



Remittances and the Dutch disease in Sub-Saharan Africa. A Dynamic Panel Approach

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Abstract

This paper investigates the effect of remittance inflows on the real exchange rate in Sub-Saharan Africa (SSA) using annual data from 1980 to 2008 for 34 SSA countries, generalised method of moments by Arellano and Bover (1995) and feasible generalised least squares by Parks (1967) and Kmenta (1971, 1986). We find that when cross-sectional dependence and individual effects are controlled for, remittances to SSA as a whole appreciate the underlying real exchange rate of recipient countries. However the Dutch-disease effect is not experienced via the loss of export competitiveness, because the exchange rate appreciation is mitigated by monetary policy positioning and overdependence on imports due to low levels of domestic production in these countries. We also find reverse causality between remittances and the real exchange rate.

Keywords: Dutch disease, remittances, real exchange rate, Sub-Saharan Africa

JEL Classification: C33, F24, F31, O55

1 Introduction

Research shows that a stable real exchange rate is one of the key factors to be considered if Sub-Saharan African countries are to be able to harness remittance inflows as an alternative source of finance for development (Higgins, 2004; Kemegue et al., 2011). This is based on the assumption that returns on investment are in home country currency units (Katseli and Glystos 1986). On the contrary, the Dutch-disease theory of Corden and Neary (1982)¹ posits that increases in foreign inflows could cause the underlying real exchange rate of the recipient economy to appreciate adversely affecting export competitiveness and consequently the trade deficit. This would further result in the contraction of the tradable sector of the recipient economy leading to a decline in manufacturing and production of other tradable goods. These two theories raise an issue with the direction of causality between remittances and the real exchange rate. Which is dominant, the impact of a strong exchange rate in driving remittance inflows or the impact of remittance inflows in appreciating the real exchange rate of recipient countries? Or is there reverse causality between remittance inflows and a strong real exchange rate?

On the domestic front an increase in remittance inflows - all things being equal - increases the disposable income of recipient households, leading to an increase in aggregate demand. This spending effect results in higher relative prices of non-tradable goods as prices of tradable goods

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¹The phrase “Dutch disease” was first used to describe a situation in the Netherlands in which the development of natural gas on a large scale led to a sharp appreciation of the real exchange rate to the detriment and contraction of the manufacturing sector in the Netherlands. Since then it has been used to describe situations in which a natural resource boom, large foreign aid or capital inflows have caused a real exchange rate appreciation that adversely impacts on the manufacturing sector (Acosta et al., 2007).

(imports) are assumed to be exogenously given (Acosta et al., 2007). The higher prices of non-tradable goods lead to an expansion of the non-tradable sector. Assuming that resources are perfectly mobile, there could be a reallocation of resources (labour) from the tradable to the non-tradable sector. Besides this reallocation of resources, remittance-receiving households are also known to sometimes reduce labour supply (Amuedo-Dorantes and Pozo, 2006). Assuming resources are fully utilised this could increase the marginal cost of labour in the tradable sector, leading to a hike in production costs and a further contraction of the tradable sector (Acosta et al., 2007). These adverse effects of an increase in foreign inflows (in this case remittances) on the real exchange rate, loss of export competitiveness, the tradable sector and trade deficit are referred to as the Dutch-disease effect of remittance inflows (Corden and Neary, 1982). This is however based on the assumption that households spend remittances mainly on non-traded goods. However, if households spend remittances on traded goods then the Dutch-disease effect would be weakened or entirely absent (Izquierdo and Montiel, 2006).

Most SubSaharan African countries are characterised by low production capacities hence trade is liberalised and the nontradable sector is largely supplemented by massive imports, which are mostly of better quality and therefore largely preferred to locally produced goods. In the medium to long term, the increase in household disposable income would also increase demand for imports through income and substitution effects. This could lead to an increase in demand for foreign currency which has a depreciating effect on the domestic currency over time (Acosta et al., 2007). This depreciation of the domestic currency could over time stimulate export revenue and consequently appreciate the real exchange rate all things being equal. Additionally, the increased demand for imports could also result in an increase in the price of tradables which could fuel domestic inflation. An increase in domestic prices also requires an appreciation of the real exchange rate to restore internal balance (Montiel, 1999). The extent to which this latter appreciation caused by increased export revenue and domestic inflation mitigates the initial depreciation of the domestic currency, would determine the total effect of remittance inflows on imports and exports and therefore the direction of the trade balance in the long run (Singer, 2008). If the latter appreciation effect alleviates the initial shortrun depreciation effect, then there would be a net deterioration of the trade deficit in the long run due to loss of export competitiveness. On the contrary, if the latter appreciation effect does not mitigate the initial depreciation effect, then the current account deficit would not worsen from the perspective of a loss of export competitiveness (OpokuAfarı et al., 2004; Nayyer, 1994).

Consequently temporal dimensions are critical in analysing the effect of foreign inflows on the underlying real exchange rate of the recipient economy and whether the Dutch disease theory is supported or not. It is relevant to distinguish the shortrun effects from the longrun effects to ascertain the total effect of remittance inflows on the underlying real exchange rate of the recipient economy (Edwards, 1989, Montiel, 1999). Besides the effect of temporal dimensions, extensive literature also exists on the role of other fundamental determinants of the real exchange which depreciate the real exchange rate thereby mitigating the appreciating effect of foreign inflows. In some countries a specific policy positioning by policy makers as well as conditionalities to development assistance have also been found to mitigate the usual transmission mechanism of macroeconomic variables (Herzberg, 2006).

The objective of this paper therefore is to examine the relationship between remittances and the real exchange rate using annual data from 1980 to 2008 for 34 SubSaharan African (SSA) countries. Does remittance inflows into SSA have an appreciating effect on domestic exchange rates? If yes, does it adversely affect the trade balance thereby worsening the trade deficit? If not, is it due to the role of other fundamental determinants of the real exchange rate or a policy positioning in pursuit of a specific monetary policy objective? We also seek to determine the direction of causality between remittance inflows and the real exchange rate or whether there is reverse causality. We establish, also, which policy implications emerge for countries looking to harness remittance inflows as an alternative source of finance for development

The rest of this paper is structured as follows; section 2 reviews relevant literature, section 3

describes the data and methodology, section 4 discusses empirical results and section 5 addresses the conclusion, policy recommendations and future research.

2 Relevant literature

Extensive literature exists on the determinants of the real exchange rate, ranging from monetary models and balance of payment models to portfolio balance models. However most of these models have largely failed to predict accurately the real exchange rate, and also do not distinguish between shortrun and longrun changes in the determinants of the real exchange rate (Kempa, 2005). Consequently, there have been newer approaches namely fundamental models, pioneered by Edwards (1989, 1994) and revised by Montiel (1999). The fundamental approach posits that the real exchange rate at any point in time is transitory and follows a path along which an economy maintains internal and external balance.²

Edwards (1989, 1994) provides a framework which decomposes the fundamental determinants of the real exchange rate into monetary variables (nominal or temporary) and real variables (permanent and fundamental). He posits that in the short run both real and nominal variables affect the equilibrium real exchange rate, however in the long run only real fundamental variables affect the equilibrium real exchange rate. The Edwards model starts with portfolio decisions and divides the economy into four categories; the demand side, supply side, government sector and external sector. Portfolio of assets consists of the sum of domestic money and foreign money converted by the nominal market exchange rate. Thus the ratio of domestic money to foreign money is decreasing in the expected rate of depreciation of the nominal market exchange rate. The Edwards model assumes perfect foresight, which implies that the expected rate of depreciation equals the actual rate of depreciation. Supply is determined by prices of exportables relative to importables while demand is determined by the level of real assets and the relative price of importables. Government is assumed to finance its consumption mainly from nondistortionary taxes. The external sector is represented by the current account. The current account is identical to the balance of payments in the Edwards model because the model assumes that there is no capital mobility. Consistent with the path along which the economy achieves internal and external balance a steady state is attained when portfolio equilibrium holds, the nontradables market clears, the current account is in equilibrium and there is fiscal balance. The real exchange rate consistent with these conditions is the longrun equilibrium real exchange rate. Changes in any of these conditions would change the longrun equilibrium exchange rate. Consequently, Edwards (1989, 1994) categorises the fundamental determinants of the real exchange rate into external variables such as terms of trade, international transfers, world real interest rates, and domestic fiscal policy variables such as the composition of government expenditure, capital and exchange controls, import tariffs, import quotas and export taxes. Nonpolicy variables such as technological progress also has an effect on the longrun equilibrium exchange rate (see Edwards 1989, 1994, for full details of the framework) Edwards's model was further developed by Montiel (1999).

The Montiel (1999) model posits that the real exchange rate is an endogenous variable and is in equilibrium when it is simultaneously consistent with internal and external balance and conditioned on longrun fundamentals (sustainable values of exogenous and policy variables). Internal balance refers to the situation where the non-tradables³ goods market clears in the current period and is expected to be in equilibrium in the future (Montiel, 1999). Thus assuming initial internal balance

²Contrary to this, the PPP approach posits that nominal exchange rates adjust rapidly to any price differentials between an economy and its trading partners, thus the equilibrium real exchange rate for an economy remains constant over time. However empirical evidence has proven that absolute PPP cannot hold (Edwards, 1989; Elbadawi and Soto, 1997) hence the equilibrium real exchange rate of an economy cannot be constant over time.

³Non-tradable goods are goods produced and consumed domestically which are not close substitutes to import or export goods and services. Tradable goods are goods that are traded internationally (exports and imports) and obey the law of one price or an appropriate relative pricing (Goldstein and Officers, 1979).

equilibrium, an increase in private spending creates excess demand for nontradable goods at the initial exchange rate. An appreciation of the real exchange rate would then be required to restore equilibrium. Hence a downwardsloping IB curve in Figure 1, leading to an increase in supply of nontradable goods and an increase in demand for tradable goods (imports). The external balance on the other hand is defined as the current account balance that is consistent with longrun sustainable capital inflows (Montiel, 1999). This is given by domestic output of traded goods net of domestic consumption, plus net aid flows less cost of foreign debt. From an initial external balance equilibrium position, an increase in private spending generates a current account deficit at the initial exchange rate. A real depreciation would therefore be required in this case to restore equilibrium. Hence an upwardsloping EB curve in Figure 1. This leads to an increase in supply of tradable goods and an increase in demand for nontradable goods.

The E^* denotes the longrun equilibrium real exchange rate consistent with internal and external balance. The Montiel (1999) model posits that factors that cause changes in the position of the internal and external balance curves would also cause changes in the longrun equilibrium real exchange rate. These factors include fiscal policy, international transfers and terms of trade, BalassaSamuelson effects (total factor productivity), international financial conditions and commercial policy (see Montiel (1999, 2003) for full details of the model).

Thus on the basis of the Montiel (1999) framework, the fundamental determinants of the exchange rate to be used in this study are fiscal expenditure (government spending on tradable and nontradable goods), terms of trade, international transfers (remittances), current account openness, international financial conditions (interest rate differential) and quasi money as a percentage of GDP (M2), as a proxy for monetary policy positioning. Total factor productivity which captures BalassaSamuelson effects is not added due to lack of accurate data on capital stock for some of the SubSaharan African countries in the panel.

The direction of fiscal expenditure whether on tradables or nontradables impacts the real exchange rate. Taxfinanced expenditure on nontradables creates excess demand in that sector requiring an exchange rate appreciation to restore equilibrium. On the contrary if fiscal expenditure is more geared towards traded goods then the trade balance moves towards a deficit. An exchange rate depreciation would then be required to restore external balance (Edwards, 1994; Montiel, 1999). The terms of trade which is the relative price of exports to imports reflects the influence of external market dynamics on the tradables sector. Its effect on the real exchange rate depends on the relative strength of the income and substitution effects emanating from changes in the prices of imports and exports. An improvement in the terms of trade leads to real wage increases in the tradable sector and a reallocation of resources towards the tradable sector. If the income effect dominates the substitution effect then it would lead to an appreciation of the real exchange rate. On the contrary if the substitution effect dominates the income effect then a change in terms of trade will lead to real exchange rate depreciation (Montiel, 1999).

International transfers like remittances impact the real exchange rate of the recipient economy in two ways. First of all an increase in remittances - all things being equal - increases the recipient country's stock of foreign exchange reserves and consequently the supply of foreign exchange in the recipient economy. This appreciates both the nominal and real exchange rate assuming that prices respond slowly. Secondly, remittances increase the disposable income of households most of which is consumed. This raises the prices of nontradable goods requiring an exchange rate appreciation to restore internal balance (Montiel, 1999). This is however based on the assumption that households spend remittances mainly on nontraded goods. However if households spend remittances on traded goods then the demand for imports would generate demand for foreign exchange over time, which would result in a depreciation of the real exchange rate (Izquierdo and Montiel, 2006).

Changes in a country's commercial or trade policy also affect the real exchange rate. Assuming import demand is price elastic an import tariff or quota that reduces imports will create an increase in the price of imports which would result in an increase in demand for foreign currency. This depreciates the real exchange rate. On the other hand a subsidy to exports would result in a current

account surplus which requires an appreciation of the real exchange rate to restore external balance (Montiel, 1999). An increase in the interest rate differential between the home country and the rest of the world attracts foreign inflows which increases a country's foreign reserves and appreciates the real exchange rate (Montiel, 1999). A decrease in the interest rate differential would result in capital outflows thereby depreciating the real exchange rate.

Although most of the countries in the panel operate flexible exchange rate regimes exchange rate stability is core to the monetary policy outlook of Sub-Saharan African countries aimed at maintaining export competitiveness and a sustainable current account deficit. An expansionary monetary policy increases demand domestically especially for nontradable goods thereby requiring a real exchange rate appreciation to restore internal balance. A contractionary policy aimed at mopping up excess liquidity would have the opposite effect. In Armenia where a flexible exchange rate regime prevails, strong remittance inflows over the last decade resulted in a real appreciation of the exchange rate, but the current account deficit did not worsen. This is because the monetary authorities embarked on sterilisation measures to smooth exchange rate volatility (Oomes, 2008). Such monetary policy positioning mitigates the natural transmission mechanism of macroeconomic variables in the recipient economy

Conditionalities to capital inflows sometimes include a requirement to devalue or depreciate the nominal exchange rate of the recipient country. Changes to the nominal exchange rate also impact the real exchange rate should prices respond slowly. A devaluation of the nominal exchange rate depreciates the real exchange rate, while a nominal appreciation of the nominal exchange rate appreciates the real exchange rate. This prevents inflows of any kind from having their natural transmission mechanism in the recipient economy (Nwachukwu, 2008). The degree of reversibility of the particular inflow in question has also been found to impact on the extent to which the real exchange rate would appreciate. While some inflows are more reversible, or more associated with outflows, others are less reversible. The resultant impact on the real exchange rate would therefore vary. Remittance inflows in particular are less reversible than other foreign inflows (Bugamelli and Paterno, 2006). This gives merit to the analysis of specific foreign inflows in order to analyse more effectively their respective impact on key macroeconomic variables such as the exchange rate (Opoku-Afari et al., 2004).

The current levels of remittance inflows to developing countries, in excess of the traditional capital inflows qualify them as major international transfers from abroad. Remittance inflows have also been found to be relatively more stable than other forms of foreign inflows such as foreign direct investment, official development assistance and portfolio investments (Ratha, 2005). However empirical evidence shows that the impact of foreign inflows on the real exchange rate varies from region to region. In a study on foreign aid and the real exchange rate in twelve francophone West African countries Quattara & Strobl (2004) found that foreign aid flows do not generate Dutchdisease effects. Similar results were found by Ogun (1995) for Nigeria and Nyoni (1998) for Tanzania. On the contrary Elbadawi (1999) in a study of 62 developing countries and White and Wignaraja (1992) for Sri Lanka found that aid flows appreciated the real exchange rate of the recipient countries in their study. Conflicting results have also been found in a study of foreign aid and the real exchange rate in Ghana. While Sackey (2001) found no appreciating effect on the real exchange rate Opoku Afari et al. (2001) found the contrary and support for the Dutchdisease theory. Using annual data on six Central American countries from 1985 to 2004 Izquierdo and Montiel (2006) found the exchange rate to be relatively stable despite increased remittance inflows. In other cases such as the EuroMediterranean region, remittance inflows appreciated the exchange rate but did not result in the worsening of the current account balance although exports suffered to some extent (Oomes, 2008). These disparities in findings have been attributed to a number of reasons such as the role of other fundamental determinants of the exchange rate or a specific policy positioning which may cause a depreciation of the real exchange rate thereby mitigating the appreciating effect of foreign inflows such as remittances.

Most studies on the impact of foreign inflows on the real exchange rate in Sub-Saharan Africa

have focused mainly on aid, foreign direct investments and portfolio investments, and scarcely on remittances. Secondly, most of them have looked at specific countries in Sub-Saharan Africa like Tanzania (Nyoni, 1998), Nigeria (Ogun, 1995), Ghana (Sackey, 2001; Opoku-Afari et al. 2004) and rarely sub-regions within Sub-Saharan Africa such as francophone West Africa (Ouattara and Strobl, 2004) or Sub-Saharan Africa (Nwachukwu, 2008). This paper therefore fills this gap in the foreign inflows literature by looking at remittance inflows to Sub-Saharan Africa and its effect on the real exchange rate, using annual data on 34 Sub-Saharan African countries from 1980 to 2008 and dynamic panel estimation techniques, namely the feasible generalised least squares (FGLS) by Park (1967) and Kmenta (1971, 1986) and the two-step system GMM by Arellano and Bover (1995).

This paper again differs from most previous work by testing for cross-sectional dependence of the error term between the countries in the panel, using the Pesaran (2004) CD test⁴. This addresses one major critique of panel data estimations, namely the assumption of cross-sectional independence of the error term. The estimation techniques used in this paper, namely the Park and Kmenta FGLS (also corrects for group-wise heteroscedasticity), two-step system GMM with time demeaned and forward orthogonal deviations of Arellano and Bover (1995) are known to adequately correct for cross-sectional dependence of the error term in dynamic panel estimations.

3 Data and methodology

Table 1 below details the data used and how they are measured. Data on all variables for the Sub-Saharan African⁵ countries in the panel are obtained from the World Development Indicators of the World Bank, complemented with data from the International Monetary Fund.

A priori expectations are detailed in Table 2.

3.1 Pair-wise Granger causality tests

Granger causality tests are used to ascertain the direction and time trajectory of the relationship between the real exchange rate and its fundamental determinants as posited by the Montiel (1999) framework. Results of Granger causality tests are detailed in Table 3.

While the real exchange rate Granger-causes remittances contemporaneously, remittances Granger-cause the real exchange rate asynchronously with a two-period lag. This shows the direction and time trajectory of the causality between remittances and the real exchange rate. Similarly, while the real exchange rate Granger-causes fiscal expenditure contemporaneously, fiscal expenditure Granger-causes the real exchange rate asynchronously with a one-period lag (four quarters, since this is annual data). This confirms that the direction of fiscal expenditure does impact the real exchange rate as posited in the Montiel (1999) framework of the fundamental determinants of the real exchange rate. Monetary policy positioning Granger-causes the real exchange rate asynchronously with a two-period lag. This is consistent with macroeconomic theory that demand management measures normally impact economies with a lag (Mohr and Fourie, 2008). There is contemporaneous reverse causality between the real exchange rate and terms of trade, openness and the interest rate differential. Thus the fundamental determinants of the real exchange rate Granger-cause the real exchange rate, as posited by the Montiel (1999) model. This justifies their use as regressors in the empirical estimation in this paper.

⁴The properties of other tests such as the Frees (1995) test and Friedman (1937) test for cross-sectional dependence are suited for static panel data estimations and not dynamic panel estimations.

⁵Benin, Burundi, Botswana, Burkina Faso, Cameroun, Cape Verde, Comoros, Cote D'Ivoire, Ethiopia, Gabon, The Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Madagascar, Malawi, Mali, Mauritius, Mauritania, Mozambique, Niger, Nigeria, Rwanda, Senegal, Seychelles, Sierra Leone, Swaziland, South Africa, Tanzania, Togo, Uganda, Zambia.

3.2 Model specification and estimation technique

Cross-correlation analysis show that the real exchange rate exhibits strong persistence behaviour. This warrants the need to specify a dynamic panel data model which includes one or more lags of the dependent variable. We specify a twoway error component model based on the heterogeneity between the 34 countries in the panel expressed in (1) as:

$$y_{it} = \delta y_{i,t-1} + X_{it}\beta + \mu_i + \lambda_t + v_{it} \quad (1)$$

where y_{it} = $NT \times 1$ vector of dependent and endogenous variables. X_{it} represents an $NT \times k$ vector of lagged endogenous regressors other than the lag of the dependent variable, β denotes a $k \times m$ vector of slope coefficients, μ_i represent country-specific effects, λ_t time effects and v_{it} the idiosyncratic error term. Equation (1) is based on the assumption that there is no serial correlation present in the error term and the regressors are strictly exogenous $E(v_{it} | x_{i1}, \dots, x_{in}, \mu_i) = 0$. The Hausman test for endogeneity rejects the null of exogeneity, meaning the regressors and the fixedeffect error terms are correlated. All the regressors in this model are assumed to be endogenous. This is because they are all determined by additional factors that are not specifically captured in this model and are likely to be reflected in the error term. Additionally, by construction the lag of the dependent variable $y_{i,t-1}$ is correlated with the fixed-effects μ_i error term. The Lagrange Multiplier test for firstorder serial correlation given fixed effects rejects the null of no firstorder serial correlation. This violates an assumption necessary for consistency of OLS estimators resulting in biased and inconsistent estimators (Nickell, 1981). The modified Wald test rejects the null of groupwise homoscedasticity implying a non-constant variance across crosssections. However it is known to have very low power in the context of fixed effects when $N > T$ (Greene, 2003). It is therefore not reported but controlled for in this paper. Table 4 details the results of initial diagnostic tests performed on pooled OLS and fixedeffects models.

Tests for cross-sectional dependence of the error terms using the Pesaran (2004) CD test rejects the null of cross-sectional independence, however with a low average cross-sectional correlation coefficient of 0.36. Table 5 details the results of the tests for cross-sectional dependence.

To determine the order of integration of the variables we take preference to unit root tests that assume individual unit root processes and accommodate crosssectional dependence to some extent due to the validity of individual effects and crosssectional dependence of the error terms. These are the Im, Pesaran and Shin Test (2003), ADF Fisher Chisquare test and PPFisher Chisquare (1932) tests (Madala and Wu, 1999; Baltagi, 2008). All the variables are stationary except M2 which is I(1). The results of unit root tests can be found in Table 6.

These initial diagnostic results warrant the use of an estimation technique that preserves homoscedasticity, prevents serial correlation, corrects for cross-sectional dependence and also preserves the orthogonality between transformed variables and lagged regressors (Arellano and Bover, 1995). Two estimation techniques fully meet these criteria, namely the feasible generalised least squares (FGLS) by Park (1967) and Kmenta (1971, 1986) and the two-step system GMM by Arellano and Bover (1995).

The Parks and Kmenta FGLS estimation technique is perfectly suited to data with individual effects, groupwise heteroscedasticity, serial correlation, crosssectional dependence and endogeneity (Kmenta, 1986; Hicks, 1994) as depicted by the initial diagnostics of the dataset in this study. The FGLS estimation technique is suitable whether the individual effects are fixed over time and crosssections or are normally distributed random variables. It is however criticised as producing upwardbiased standard errors. Hence the panelcorrected standard error (PCSE) technique of Becks and Katz (1995) is sometimes used as an alternative. The Becks et al. (1995) PSCE technique produces OLS estimates with standard errors that correct the upwardbiased standard errors of the FGLS estimation. However the PCSE estimation technique is best suited to small and finite samples (Greene, 2003). OLS estimates are also known to be biased and inconsistent in dynamic models with one or more lags of the dependent variable as a regressor due to serial correlation (Nickel

1981). Hence the FGLS is still superior to the PCSE estimation technique in dynamic models characterised by individual effects, serial correlation, endogeneity of the regressors and groupwise or other heteroscedasticity. The FGLS estimation is however known to lose some efficiency when the regressors are endogenous and the error process has a large number of parameters (Kmenta, 1986). Hence for robustness we also employ the twostep system GMM estimation technique of Arellano and Bover (1995)

In the two-step system GMM the endogeneity problem is addressed by time demeaning the data to remove time effects. This is also known to correct moderate levels of cross-sectional dependence as in this study (De Hoyos and Sarafidis, 2006; Coakley et al., 2008). The cross-sectional specific effects are then eliminated using forward orthogonal deviations, thereby making it possible to use one period lags of the regressors as valid instruments since they are not correlated with the transformed error term (Love and Zichinno, 2006). Time demeaning and Helmert transforming the data preserves homoscedasticity, prevents serial correlation, controls for cross-sectional dependence and also preserves the orthogonality between transformed variables and lagged regressors (Arellano and Bover, 1995). Another advantage of this approach is that it is more resilient to missing data. It is computable for all observations except the last for each cross-section, thereby minimising data loss (Roodman, 2006).

4 Empirical results

Similar results are obtained for the FGLS and the twostep system GMM estimations. Table 7 details the empirical results.

As expected the real exchange rate shows strong persistence behaviour significant at the 1% level. The coefficient of remittance inflows is negatively signed and statistically significant at the 1% level. This means that remittances on average have an appreciating effect on the real exchange rate of recipient SubSaharan African countries in the panel. Taxfinanced fiscal expenditure is positively signed and statistically significant at the 1% level. This denotes that government expenditure is more geared towards traded goods, with the economy requiring an exchange rate depreciation to restore external balance. The coefficient of terms of trade is negatively signed and statistically significant at the 1% level, indicating an appreciating effect on the real exchange rate. This denotes that the income effect dominates the substitution effect of an improvement in the terms of trade, requiring an appreciation of the real exchange rate to restore external balance. Current account openness is also negatively signed and statistically significant at the 1% level. This indicates an exportdominated foreign sector on average hence an appreciating effect on the real exchange rate. Contrary to *a priori* expectations the interest rate differential is positively signed and statistically significant at the 1% level which denotes a depreciating effect on the real exchange rate. This is consistent with the finding of Nwachukwu (2008) that foreign inflows sometimes include the conditionality to devalue or artificially depreciate the nominal exchange rate mitigating its appreciating effect on the real exchange rate of the recipient economy. Monetary policy positioning is positively signed and statistically significant at the 1% level. This denotes that monetary policy is positioned to keep the real exchange rate depreciated. This gives an indication of the mitigating effect of monetary policy positioning on the appreciation of the real exchange. This positioning is usually policy determined as countries strive to achieve regional macroeconomic convergence criteria or maintain a real exchange rate that ensures export competitiveness and a sustainable current account deficit. The twostep system GMM estimation meets all postestimation diagnostic requirements. The Arellano and Bond (1991) test for secondorder serial correlation fails to reject the null of no autocorrelation. The Hansen (1982) test for overidentification fails to reject the null that the overidentification restrictions are valid while the Difference in Hansen test also fails to reject the null that the instrument subset is strictly exogenous.

5 Conclusion, policy recommendations and future research

Empirical results show that when crosssectional dependence and individual effects are controlled for remittance inflows on average appreciate the underlying exchange rate of the recipient economy. This is consistent with the Dutchdisease theory of Corden and Neary (1982). However this appreciating effect of remittance inflows on the real exchange rate is mitigated by monetary policy positioning and overdependence on imports. Monetary policy is positioned to keep the real exchange rate depreciated despite known steady increases in the rate of inflation in countries in the panel. This prevents remittance inflows from exerting their natural transmission mechanism on the real exchange rate. It then implies that the nominal exchange rate is either being held or managed in most of the countries in the panel. This aligns with the findings of Oomes (2008) on Armenia, and Nwachukwu (2008) on Sub-Saharan Africa which cite policy interventions as the mitigating factor on the appreciating effect of foreign aid on the real exchange rate.

However, the addition from this paper is that in the case of remittances other fundamental determinants of the exchange rate, specifically the direction of fiscal expenditure and overdependence on imports, are additional factors that mitigate the appreciating effect of remittances on the real exchange rate. Overdependence on imports and the depreciating effect on the real exchange rate is indicated by the positive and statistically significant coefficient of openness and terms of trade for most of the countries in the panel. This raises the likelihood that taxfinanced fiscal expenditure is more geared towards tradables than nontradables hence its depreciating effect on the real exchange rate. It also implies that remittances are probably spent more on tradable goods than on nontradable goods or probably sent in kind further worsening the current account deficit. The worsening of the current account deficit is therefore more driven by overdependence on imports than the loss of export competitiveness resulting from of an appreciation of the real exchange rate due to remittance inflows.

Furthermore, the greater probability of remittances being spent on tradables and fiscal expenditure geared towards tradables, rather than nontradables generates increased demand for imports which over time could result in a depreciation of the real exchange rate due to demand for foreign exchange. This could stimulate export revenue over time which has an appreciating effect on the real exchange rate. Additionally, increased demand for imports would have a feedback effect on domestic inflation, which would also have an appreciating effect on the real exchange rate. The extent to which this latter appreciation caused by increased export revenue and domestic inflation mitigates the initial depreciation of the domestic currency, would determine the total effect of remittance inflows on imports and exports and therefore the direction of the trade balance in the long run (Singer, 2008). If the latter appreciation effect alleviates the initial shortrun depreciation effect, then there would be a net deterioration of the trade deficit in the long run due to loss of export competitiveness. On the contrary, if the latter appreciation effect does not mitigate the initial depreciation effect, then the current account deficit would not worsen from the perspective of a loss of export competitiveness.

In terms of policy relevance the findings of this study highlight the fact that although monetary policy positioning in most of the SubSaharan African countries in the panel is focused on preventing the loss of export competitiveness and its adverse effect on the current account deficit as a result of foreign inflows (in this case remittances), the Dutchdisease effect of remittance inflows could equally be caused by overdependence on imports in the long run. In light of this, Sub-Saharan African countries are confronted with a difficult decision with respect to which real exchange rate is optimal to attract diaspora remittances for development finance, maintain export competitiveness and at the same time a sustainable current account deficit.

Since most Sub-Saharan African countries are price takers, export revenue is subject to international price fluctuations and other factors beyond the control of developing countries. Thus if the net benefit of attracting remittances for development finance exceeds the adverse impact of a loss of export competitiveness then policy makers would have to refrain from the depreciationbiased monetary policy positioning in order to attract remittance inflows for development. On the contrary

if the impact of a loss of export competitiveness exceeds the benefits of attracting remittances for development finance then financing development through remittances would not be optimal. Except in addition to other financing needs of the country, it is also channeled into financing technological improvements in the production of tradables that would improve a country's comparative advantage on international markets thereby mitigating the associated loss of export competitiveness due to remittance inflows.

The findings of this study further reveal that the depreciation-biased monetary policy positioning could be the reason why Sub-Saharan African countries have hitherto failed to harness remittance inflows as an alternative source of finance for development. This is because profit-seeking migrants would prefer a strong exchange rate to avoid loss of value since returns on investments are assumed to be in home country currency units (Katseli and Glystos, 1986; Higgins et al., 2004).

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Table 1: Sources and definition of variables

	Variable	Source	Definition
RER	Real exchange rate	IMF, World Bank	The real exchange rate is measured as the product of the nominal exchange rate to the US dollar and the ratio of the wholesale price index of the US to domestic prices (GDP deflator in 2005 = 100) for each country.
REM	Remittances as a percentage of GDP (International transfers)	World Bank	Worker's remittances and compensation of employees as a percentage of GDP in current prices (US\$ Millions).
FP	Fiscal Policy	World Bank	Government final consumption as a percentage of GDP in SSA countries (a proxy for the composition of government expenditure).
OPEN	Current account openness	Penn World Table PWT 7.0	The ratio of the sum of exports and imports of goods and services to GDP in SSA countries.
Idif	International financial conditions	IMF, World Bank	Interest rate differential between SSA countries and the US.
M2	Monetary Policy effects	IMF, World Bank	Quasi money as a percentage of GDP. (A proxy for short-term monetary policy positioning)
TOT	Terms of Trade	World Bank	Ratio of exports prices to import prices of the SSA countries.

Table 2: A priori expectations

Variable	Sign	Inference
REM	Positive/ negative	Remittances improve the foreign reserve position of recipient countries which should appreciate (negative relationship) the domestic currency. If remittances are spent on tradables then it would have a depreciating effect (positive relationship) with the real exchange rate
FP	Positive/ negative	If fiscal expenditure is on traded goods then it would have a (positive relationship) depreciating effect on the real exchange. If it is geared towards non-traded goods then it would have a (negative) appreciating effect on the real exchange rate.
TOT	Positive/ negative	An export dominant terms of trade would appreciate the real exchange rate (negative relationship) whiles an import dominant terms of trade would depreciate the real exchange rate (positive relationship)
OPEN	Positive/ negative	An export dominant foreign sector would appreciate the real exchange rate (negative relationship), an import dominant foreign sector would depreciate the real exchange rate (positive relationship).
Idif	Negative	A positive interest rate differential should attract foreign inflows that should appreciate (negative relationship) the real exchange rate.
M2	Negative/ positive	Monetary positioning aimed at depreciating the real exchange rate would have a positive relationship with the real exchange rate and a negative relationship if it is aimed at appreciating the real exchange rate.

Table 3: Pair-wise Granger-causality tests

Null Hypothesis:	Obs.	F-Statistic	Prob.
RER does not Granger Cause REM REM does not Granger Cause RER	578	2.31206 0.02538	0.0070 1.0000
RER does not Granger Cause REM(-2) REM(-2) does not Granger Cause RER	850	0.01885 2.81689	0.9813 0.0604
RER does not Granger Cause FP FP does not Granger Cause RER	578	2.02152 1.18127	0.0206 0.2929
RER does not Granger Cause FP(-1) FP(-1) does not Granger Cause RER	884	4.84933 7.41764	0.0080 0.0006
RER does not Granger Cause IDIF IDIF does not Granger Cause RER	578	8.66556 5.04677	3.E-15 5.E-08
RER does not Granger Cause IDIF IDIF(-1) does not Granger Cause RER	884	1.83514 8.69393	0.1602 0.0002
RER does not Granger Cause M2(-2) M2(-2) does not Granger Cause RER	850	0.04871 2.83391	0.9525 0.0593
RER does not Granger Cause OPEN OPEN does not Granger Cause RER	578	6.36950 0.82750	1.E-10 0.6221
RER does not Granger Cause TOT TOT does not Granger Cause RER	578	1.44578 2.93351	0.0109 0.0006

Table 4: Initial diagnostic tests

Test	Test statistic	Critical value	Inference
Serial correlation (two-way model)			
Durbin Watson test for first order serial correlation, given fixed effects. $H_0: \rho = 0; H_A: \rho > 0$	$d_p = 1.60$	$d_p < 1.9639$	Positive first-order serial correlation, given fixed effects.
Hausman specification test			
$H_0: E(\mu_{it}/X_{it}) = 0$ $H_0: E(\mu_{it}/X_{it}) \neq 0$	$m_3 = 13.60$ Prob $X^2 = 0.03$	$X^2_{(6)} = 12.59$	Regressors are endogenous.
Pesaran CD (2004) test for cross-sectional dependence			
$H_0: \text{corr}(\mu_{i,t}, \mu_{j,t}) = 0 \text{ for } i \neq j$ $H_A: \text{corr}(\mu_{i,t}, \mu_{j,t}) \neq 0 \text{ for some } i \neq j$	LM = 8.98 (0.36)	Prob = 0.00	Cross-sections are inter-dependent

Table 5: Tests for cross-sectional dependence¹

Test	Test statistic	Prob. value	Distribution	Inference
Frees (1995, 2004) test	3.78	$\alpha = 0.10 : 0.09$ $\alpha = 0.05 : 0.12$ $\alpha = 0.01 : 0.17$	Frees' Q distribution	Cross-sections are inter-dependent
Friedman (1937) test	96.76	Prob = 0.00	$X^2_{(T-1)}$	Cross-sections are inter-dependent

Note: For all tests: $H_0: corr(\mu_{i,t}, \mu_{j,t}) = 0$ for $i \neq j$; $H_A: corr(\mu_{i,t}, \mu_{j,t}) \neq 0$ for some $i \neq j$

Table 6: Order of integration of the variables

Variable	I(d) Levels	I(d) Difference	Obs.
RER	I(0)		986
REM	I(0)		986
FP	I(0)		986
TOT	I(0)		986
OPEN	I(0)		986
ldif	I(0)		986
M2	I(1)	I(0)	986

¹ It is recognised in this study that the properties of the Frees (1995) and Friedman (1937) tests for cross-sectional dependence are suited for static panel data estimations and not dynamic panel estimations. Only the Pesaran (2004) test under FE/RE is suited for dynamic panel estimations (De Hoyos and Sarafidis, 2006).

Table 7: Full sample empirical results: OLS, FGLS and Two– step system GMM
Dependent variable RER²

Variable	OLS	FGLS	Two-step system GMM
RER(-1)	0.90***	0.79***	0.79***
REM	0.28**	-3.05***	-3.20***
FP	-1.84***	10.43***	10.72***
TOT	-0.08**	-0.72***	-0.99***
OPEN	-0.11**	-0.64***	-0.93***
Idif	0.08	0.81***	0.71***
M2	-0.52***	1.21***	2.88***
Adjusted R ²	0.98		
ABond test for second-order serial correlation			Prob > z = 0.29
Hansen test for overidentification			Prob > = 1.00
Diff. in Hansen test for exogeneity of instrument set			Prob > = 1.00

Note: (*), (**), (***) denotes 10%, 5% and 1% levels of significance respectively.

² The FGLS estimation specified that the errors of the panels are correlated. The two-step system GMM estimation involves forward orthogonal deviations instead of differencing (Arellano and Bover, 1995).

Figure 1: The equilibrium real exchange rate (Montiel, 1999).

