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## Article

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# Remittances and Real Exchange Rate: Latest Evidence from Cochrane Orcutt Econometric Model

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## Abstract

We examine the impact of remittances on the real exchange rate in South-Africa using Cochrane-Orcutt Ordinary Least Square. The study finds out that remittances do not show any relationship with Rand in the foreign exchange market but certain factors like income, gross fixed capital formation and trade are significant to explain the dynamics in foreign exchange rate of South-African currency. The study suggests domestication of the excessive desire for western products, and provision of necessary incentives for local substitute companies to curb negative impact of trade on the foreign exchange rate. The study is constrained in so many ways, but one important area future research will like to investigate is how underground remittances operates to influence the dynamics in the real exchange rate.

## Key words

Migrants, exchange rate, capital flow, Cochrane-Orcutt, South Africa

**JEL Codes:** J15, F3, F29

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## 1. Introduction

The impact of capital flight resulting from number of arrangements made by migrants sending money to their home country and its desirable consequence on real exchange rate volatility have attracted attention and generated keen debate among policy makers and economists lately. Recent evidence has shown that cross-border migration spurs some important economic implications in the current global economy. This is visibly seen in the ways migrant workers repatriate some of their earned income to their family members either to compensate for the unavoidably neglected responsibilities, finance productive projects or buy real or financial assets at the home countries (Amuedo-Dorantes and Pozo, 2004; Musumba *et al.*, 2015; Taştan, 2013).

Most studies on the attempt to investigate the macroeconomic consequences of remittance often document mixed evidence (Biyase, 2012). While some studies claimed that exchange rate fluctuation should be widely blamed on the high level of remittances in the recipient countries (Abdih *et al.*, 2014; Acosta *et al.*, 1996; Barajas, Chami *et al.*, 2014; Hassan and Shakur, 2017; Mandelman, 2013), relatively few studies reported otherwise (Bashar *et al.*, 2013). Recently, Abdih *et al.* (2014) show that public finances of remittance-recipient countries are affected by external shocks working through private demand and ultimately affecting tax revenue. This effect has been described as quite significant thereby calling attention. Similarly, Mandelman (2013) shows that the welfare implication of remittance can lead to random cyclical fluctuation, which can impact negatively on the real exchange rate and in turn affect the real economy. Inversely, Barajas *et al.* (2014) find no relationship between remittance and growth. Contrariwise, Bashar *et al.* (2013) argue that remittance has emerged as a key driver of economic growth and poverty reduction in Bangladesh. In other words, mixed results are documented in literature regarding the macroeconomic consequences of remittance.

According to some studies, remittances have shown to be very helpful to third world continents that experience economic down-turns in the past as they contribute in boosting their socio-economic well-being and copying mechanism during the down-turns (Alonso González and Sovilla, 2014; Azizi, 2018; Bashar *et al.*, 2013). Migrant workers are never fully cut off from their non-migrant family members experiencing financial difficulties back at the home country. With remittances from their migrant family members, they are to absorb the short-run negative income shock that incessantly hunt developing nations (Batu, 2017; Faini, 1994). In a sharp contrast to this altruistic gesture, investment purposes (self-interest motive) sometimes serve as rational reason for remittances if migrants consider it more viable to invest at home than the present country of residence. Some studies have shown that the interplay of inflow and outflow on real exchange can lead to volatility, if the issue of remittance is not critically examined (Mandelman, 2013).

Interestingly, there has not been wide consensus in literature to determine to what extent remittances impact the recipient economies; however, past analytical studies identified some possible macroeconomic implications to bulk of capital repatriated to the home countries in form of remittances (Arshad *et al.*, 2014). Sayan (2014) points out that those instances when remittances rise so high seemly challenge policy makers and can potentially pose threat to macroeconomic balances if there are sudden changes in share of remittances in foreign exchange receipt. This stance has been challenged by some writers who gave so much optimism and support to transfers coming to home countries. The multiplier effect created through these inflows spurs economic activities that indirectly benefitted households that do not receive remittance (Singer, 2010). Furthermore, some streams of studies on economic impact of this capital transfer argued that remittances are countercyclical. For instance, a study by Ruiz and Vargas-Silva, (2014) confirmed that the effect of remittance shock on monetary policy variables was not enormous in Mexico, which happens to be one of the largest receivers in the world.

While not so many studies have been conducted on remittances and foreign exchange rates, the nexus between these variables has become a topical issue in literature. The general view held from available empirical evidence is that appreciation or depreciation of exchange rates directly relate to large foreign inflows/outflows in the migrants' countries.

### 1.1. Remittances: Importance, Trend and Critics

Remittances are variants of capital inflow that scholars unanimously agree to buffer financial constraints at the time of economic hardship in the recipient's country. Remittances, however, are different from conventional capital flows because they do not entail the creation of external debt with future repayment obligations (Chami *et al.*, 2014). In developing regional countries, remittances constitute one of the larger proportions of foreign receipts. In actual fact, remittance has grown progressively as second source of external finance after Foreign Direct Investment (FDI) after the 1960s accounting in developing regions (Sayan, 2014). Despite this assertion in literature, the past two years between 2013-2014 have shown a negative remittance growth for most receiving regions. The rate of decline is less compared to some countries in the developing regions; East Asia and Pacific; 3.8% to 127.3 billion, Europe and Central Asia; -22.1% to 40.3 billion Latin America and Caribbean; 6.0% to 68.3 billion, Middle-East and North Africa; -6.1 to 51.1 billion, South Asia; 1.6% to 117.6 and overall developing countries; -1% to 439.8 billion. This seems to have been the first time the remittance inflows would have two years successive decline (Ratha *et al.*, 2017).

Some of the reasons put forward for the decline in remittances to Africa continent and other developing countries included negative growth in host countries, fall in international prices of oil and the reroute of funds resulting to capital movement through improper channels within the period. However, remittance projections for these regions show positive growth in 2017 (3.3%) and 2018 (4.9%) for Sub-Saharan Countries. Among other African countries, Nigeria, Ghana and Senegal were projected to show more positive improvement in these years. The migration and remittances' statistics estimated remittance as a percentage of the country's Gross Domestic Product (GDP) 2016 in the sub-Saharan region giving the expected surge as follows: Nigeria to take the lead with \$19 billion, Ghana with \$2 billion, South Africa with \$0.6 billion and Madagascar \$0.4 billion (Ratha *et al.*, 2017, p.3). With the current tightening policies, the host countries are putting in place on immigration, remittances are expected to surge in recent coming years.

The major criticism on foreign remittances has been centered on the heavy correlation of host countries' economic conditions with the quantum of remitted fund to the home countries. Critics believed remittance dependent economies tend to suffer economic hardship when something goes bad in foreign countries. We recall that remittance is a component of current account; a shock that results from sudden cut in this quantum may put the balance of payment under pressure (Ajaero *et al.*, 2017; Kose *et al.*, 2015). However, although global economic events usually account for the swing of remittances, statistics have shown that receiving countries have benefited more than the harm it comes with.

### 1.2. Remittances in South Africa

Remittances by South-African immigrants have been an important income support for many households from which they originate. These remittances from other countries have also been regarded as substantial bolster for the South African economy. A report by Ratha *et al.* (2017) shows that compensation of the employees hovers round \$971 to \$913 million in the year 2013 and 2014 respectively. The estimated figure (\$1.003 billion) for 2015 almost reached its past five-year figure when at the time there was positive growth in inward remittance flow (FAO, 2018).

Net investment income in the South-African Balance of Payment is identified to be the largest deficit in the current account balances, with the capital departure and unstable current account outflows, which has positioned South-Africa in a vulnerable economic condition (Samuel, 2013). It is a proven fact that while other foreign inflows such as FDIs are meant to catch up investment opportunities, they often have damaging effect on the receiving economies when they are repatriated. Remittances are forms of untied capital transfer that do not result in debt servicing, claims on assets and another contract

obligation (Brown, 2006). Although South-Africa is barely ranked among top four sub-Saharan remittance recipients, the fluctuations in quantum of remittances over the years have some macroeconomic implications.

## 2. Literature review

In this section, we present a concise review of related theory and various empirical evidence on the drivers of remittance and exchange rates.

### 2.1. Theoretical Framework

In literature, the concept of Dutch Disease that shows the economic consequence that can arise from a spike in the value of a nation's currency is the theoretical foundation of this present study. The economic intuition behind Dutch Disease is credited to W. Wax Coden and Peter Neary (1982). Both scholars show the implication of Dutch Disease using two economies that have both forward and backward links (Acosta *et al.*, 1996).

The concept also captures the increase in real exchange rate resulting from remittance or capital flow. The possibility that Dutch disease could explain the link between remittance and real exchange rate is well captured in the Salter-Swam Conder Dornbush model that presumed price of tradable are often determined endogenously. The consideration of the model is that it unveils the spending effect of higher capital flow or remittance on real exchange rate. In any case, substantial change in transfers bolsters consumptions, capital formation and productions. This higher capital inflows cause the price of non-tradable to increase causing appreciation in real exchange rate. This mechanism is reasonable, if we recall the paradox of international capital transfer as given by the classical (Miranda, 2017).

Remittance impact on real exchange rate appreciation is also seen through the favorable current account balances that raise the net foreign asset position, Frenkel and Mussa (1985) and Alberola and López (2001). Remittances also impact on real exchange rate through growth. Importantly, prior scholarship have associated large capital transfer between countries to improvement or exacerbation on balance of payment thereby putting pressure on the foreign exchange rate (Adams *et al.*, 2016; Eregba, 2019; Macdonald, 1999).

### 2.2. Time Series Evidence

There is a long and inconclusive literature on the macroeconomic consequence of remittance in both developed and developing countries. While some recorded positive results, others showed negative response with relatively few reporting mixed results. For instance, Ajaero *et al.* (2017) investigated the links between international migration, remittances and household welfare in Nigeria by examining household consumer and durable assets as welfare indicators, as against the use of income and recurrent expenditure as indicators of the impact of migration and remittance on households. Data were sourced from the 2009 World Bank Migration survey and were analyzed by descriptive statistics, asset index technique, quintile estimation, ordinary least square and probit regressions. They reported that more of the migrants were single, male, students, with primary education, and are within a mean age of 30 years prior to migration. Hassan and Holmes (2018) estimated a balance data set for 57 remittance-receiving countries between 1995 and 2014 and reported that growth in remittance is positively correlated with growth in lending rates.

Hassan and Shakur (2017) examined the impact of inward remittances flow on per capita GDP growth in Bangladesh over the period 1976 – 2012 and reported that growth effect of remittances was negative at first but became positive at a later stage, proving an evidence of a non-linear relationship. Unproductive use of remittances was rampant in the beginning when they were received by migrant families, but better social and economic investments led to more productive utilization of remittances receipts at later periods.

Simionescu and Dumitrescu (2017) examined the impact of remittances on economic growth, private consumption, private investments and the government tax revenue in low and upper middle-income countries, using a panel data from 74 developing countries collected for the period between 1989 and 2015. Their results show that migrants' remittances are positively related with economic growth and private consumption expenditure. Torero and Viceisza (2015) analyzed a field experiment among Salvadoran migrants in Metro DC area and reported that migrants prefer to arrive as cash than groceries when stake are high. Meyer and Shera (2017) observed the impact of remittance on economic growth, using a panel data set of six high remittances receiving countries between 1993 and 2013 and reported that remittance has a positive relation with growth.

Some studies estimated various demand response shock and reported mixed evidence. Barajas *et al.* (2011) opined that the equilibrium real interest rate appreciation may result due to large inflows of remittances from abroad. However, they identified that the effect tends to be smaller in open economy with elastic labour market. The same study conducted by Dramane (working paper), posits that increase in remittances causes steady-rate exchange rate appreciation only if capital

is sector-specific. Hassan and Holmes (2013) contradicted the stream of studies that disapprove the presence of Dutch Disease type effect in most nations that enjoy remittance inflow. Unlike the other end of the spectrum, they argued that large capital inflow in form of remittances coincide with currency appreciation resulting to the erosion of nations' competitiveness in the international trade market. Against the tide from prior scholarship, David (2017) argued that remittances compensate for the sacrificed autonomy in the domestic economy. Riccardo (1994), however, took the other side of the coin in his attempt to examine the key determinants of remittance in five Mediterranean countries. Against the trending scholarship, he argued that real exchange profoundly determines remittances in these countries.

With disparate views on impact of remittance on exchange rate and some other macroeconomic policy variables in the receiving countries, this study tends to examine the consequence of migrants' capital inflows on real exchange rate in South Africa. The significance of the study is not only to fill the vacuum that was left in literature in terms of methodological approach but to show succinct evidence in a true representative sub-Sahara economy. While many research findings on impact of remittances on real exchange rate in developing regional countries of East Asia and Pacific, Europe and Central Asia, Latin America and Caribbean Middle–East, and South Asia are pervasive in literature, studies are scarcely found about sub-Saharan countries in Africa.

### 3. Methodology of research

#### 3.1. Model

The Dutch Disease hypothesis and Salter-Swam Conder Dornbush model were considered appropriate for this study. While our empirical strategy follows Musumba *et al.* (2015) finding, our baseline model is stated below as:

$$REXCH_t = \alpha + \beta REM + \delta X_{it} + e_t \quad (1)$$

Where: REXCH = Real Exchange Rate; REM = Remittance; X = The vector of the control variables (gdp, gross capital formation, trade and real interest rate);  $\alpha$  = Constant parameter;  $\beta$  = the intercept;  $\delta$  = the vector of partial coefficients of the control variables;  $e_t$  = error term.

Transforming the data

$$REXCH_t - \psi REXCH_{t-1} = \alpha(1 - \psi) + \psi \beta REM + \psi \delta_i X_{it} + \mu_t \quad (2)$$

Estimation  $\psi$  follow:  $e_t = \psi e_{t-1} + v$

$$REXCH_t^* = \alpha^* + \beta^* REM + \delta_i^* X_{it} \quad (3)$$

Where  $\alpha^* = \alpha / (1 - \psi)$ ,  $\beta^* = \beta$ ,  $\delta_i^* = \delta_i$ ,  $i = 1, 2, 3, 4 \dots \dots \dots$

#### 3.1. Data

The variables considered are real exchange rate, remittance measured as percentage of GDP, gross fixed capital formation, interest rate and trade measured as percentage of GDP. The above stated data are extracts of the World Bank database for South-Africa from 1970 to 2016.

#### 3.2. Estimation procedure

The serial correlation of the resultant residuals from Ordinary Least Square always makes it difficult to make adequate precision for time-series relationship. These correlated residuals often render coefficients of the regression model inefficient, underestimate the error variance and give imprecise confidence interval (Betancourt and Kelejian, 1981). The model at hand suffers this harmful statistical plague that turn down the overall conclusion. Different methods are suggested in literature in removing this problem from time-series modeling; however, current study employs Cochrane-Orcutt Procedure as developed by Orcutt and Cochrane, (1949). The justification for using this statistical estimation is founded on the consideration that the various parameters, which entered into theoretical formulations of economic relationships is one of the main objectives of econometrics and the most common statistical technique used is multivariate regression analysis. The classical method of least squares regression has been shown to give best linear unbiased estimates of the coefficients when certain well-known conditions are fulfilled (Orcutt and Cochrane, 1949).

#### 4. Results

In Table 1, we present the results of the Cochrane-Orcutt regression analysis as discussed earlier. The results show that there is a partial coefficient of the research and controlled variables. It is evident that remittance is not significant as determinant of real exchange rate in South-Africa. Other interesting results for the controlled variables also attract a brief explanation.

Table 1. Cochrane Orcutt - OLS Regression

Variable	Coefficient
c	6.47**
Y	-0.88**
I	0.72*
REM	-0.021
T <sup>1*</sup>	-0.021**
i <sup>1*</sup>	-0.06***
R <sup>2</sup>	<b>0.85</b>
Adj – R <sup>2</sup>	0.84
F - Stat	48.91
P-Value	0.001
Durbin Watson	1.95

Note: Robust standard error in parentheses. \* $P < 0.1$ ; \*\*  $P < 0.05$ ; \*\*\* $P < 0.001$

**Source:** Researchers (2019)

The model fit is good with an  $R^2$  of 0.85, indicated that 85% variation in real exchange rate is explained by the Cochrane Orcutt regression model. The F-Stat of 48.91 with corresponding P-Value is 0.0024, which shows that all the variables considered truly explained the model. The non-significant impact of remittance flow on exchange rate in South-Africa is not surprising as the country accounts for large amount of remittance flowing outside the country through its immigrants. Samuel (2013), argued that neighboring nations' immigrants in South Africa repatriate no small amount to family members in their home countries every year. Also, among the large sub-Saharan African economies, South-Africa is least ranked of receivers of remittances from the world. It is plausible to assert that remittance inflow has not shown appreciable impact on South-Africa Rands over the decades. In the light of this finding, it is reasonable to examine the South-African Rands relationship with chosen controlled variables in the study. The GDP and Trade indicate a negative relationship with Rands.

In the 1970s to early 1980s for big economies in Africa, one of the nation's currencies could buy more than one US dollar. This period also coincided with more exports and less import into the countries. Over the years, increase in income and uncontrolled desire for sophisticated western products have impacted the flooding of African economies with foreign and international products with resultant impact on exchange rate. This case is not different for South Africa, as a Rand could exchange for \$1.4409 in 1973 but \$0.0784 in 2015. It is logical to argue that the depreciation of the country's currency resulted from increased level of income that chased after foreign goods. The impact of interest rate is significant but negative. This is inconsistent with interest rate parity condition as suggested in theory. The story of this contradiction may not be hard to tell for South-Africa with surprised cut in interest rates and sometimes actions of the agents' expectations in foreign exchange market.

Gross Fixed Capital Formation (GFCF) shows a significant positive relationship with exchange rate of South-Africa. GFCF, partly financed by foreign capital flow, acts like catalyst for economic growth in upward looking economies like South Africa. This impact of capital stock buildup on economic growth lent credence to Solow growth model. Thus, South Africa's Rands appreciation is indirectly linked to foreign inflow that constitutes part of accumulated capital since the wake of South African political freedom.

#### 5. Conclusions

The paper accounted for South African remittance-exchange rate imbalance by using data sourced from the world development indicators, 2018. We found that remittances do not show any relationship with Rand in the foreign exchange market but certain factors like income, gross fixed capital formation and trade are significant to explain the movement in foreign exchange rates. The study suggests domestication of the excessive desire for western products and provision of necessary incentives for local substitute companies to curb the negative impact of trade on the foreign exchange rate. One important contribution of this study is that remittance has been confirmed not to have any relation with real exchange rate fluctuation in South Africa.

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