Migrant Workers' Remittance and Real Exchange Rates Dynamics in Kenya: Are there Asymmetries?

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Abstract: *Is the inflow of migrant workers' remittance to Kenyan economy a blessing or a curse? This question is what motivated the study considering the status of Kenya in Africa as one of the top recipients of migrant workers' remittances from various developed and developing countries. The outcome revealed that variables were co-integrated as evidently shown by Engle-Granger technique. The asymmetric co-integration test however shows that the result based on Threshold Autoregressive (TAR) and Momentum Threshold Autoregressive (MTAR) signifies that variables are not co-integrated. The finding suggest that inflow of remittances trigger real exchange rates in Kenya, this reconfirmed the Dutch disease phenomenon as mainly found in majority of the developing countries considering the nature of the economies as well as level of financial development. Effective policy framework in terms of remittances utilization is important in order to offset the negative consequences caused by the financial inflows.*

Keywords*: Remittances, Exchange rates, co-integration, Threshold Autoregressive (TAR), Momentum Threshold Autoregressive (M-TAR), Kenya.*

1. Introduction

Financial inflows sent by migrant workers to their home countries are important growth elements in the receiving economies, and their volume is rapidly growing year by year which is greater than both official development aid and foreign direct investment (FDI) in 2011 (World Bank, 2011). For instance in 2007 the volume of remittances received in Sub-Saharan Africa is equal to the official development aid received in the region. Workers' remittances presently contributed to 17 percent of GDP and 77 percent of exports in El Salvador, and more than 20 percent of GDP and almost 50 percent of exports in Honduras. In both countries remittance flows are higher than FDI flows by five times (Barajas, et al. 2010). The value of migrants' remittances in 2010 is more than US $440 billion and out of the amount US $325 billion was sent to developing countries which contributed more than 10 percent of their GDP on average. Financial inflows sent by the migrant workers to their home countries is a source of capital inflow analogous to that examined by the Dutch Disease theory in which the incoming of additional financial resources which is similar to capital flow is evaluated alongside their impact on the real exchange rate and the economy's international competitiveness (Corden & Neary, 1982). Kenya is among the top ten recipients of remittances in Africa both in terms of volume and contribution to GDP. The financial inflows coming into the Kenyan economy may sometimes create negative consequences if there is no standard policies to utilize the funds efficiently as the funds may lead to exchange rates appreciation in the country. For example in 2009 remittance contributed 5.4 percent of the country's GDP and it received $1.8 billion in 2010 as the third recipients in the continent (Remittance and Migration fact book, 2011). The objective of this paper is to test the effects of remittances on real exchange rates in Kenya because considering the huge inflows into the country; no study has examined such relationship with real exchange rates. The hypothesis of this research is presented below which shows that null is against alternate hypothesis as presented below;

H_{o1}*: Inflow of remittances leads to exchange rates appreciation in Kenyan Economy*

H_{o2}*: Inflow of remittances does not lead to exchange rates appreciation in Kenyan Economy*

2. Literature Review

2.1 Theoretical framework

From theoretical perspectives, the relationship between remittances and real exchange rates can be

viewed in terms of a small open economy which comprises two sectors of tradable and non-tradable commodities. Inflow of remittances will enhance spending in both the two sectors, the prices of tradable sector will remain constant as it is set externally, however when there is more demand the prices of non-tradable will rise. The production of non-tradable will become more profitable and hence lead to an increase in factor demands and diverting of resources from tradable to non-tradable commodities sector. Real wages and other factor costs in the tradable commodities sector will shoot up. Meanwhile, the real exchange rate is determined by the ratio of sector prices for tradable to non-tradable commodities, continuous inflow of remittances will reduce the competitiveness of the tradable sector which will influence the real exchange rate positively. Migrant workers send money to their family left behind in the home countries mainly due to two main reasons as theoretically propounded by Lucas and Stark in 1985; the reasons are altruism and self-interest. While the former relate to the intention of migrant workers to send money so as to maintain the living condition of their family members at home the latter is intended to invest the funds into the local economy. Remittances that were sent for altruistic motives tend to be counter-cyclical in relation to output in the receiving economy because during economic recession more money will be sent so as to cope with the declining family income (Agarwal & Horowitz, 2002). When the motive is however self-interest the inflows will be pro-cyclical during economic recession because the volume of remittances will decline as investment is not profitable during an economic downturn (Giuliano & Ruiz-Arranz 2009).

2.2 Empirical literature

Various empirical studies were conducted about the impact of remittances on exchange rates; Bourdet and Falck (2003) assess the impact of remittances on equilibrium real exchange rates in Cape Verde for the period of 1980 to 2000. Their finding reveals that when the level of remittances improves it leads to the appreciation of equilibrium real exchange rates; this confirms the conventional beliefs of the term "Dutch Diseases "which refers to appreciation of currency when new inflows are received in the economy. Hassan and Holmes (2013) conducted a study on the nexus between remittances and real exchange rates for high remittance receiving developing countries applied panel co-integration approach and used innovative technique. Their finding shows that there exists Dutch Disease, meaning remittances lead to real exchange rates to appreciate in the economies under study and the short-run relationship indicated that remittances caused real exchange rates.

While some studies confirm Dutch-Disease phenomenon between remittances and real exchange rates, others deviate from it as the findings show the relationship is negative. For example a study conducted by Izquierdo and Montiel (2006) for the period 1960 to 2004 across six Central American nations found conflicting results, for Honduras, Jamaica, and Nicaragua. The result shows that there was no significant effect of workers' remittances on the equilibrium real exchange rate, while remittances have significant effects on the real exchange rates in the Dominican Republic, El Salvador, and Guatemala, though even within the three countries that remittances affect real exchange rate the effects is more robust on El Salvador and Guatemala than Dominican Republic. Figure 1 below shows the relationship between migrant workers' remittance and real exchange rates in Kenya which indicated that an increase in remittances could lead to exchange rates appreciation.

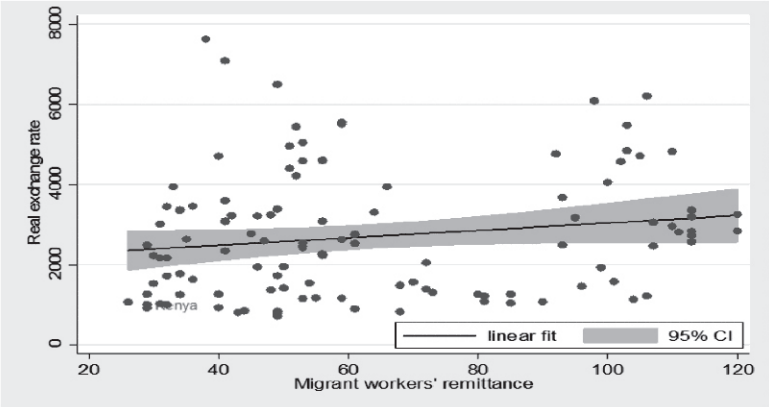

Figure 1: *Migrant Workers' Remittance and Real Exchange Rates for Kenya (2005-2014)*
Source: *Author's calculation based on data from Kenya Central Bank and DataStream International.*

[1]Also similar findings are obtained from the studies of Hyder and Mahboob (2005) and Saadi-Sedik and Petri (2006).

3. Methodology

3.1 Econometric model specification

The model is specified by $LRER_t = a_0 + a_1\ LMWR_t + \mu_t$ .....(1)
LMRW is the log of migrant workers' remittance and LRER is the log of real exchange rates, a_0 is the intercept and a_1 is the slope of the coefficient that explains the link between the remittances and real exchange rates, and μ_t is the error term that may be serially correlated (Enders and Siklos, 2001).Since we are dealing with time series data the variables need to be stationary which will give us chance to proceed, if the variables are stationary as indicated by either Augmented Dickey–Fuller (ADF) or Phillips–Perron (PP) unit root tests. The next is to test for co -integration by testing the residual as initiated by Engle and Granger (1987) method, as well as the Johansen (1988) and Johensen and Juselius (1990) Vector Auto Regressive (VAR) test.

3.2 Data, Measurements and Sources

Several data sources were used for this study for the period of January 2005 to May 2014. Data on both Kenya Consumer Price Index (CPI) and nominal exchange rates were obtained from Kenya Central Bank (KCB), and United States (US) CPI sourced from Data Stream International, while the data for workers'

remittances was obtained from the World Bank. Real exchange rate was obtained by comparing Kenya's Shillings with US$ Dollar over the study time period multiplied by the US consumer price index (CPI) and divided by the Kenya's CPI.

4. Results and Discussions

4.1 Results of the ADF and PP Unit Root Tests

Based on the Table 4.1 results of both ADF and PP unit root tests null hypothesis cannot be rejected at level, but when we take first difference null hypothesis was rejected at 5% which shows variables are non-stationary al level but stationary at first difference, all variables are therefore integrated at I(1).

Table 4.1: Results of the ADF and PP Unit Root Tests for Remittances and Real Exchange Rates

Variables	ADF	PP
$\mathbf{LMWR_t}$	2.575	3.11
	(0.99)	(0.99)
$\mathbf{\Delta LMWR_t}$	-8.91	-25.37
	(0.00)***	(0.00)***
$\mathbf{LRER_t}$	0.00	0.22
	(0.68)	(0.75)
$\mathbf{\Delta LRER_t}$	-6.23	-6.02
	(0.00)***	(0.00)***

*NB: The ADF and PP test equations include both constant and trend terms. The Schwarz information criterion (SIC) is used to select the optimal lag order in the ADF test equation. The values in brackets are corresponding p-values. ***denote significance level at 1%, **5%, and *10% respectively.*

According to Engle-Granger (1987) the residual must be moving together at level which is shown below;

$\Delta\mu_t = \rho\mu_{t-1}\ \sum_{i=1}^{q} \delta_1 \Delta X_{t-1} + v_t$ ..... (2)

The long-run estimated equation is presented below;

$LRER_t = 2.961 + 0.141 LREM_t + \mu_t$

(0.00)*** (0.03) **

$R^2 = 0.038$, D.W = 0.08.....(3)

[1] Data for CPI and nominal exchange rates was obtained from Central Bank of Kenya check https://www.centralbank.go.ke/

The values in brackets are P-values, to obtain Engle-Granger values however we regress the residual using ADF at level without trend or intercept, the residual after estimation is as follows;

$$\Delta\mu_t = -0.992\mu_{t-1}$$

(-10.395)

$$R^2 = 0.49, D.W. = 1.99 \quad \text{.....(4)}$$

Based on the t-statistics (-10.39) we reject null hypothesis at 5%, this signifies the co-integrating relationship between remittances and real exchange rate in Kenya. Since the result shows that variables have long-run relationship we move further to test whether the speed of adjustment is linear or otherwise using either threshold autoregressive (TAR) or momentum threshold autoregressive (M-TAR) as initiated by Enders and Siklos (2001). The residual of equation (1) will be estimated to determine the long-run equilibrium of the equation between the two series, and to estimate equation (2) based on ρ and λ. The non-linear relationship between the variables will be tested when we modify equation (2);

$$\Delta\mu_t = I_t\rho_1\mu_{t-1} + (1 - I_t)\rho_2\mu_{t-1} + \sum_{i=1}^{p-1} \gamma_i\Delta\mu_{t-1} + \varepsilon_t \quad \text{..... (5)}$$

Dummy variable known as Heaviside indicator function is used in order to determine above and below threshold (?), in which:

$$T_t = \begin{cases} 1 \; if \; \mu_{t-1} \geq \tau \\ 0 \; if \; \mu_{t-1} < \tau \end{cases} \quad \text{.....(6a)}$$

$$M_t = \begin{cases} 1 \; if \; \Delta\mu_{t-1} \geq \tau \\ 0 \; if \; \Delta\mu_{t-1} < \tau \end{cases} \quad \text{.....(6b)}$$

The equation (5) above when combined with 6a refers to Threshold Auto Regressive (TAR) model, and equation (5) and 6b is Momentum Threshold Auto Regressive (M -TAR) model. These models suggested that when μ_{t-1} is above the threshold the coefficient for the adjustment is $\rho 1\mu_{t-1}$, while if the μ_{t-1} is below the threshold the adjustment coefficient is $\rho 2\mu_{t-1}$ Null hypothesis of no co-integration will be tested so as to find out if the adjustment speed is symmetric or as ymmetric, if null is rejected then we use F-equality values to determine asymmetric adjustment of the variables when deviated from the equilibrium.

Table 4.2: TAR and M-TAR Co-integration Estimates for Remittances and Real Exchange Rates

	TAR	TAR Consistent	M-TAR	M-TAR Consistent
$\rho_1{}^a$	0.019	0.011	-0.004	0.118
	(0.03)	(0.03)	(0.04)	(0.08)
$\rho_2{}^a$	-0.076	-0.097	-0.044	-0.040
	(0.04)	(0.05)	(0.04)	(0.03)
Φ	1.70	1.93	0.554	1.858
	[5.68]	-	[6.00]	[8.13]
$\rho_1 = \rho_2$	2.75	3.22	0.473	3.063
	[3.25]	-	[3.61]	[8.42]
τ	0	-0.44	0	0.12

N.B: t-statistics and critical values are given in round and squared brackets respectively. Monte Carlo simulation is used to obtain critical value at 5% significance level.

[1]Follow the link below for Data on Remittances of various economies:
http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTDECPROSPECTS/0,,contentMDK:22759429~pagePK:64165401~piPK:64165026~theSitePK:476883,00.html

From Table 4.2, the threshold adjustment for upper and lower bound for TAR and MTAR consistent is not similar, some show evidence of persistence as indicated by the negative signs and significance of the p-values, the TAR consistent result for upper threshold is significant but positive, this might be connected with the nature of most financial variables, for lower threshold is negative and significant. For the case of MTAR, the upper threshold is positive and insignificant whereas the lower threshold is both negative and significant at 5%. We cannot reject null for both TAR and MTAR models because both F-joint and F-equality are insignificant. Since the speed of adjustment is symmetric we tested symmetric error correction modeling as reported below.

4.2 Error Correction Model and Granger Causality Test

Since we failed to reject null hypothesis of asymmetric adjustment between remittance and real exchange rate we will now proceed to estimate vector error correction model (VECM), following Engle-Granger (1987) to find out both short-run and long-run dynamics between migrant workers' remittance and real exchange rates for the period under review in the following form below;

$$\Delta LRER_t = \delta_0 + \sum_{i=1}^{\rho} \lambda_{1i} \Delta LRER_{t-i} + \sum_{i=1}^{\rho} \beta_{1i} \Delta LMWR_{t-i} + \eta_1 ECM1_{t-1} + \mu_{1t} \quad (7)$$

$$\Delta LMWR_t = \delta_1 + \sum_{i=1}^{\rho} \lambda_{2i} \Delta LMWR_{t-i} + \sum_{i=1}^{\rho} \beta_{2i} \Delta LRER_{t-i} + \eta_2 ECM2_{t-1} + \mu_{2t} \quad (8)$$

The term ECT_{t-1} signifies linear error correction terms as all variables are previously specified. The Granger causality test shows no any causality between migrant workers' remittances and real exchange rates. This means neither remittance nor real exchange rate caused each other though this is a short run phenomenon.

4.3 Symmetric Error Correction Model Result

$$\Delta LRER_t = 0.018 + 0.369\,\Delta LRER_{t-1} - 0.06\,\Delta LREM_t - 0.002\,ECT_{t-1} + \mu_t$$

(0.06) (0.09) (0.06) (0.00)

The error correction term in table 3 above is negative and significant at 1% which reconfirmed the element of long-run relation as the variables converge to equilibrium when deviated. This means if variable deviated from the equilibrium by 1%, it takes 0.2% to converge to steady state. The symmetric error correction term shows that 1% increase in remittance could lead to 0.06% rises of real exchange rates in Kenya which reconfirmed Dutch disease problem in the country.

4.4 Major Findings

The main finding of this research is that financial inflows of migrant workers' remittances are not a blessing rather a curse to the Kenyan economy, this is based on the result found in this article as 1% increase in remittances leads to 0.14% appreciation of exchange rates. Moving to TAR and MTAR asymmetric co-integration techniques, the main finding reveals that variables were symmetrically co-integrated, this made us to test symmetric error correction and the result reconfirmed our earlier finding of the existence of Dutch Disease due to migrant workers inflows into the Kenyan economy.

5. Conclusion and Recommendations

5.1 Conclusion

The present article investigated the dynamic impact of migrant workers' remittances on exchange rate in Kenya for the period between January 2005 to May 2014 based on Enders and Siklos (2001) asymmetric co-integration technique. The Engle-Granger two-step shows that variables were co-integrated. Moving to Enders and Siklos (2001) asymmetric co-integration, the finding shows that variables are not related in the long-run and the adjustment speed is symmetry.

5.2 Recommendations

Effective policy framework is needed in order to efficiently utilize migrant workers' remittance; this is because proper utilization of the funds will offset any negative consequences and curtail the effect of Dutch Disease damages in the economy. The policy makers should also try and make the real economic sector more competitive and productive so that the incoming inflows will be invested and influence the overall economic performance. Lastly, the recipients need to be sensitized and made them to understand the benefits of saving the funds in the formal financial institutions, this will increase the liquidity of the banking sector and loanable funds will be available for investment and this will ultimately increase the level of financial inclusion.

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