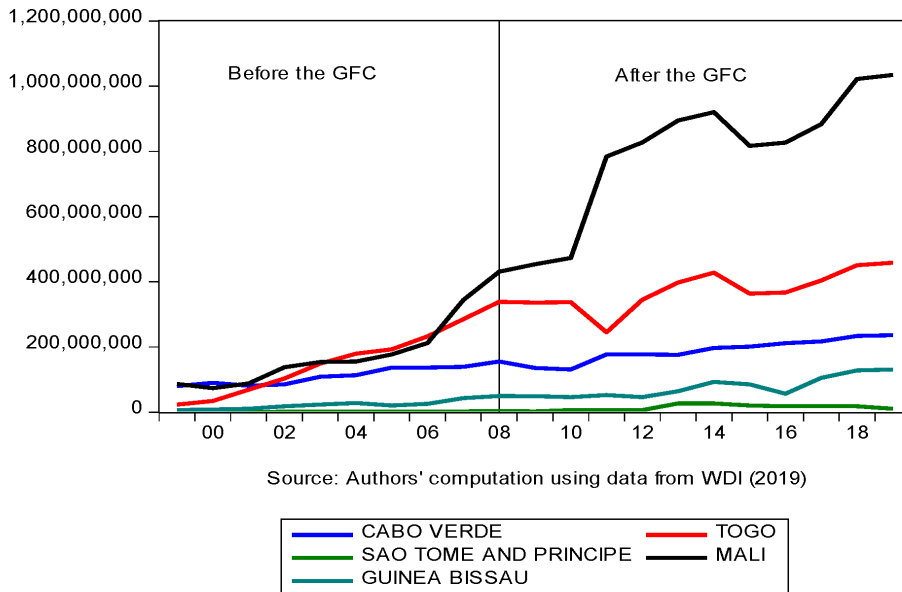Source: Authors' computation using data from WDI (2019)

Fig.1 and 2 show the trend in remittances for the 10 (initially selected) countries for the period under review. Apart from Cabo Verde and Lesotho, the other countries sampled witnessed an upward trend in personal remittances received before the Global Financial Crisis (GFC) (1999 to 2008). For Cabo Verde and Lesotho, there was an initial rise, followed by a flattening out period.

Surprisingly, it will be noticed that Senegal's personal remittances fell in 2008, but picked up again in 2009, and remained upwardly trending throughout the period under review. The same can be said of Mali, Cabo Verde, Togo (after plateauing between 2008 and 2010 and significantly declining in 2011) and Sao Tome and Principe. After an initial fall in 2009, Liberia's personal remittances received recovered quite significantly, but suffered from episodes of declines and upswings.

Generally, the trend analysis does not indicate that the economic shock due to the GFC had a significant negative effect on the flow of personal remittances into the mostly-remittance-dependent African countries. In fact, to further drive the point home, the lowest personal remittance received of all the countries sampled, within the period under review, was recorded for Sao Tome and Principe in 2000 and not around the GFC period.

The trend analysis seems to support a positive relationship between the GFC and remittances. It remains to be seen if this relationship holds after removing the outliers - Senegal and Mali - in an econometric estimation, and how significant the relationship is.

5. Empirical results

5.1 Correlation matrix of dependent and independent variables

Table 3 presents the pattern of relationships between the independent variables in the model. Following Dormann *et al.* (2012), who placed |r| at ≤ 0.7, or collinearity becomes a problem among independent variables, we find that the independent variables do not suffer from the problem of multicollinearity.

Table 3. Correlation matrix

	GFC	lnPCI	lnEXR	INF	lnPCIX
GFC	1				
lnPCI	0.184	1			
lnEXR	0.067	-0.460	1		
INF	-0.111	-0.164	-0.123	1	
lnPCIX	0.022	0.433	-0.128	-0.053	1

Source: Authors' computation 2020

5.2 Findings

Table 4 presents the estimated effects of the global financial crisis on inward remittances to SSA, using the fixed effects estimation procedure. We made the choice for the fixed effects model based on the result of the Hausman test between this and the random effects model. In the table, we also present the result for the ordinary least squares (OLS) and random effects (RE) techniques, which are not of interest to us.

Based on visual inspection of the trend analysis, Mali and Senegal were dropped from the estimation since their remittances received within the period under review showed more significant growth trends than the rest of SSA countries. Thus, we ended up estimating the fixed effects model with 8 of the 10 countries selected.

Fixed effects (FE) results show that the global financial crisis exerted positive and significant effect on remittances received. This result is in consonance with the trend analysis carried out in section 4.3. The estimated result is in opposition to that of Naudé and Bezuidenhout (2012) who found a negative and significant effect (in a dynamic model) of global financial crisis on remittances received in 23 Sub-Saharan African countries. Their findings may have been a result of pooling countries to which remittances may be large, like Nigeria, but insignificant as a share of national output, as compared to others. Furthermore, in our study which sampled 8 selected SSA countries, only 3 had African countries as top migrant destinations, namely through the Liberia to Guinea, Lesotho to South Africa and Togo to Ghana migration corridors; migrants from the other 5 countries preferred European countries as a top destination, which necessitated the measure used in this study for income in remittance source country to be per capita values from those countries, unlike the study by Naudé and Bezuidenhout (2012), which considered the average SSA per capita as a proxy for host country economic strength. Given that the migration pattern of most of the countries selected is to advanced economies of Europe, where social safety nets in the face of adverse economic conditions are available, migrants could still remit to their home countries despite those economic conditions, contrary to the conclusion by Barajas *et al.* (2010). Our results are also different from those of Naudé and Bezuidenhout concerning the number of years employed in the analysis. The empirical findings of our study are close to those of Rajan and Narayana (2012). Although more focused on the effect of the GFC on migrants from South Asia, and remittances into South Asia from the Gulf Cooperation Council (GCC) countries of Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates, Rajan and Narayana (2012) agreed that the effect of GFC on remittances was low and easily recovered. While the findings of Rajan and Narayana (2012) were an assessment (and not an econometric analysis) of labour into and migrants' remittances from the GCC, it found that the crisis did not adversely affect labour migration to the GCC and remittances from there. While this phenomenon has been attributed to the

resilience of the economies in the GCC, especially as the price of oil recovered very quickly following the crisis, the resilience of remittances in the face of an economic crisis induced by the COVID-19 pandemic may be a combination of the resilience of the sectors into which migrants are employed and the social safety nets that may serve as a cushion to loss of income due to lockdown measures taken to contain the spread of the virus.

On the control variables, the FE model shows, as expected, that the coefficient of per capita income in the migrant home country exerts a negative effect on remittances received, which means that the higher the per capita income in the remittance recipient country, the lower the remittances received. This result agrees with that of Fonchamnyo (2012), whose static analysis found that the remittance-home per capita income relationship was negative, thus supporting the altruistic motive for remitting by migrants and implying that improving economic conditions in the home country leads to fewer remittances received, while falling income at home raises remittances received.

Exchange rate is shown to have a positive but not significant effect on remittances received, because as nominal currency adjusts and causes devaluation/depreciation, inward remittances will increase. Falling domestic exchange rate will induce more remittances as migrants will want to take advantage of the larger domestic currency amount to be exchanged for a dollar. Besides, a weaker domestic currency vis-à-vis the dollar is a signal of adverse domestic economic conditions at home, which migrants will respond to by sending more money home. This finding is unlike that by Olubiyi and Kehinde (2015), who found that depreciating home currency led to reductions in remittances.

The coefficient of inflation is seen as exerting a negative and statistically not significant effect on remittances. By implication, rising domestic prices lead to a fall in inward personal remittances. Inflation in the home country may lead migrants to send lower remittances home for consumption, but investment, which will ultimately result in better economic outcome for the households, as lower inflation increases remittance inflows. This finding agrees with that by Aydas, Metin-Ozcan and Neyapti (2005), whose single country analysis for Turkey found a similar result. Results indicate that the coefficient of per capita income for the remittance source country is positively and significantly related to remittance inflows. This result meets our expectation of remittances rising, the richer the source country is. When compared to the findings of Schiopu and Siegfried (2006), our results are shown to be robust to the time-period and remittance receiving regions considered.

Table 4. Estimation result on the effect of the global financial crisis on remittances

Dependent Variable: Remittances	OLS	FE	RE
Global financial crisis	0.722*** (0.228)	0.721*** (0.160)	0.870*** (0.142)
Per capita income	0.756*** (0.236)	-0.126 (1.220)	0.516 (0.443)
Exchange rate	-0.118 (0.087)	0.488 (0.689)	0.165 (0.166)
Inflation	-0.087*** (0.021)	-0.014 (0.014)	-0.006 (0.013)
Per capita income in remittance source country	-0.661*** (0.094)	2.389** (0.801)	-0.342 (0.227)
Constant	19.776*** (1.650)	-5.243 (13.777)	16.709*** (3.020)
Number of countries	8	8	8
Observations	130	130	130
F-statistics	17.01***	14.64***	70.82***
R-square	0.383	0.440	0.376
Hausman Test (Chi^2)		15.43***	

Source: Authors' computation 2020

Note: Values in parenthesis are standard errors which are heteroscedasticity consistent. All variables (except Global Financial Crisis and Inflation) are in logarithmic form; ***p<0.01, **p<0.05, *p<0.1.

5.3 Robustness Check

Table 5. Robustness test on the effect of the global financial crisis on remittances

Dependent Variable: Remittances as a percentage of GDP	OLS	FE	RE		OLS	FE	RE
Global financial crisis	-2.046 (1.569)	3.743** (1.213)	2.056* (1.179)		0.535 (0.776)	1.621** (0.617)	1.234** (0.525)
Per capita income	1.970 (1.630)	-28.825 (16.551)	-16.579*** (3.911)		-1.063 (0.772)	-8.717 (6.867)	- 4.146*** (1.534)
Exchange rate	-3.917*** (0.600)	2.918 (4.145)	-1.388 (1.547)		-1.413*** (0.238)	1.853* (1.087)	0.308 (0.480)
Inflation	-0.465*** (0.148)	0.042 (0.109)	0.023 (0.102)		-0.307*** (0.062)	0.003 (0.032)	-0.007 (0.040)
Per capita income in remittance source country	-2.422*** (0.646)	-2.466 (11.439)	1.519 (2.250)		0.457* (0.249)	2.334 (1.795)	1.305 (0.881)
Constant	40.909*** (11.371)	217.608 (199.055)	115.527*** (28.038)		18.269*** (5.623)	35.222 (36.273)	20.882 (10.315)
Number of countries	8	8	8		20	20	20
Observations	130	130	130		365	365	365
F-statistics	11.88***	2.91*	20.51***		10.92***	3.03**	10.21*
R-square	0.297	0.280	0.238		0.120	0.071	0.055
Hausman Test (Chi^2)		35.38***				17.45***	

Source: Authors' computation 2020

Note: Values in parenthesis are standard errors which are heteroscedasticity consistent. All variables (except Global Financial Crisis and Inflation) are in logarithmic form; ***p<0.01, **p<0.05, *p<0.1.

We subjected the findings of this study to a robustness check by using remittances-to-GDP as a measure of remittances received for the 8 countries in the main analysis. Subsequently, we increased the number of countries selected to 20 (12 more countries were added to make the number up to 20 following Olusuyi *et al.* (2016); these countries are all in SSA) to find out if the effect of the GFC on remittances is robust to sample size and remittance measure. The 12 additional countries were selected based on the large size of their remittances-to-GDP ratios as presented in WDI (2020).

As reported in Table 5, estimating equation (1) with remittances-to-GDP as a measure of remittances with the initial sample of 8 countries produced a similar result in terms of coefficient sign and significance of the GFC dummy, to the main estimate. From the estimated model, the GFC is observed to be positively and significantly related to remittances received. Similarly, it can be observed that increasing the sample size of countries to 20 with remittances-to-GDP as a measure of remittances produced a similar outcome to that of the main analysis, in terms of coefficient sign and significance of the GFC dummy. In the estimates for the robustness test for the 8 and 20 countries, apart from the significance of the coefficient of the GFC dummy, exchange rate was the only other variable whose coefficient was reported to be statistically significant at the 10% level. Based on this sensitivity check, we can conclude that our findings are robust to remittance measures and large country sample size.

6. Concluding Remarks and Lessons for COVID-19

This study investigated the effect of the global financial crisis on remittances received in Sub-Saharan Africa, using an unbalanced panel data for 8 African countries for the period from 1999 to 2019. We employed the fixed effects model for our empirical analysis to remove the time invariant characteristics of individual countries that may bias the dependent variable. This choice was made after conducting a Hausman test between the fixed effects and random effects models. The result of the empirical analysis showed that the global financial crisis exerted a positive, and statistically significant effect on remittances. Per capita income of the migrants' home country exerted a negative but statistically insignificant effect on remittances. The effect of exchange rate on remittances was positive but not significant, inflation had a negative and insignificant effect, while the per capita income of the remittance source country was shown to be positively and significantly related to remittances received.

The study has shown that remittances flow is resilient to adverse economic conditions in both the migrant home countries and remittance source countries. The ability of the GFC to negatively affect migrants' remittances may have been diminished by the policy responses of the advanced economies of Europe, in particular, and North America, where these migrants move to, to save employment. For example, the German government, in the wake of the financial crisis, introduced the 'Kurzarbeit' to protect employment (di Mauro, 2020).

In summary, while strong home connection and policy response to the GFC in the more advanced countries may have contributed to the positive effect of the global financial crisis on remittances in the SSA countries studied, further studies may be needed to unravel if accumulated wealth and savings of migrant workers from the countries sampled played any role in their sustained remittances to families in the home countries in the face of adverse economic conditions.

The economic disruption caused by the COVID-19 pandemic may be more severe than the one caused by the GFC. This is because, besides supply disruptions, demand is also affected due to lockdown measures introduced by various governments to contain the spread of the virus. According to Lustig and Mariscal (2020, p. 186), "the efforts to contain COVID-19 have frozen many global supply channels; while the fear of contagion is causing an unprecedented retrenchment in consumer demand." A combination of falling consumer demand and low supply will most likely lead to a fall in employment. A return to a pre-COVID-19 economic state would mean that the virus has been eliminated and the threat of lockdowns has disappeared. This hope is not misplaced because, despite the threats of new surge in cases across much of the world (especially in Europe and America), the discovery of several vaccines against the virus has rekindled hope of a return to some form of pre-COVID-19 conditions, which guarantees employment and consumption. Although the study has shown how resilient remittances can be in the face of harsh economic conditions, judging by the peculiar nature of the COVID-19 pandemic, this optimism has to be tapered as a lot depends on the public health response to the different waves of the virus and on how far-reaching the vaccines can be in migrant host countries to contain the spread of the virus. Migrants in host countries, who may have held jobs in sectors not hit by the GFC, may lose them under the COVID-19 pandemic, and in places where they do not qualify for state welfare interventions, they may rely on their savings to survive the economic effects of the pandemic. This may likely impact how much they remit.

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