Brain drain or brain gain? investigating the diaspora's effect on the economy and real estate bubble: new evidence from Kenya based on ARDL analysis

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Brain drain or brain gain? investigating the diaspora's effect on the economy and real estate bubble: new evidence from Kenya based on ARDL analysis

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Abstract

The diaspora has often been castigated for the real estate bubble as a greater part of their remittances is invested in property. We therefore want to identify the relationship between these remittances, real estate prices and the GDP and employ the ARDL model to try and investigate whether there exists a long run relationship between them. This we believe would make a significant contribution to both the policy makers and academia due to scarce literature focused on the diaspora's effect on the real estate prices in their home countries. We find no causal relationship between the remittances and the real estate bubble but find a trade-off in using the exchange rate to make housing more affordable at the expense of economic growth.

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1.0 Introduction

The importance of diaspora remittances cannot be overstated especially in the developing economies. Remittance is one of the channels through which the home country is affected by the migrants' decision to emigrate. The developing economies face well covered issues ranging from poverty, unemployment to inequality. This brings about the 'brain drain' effect where the highly skilled and qualified portion of the labour force is left with little choice but to emigrate in search for better opportunities and greener pastures more often than not towards more developed economies.

The Kenyan economy is the leading economy in the east Africa with a GDP growth of 5.8% in 2016 and is recognised as a regional powerhouse. The economy remains resilient due to its diversity while services contributed the highest proportion to GDP growth and is expected to continue as the country remains the leading regional hub for information and communication technology, financial, and transportation services (AfDB, 2018).

The diaspora plays a critical role in the Kenyan economy with statistics indicating that their remittances exceed that of both aid and foreign direct investment (FDI) which emphasizes their importance towards the development of the country. Moreover, the real estate sector is viewed as a safe investment option with gradual appreciation in value as well as both generating a stable return and inducing a sense of patriotism to the Kenyans living abroad.

The real estate prices in Kenya have been on a sharp upward trend in the last decade and the prices of real estate per square foot in the capital Nairobi are one of the highest in Africa due to a surge of investments in the sector as well as rapid urbanisation among other reasons.(Knight Frank, 2014)

Theoretically, the 'brain drain syndrome' is known to be detrimental to developing economies as the respective country loses the 'crème de la crème' of its most precious asset, its labour force (Grubel and Scott, 1966; Johnson, 1967). This could be both in terms of skilled as well as unskilled labour and causes a welfare loss through both externalities and short run adjustment costs. It also reduces human capital growth rate resulting in a shrinking per capita growth for the developing economy (Haque and Kim, 1995).

The pure altruism theory demonstrates that a positive utility is developed by emigrants when the welfare of their family in their home country improves. Furthermore, it adds that the remittances from the emigrants are of a countercyclical nature hence are expected to increase with worsening economic conditions in their home country thus having a compensatory effect. (Vargas-Silva, 2009). On the contrary, the pure self interest theory indicates that there is no inverse relationship between remittances and the home countries' economic condition and goes a step further to even indicate the possibility of a positive relationship between economic conditions and remittances where positive economic conditions may signify higher levels of potential and hence encouraging higher remittances by emigrants, this highlights the 'self interest' motive in the theory. Therefore the theories remain inconclusive as to whether remittances are centered on self interest or are more altruistic in nature.

Empirical studies on developing economies demonstrate that the diaspora remittances have varying effects on the receiving or home economies of those remittances depending on their transmission channels which include consumption and trade among others.

Some studies demonstrate that migrant remittances have positive growth effects in recipient economies including developing countries in South Asia such as, Pakistan and Sri Lanka among others (Cooray, 2012; Fayissa & Nsiah, 2010),while others highlight the negative growth effects of remittances (Jahjah & Chami, 2003; Karagoz, 2009). Moreover, other studies illustrate that there exists no causal relationship and that remittances have no impact on economic growth of recipient countries for countries including India (Gapen & Montiel, 2009; Rao & Hassan, 2011; Siddique et al, 2012).

Therefore, the empirical controversy on the subject remains unresolved.

We therefore try to make an humble attempt to answer the three following questions in this paper:

1) Does there exist a causal relationship between remittances and GDP?
2) Does there exist a causal relationship between remittances and real estate prices?
3) Is the brain drain syndrome purely a negative attribute to the home economy?

From the available literature, it is evident that there has very limited studies that have been conducted to establish the impact of diaspora remittances on real estate prices and growth in developing economies. This will be the one of our focus areas and will enable us to discern the relationship (if any) between remittances, real estate prices and economic growth which will provide both empirical contributions as well as bring about clarity to stakeholders, policy makers and academia on the existing gaps.

We find no causal relationship between the level of diaspora remittances to GDP growth nor towards the property bubble but find a significant and negative relationship between the exchange rates to both the GDP as well as the real estate prices.

The rest of the paper will be structured as follows. A brief review the relevant literature followed by the third section which discusses the data and methodology employed in the paper, while the fourth section will present the results leading to the final section which concludes.

2.0 Literature Review

There has been abundant empirical literature relating to foreign remittances and its causal relationship with economic growth especially in developing economies since they are more susceptible to emigration (outflow) and even more towards their highly skilled workers.

As mentioned earlier, there has been ambiguity empirically in establishing the relationship between remittances and economic growth.

In South Asia, Cooray (2012) tries to identify the contribution of migrant remittances on economic growth and focused on six countries namely Bangladesh, India, Nepal, Maldives, Pakistan and Sri Lanka, and finds that remittances have a positive and significant effect on economic growth when education levels and financial sector development are comparatively high. Furthermore, Siddique et al. (2012) investigated whether remittances had any effect on the economies of Bangladesh, India and Sri Lanka, and found mixed results. Using a Vector Autoregression with time series over 25 years, they found a significant impact of growth in remittances on economic growth in Bangladesh and that it was a one-way causal relationship. For India they found no significant results and therefore

no causal relationship between the two variables, but for Sri Lanka it was a two way direct causality. In other words, growth in remittances into Sri Lanka promotes economic growth and vice versa.

Interestingly, Jongwanich (2007) find strong evidence that remittances have a significant effect on poverty reduction in the region, but only a marginal impact on economic growth in a study that comprised both the Asian and Pacific regions. Ang (2007) looks at four areas including remittance and overall growth, the linkage between remittances and microfinance, tracing the contribution of remittances to countryside development and the relationship between worker remittances and structural reform policies and finds that on a national level that remittances have a positively and significantly influence on economic growth.

On the other hand other studies discovered a negative relationship between the level of remittance and economic growth where Amuedo and Pozo (2004) show that remittances could reduce the international competitiveness and impose economic costs on the export sectors of receiving countries.

Contrary to the findings above, other literature points towards no relationship such as Spatafora (2005) and inconclusive outcomes. Yaseen (2012) and Berguellil et al. (2013) use a different approach to find the impact of remittances on economic growth, as they divide different countries into groups. Using a panel data over two groups of countries Barguellil et al. (2013) try to find the relationship between the variables of interest; remittances, economic growth and education. Their findings are inconclusive.

The literature appears to be inconclusive as witnessed above and may be attributed to several reasons as pointed out by Barajas et al. (2009). Firstly, the definition of remittances may vary across studies and the difference between compensation, transfers and remittances may be large where proxies used for remittances often do not encapsulate the real amounts repatriated where the above three terms are often used as proxies for remittances. Secondly, there is a disparity on the identification on the effects which may be either through cross-sections, annual panels or using different estimators. Thirdly, the difference in time periods, data set estimates, control variables used may lead to the disparity and hence inconclusive results.

3.0 Data and Methodology

3.1 Data

We used quarterly data for this study from 2004-2016 and was obtained from various sources. The study comprises of time series data on economic growth, real estate prices, inflow of remittances into the country, inflation rate, interest rate and finally the exchange rate.

- Gross domestic product (GDP) in US$ was used as a proxy for economic growth and was sourced from the Kenya National Bureau of Statistics (KNBS)
- Real estate prices (REP) were retrieved from the Hass Property Sales Index (HPSI) which is the only comprehensive index covering the sample period
- Remittance inflow (REM) was sourced directly from the Central Bank of Kenya (CBK) database in US$
- Inflation rates (INF) were collected using CPI data from KNBS
- Lending rates (INT) were collected directly through the CBK database
- The exchange rates (XR) were collected from the World Bank database as (KES/USD)

3.2 Methodology

The study applies ARDL approach proposed by Pesaran, Shin and Smith (2001), which is commonly used to examine whether there exists a long-run relationship between the variables. In comparison with other known cointegration methods that have been used before such as Engle and Granger (1987) as well as Johansen (1990), the ARDL approach allows different optimal lags for the variables, improves the small-sample properties of the estimates regardless of the nature of the time series, stationary or not. This contrasts with the conventional methods that require unit root pre-testing before carrying out the cointegration tests since the ARDL approach can be used regardless of whether the data are integrated of order I(0) or I(1). Furthermore, the ARDL approach may be applied for smaller sample sizes as is the case in the current study and allows a simultaneous presence of both the short-term and long-term estimates.

Firstly, we provide some descriptive statistics in order to understand the nature of the links between the variables we consider. Second, we conduct ADF, PP, KPSS tests to examine the stationarity properties of the series after which we then undertake diagnostic tests to ensure the validity of the regressions used for the implementation of the bounds test approach of cointegration among the variables. If we are sufficiently satisfied that a long-run relationship exists, then we can ascertain the causal direction through error correction modelling before finally employing variance decomposition (VDC) to check on the relative exogeneity and endogeneity of each variable and impulse response to present the graphical output of a shock to each variable.

4.0 Results

4.1 Unit Root Tests

We employ following standard unit root tests to assess the stationarity of the variables: the Augmented Dickey Fuller (ADF) tests and Phillips-Perron (PP) tests and the KPSS test. The ADF and PP tests the null hypothesis of a unit root, against the alternative that it is stationarity. While the ADF test adjusts for correlation, the PP test adjusts for both autocorrelation and heteroscedasticity. On the contrary, Kwiatkowski, Phillips, Schmidt, & Shin (1992) maintain that the ADF and PP tests have lower power of rejecting the null hypothesis, since they are designed on the basis of the null that a series is I(1). Hence the KPSS test, where the null hypothesis is stationary.

The results of the KPSS tests, shown in in Table 3a and 3b, suggest that the variables are stationary, or integrated of order one, I(1). This is in contrast to the results obtained from PP tests, which suggests that the some variables are integrated of order Zero, I(0). However, the KPSS results are similar to the ADF results shown in Table 1a and Table 1b. Therefore we can proceed Engle-Granger or Johansen cointegration tests, as the variables appear to be integrated of the same order. However, these tests are subject to asymptotic properties and hence, require a large sample size.

This criteria may not be fulfilled with the quarterly data we are employing, which covers the at most 55 observations. Furthermore, due to the conflict between PP tests with the KPSS test, we cannot be certain that results of stationarity and their integration order

since the previous two tests provide different results thereby undertaking the ARDL test for cointegration where the results need not be at I(1).

4.1.1 ADF Test

	VARIABLE	ADF	VALUE	T-STAT.	C.V.	RESULT
LOG FORM	LREP	ADF(1)=SBC	102.6451	-2.837	-3.475	Non-Stationary
		ADF(1)=AIC	105.4829	-2.837	-3.475	Non-Stationary
	LREM	ADF(1)=SBC	45.3001	-2.094	-3.475	Non-Stationary
		ADF(1)=AIC	49.0838	-2.094	-3.475	Non-Stationary
	LGDP	ADF(1)=SBC	63.1158	-2.331	-3.475	Non-Stationary
		ADF(1)=AIC	66.8994	-2.331	-3.475	Non-Stationary
	LINF	ADF(1)=SBC	40.9983	-6.957	-2.968	Stationary
		ADF(1)=AIC	43.836	-6.957	-2.968	Stationary
	LINT	ADF(1)=SBC	77.7003	-2.511	-2.968	Non-Stationary
		ADF(1)=AIC	80.5381	-2.511	-2.968	Non-Stationary
	LXR	ADF(1)=SBC	107.0527	-0.943	-2.968	Non-Stationary
		ADF(1)=AIC	109.8905	-0.943	-2.968	Non-Stationary

Table 1a

	VARIABLE	ADF	VALUE	T-STAT.	C.V.	RESULT
1ST DIFFERENCED FORM	DREP	ADF(1)=SBC	98.5878	-5.081	-3.587	Stationary
		ADF(1)=AIC	102.3302	-5.081	-3.587	Stationary
	DREM	ADF(1)=SBC	40.389	-5.327	-3.587	Stationary
		ADF(1)=AIC	45.4499	-5.327	-3.587	Stationary
	DGDP	ADF(1)=SBC	63.8395	-7.837	-3.587	Stationary
		ADF(1)=AIC	67.5819	-7.837	-3.475	Stationary

		ADF(1)=SBC	28.6863	-3.896	-3.045	Stationary
	DINF	ADF(1)=AIC	31.4931	-3.896	-3.045	Stationary
		ADF(1)=SBC	74.2992	-4.494	-3.045	Stationary
	DINT	ADF(1)=AIC	77.106	-2.511	-3.045	Stationary
		ADF(1)=SBC	111.6964	-5.941	-3.045	Stationary
	DXR	ADF(1)=AIC	114.5032	-5.941	-3.045	Stationary

Table 1b

4.1.2 PP Test

	VARIABLE	T-STAT.	C.V.	RESULT
	LREP	-1.9218	-3.4124	Non-Stationary
	LREM	-3.6406	-3.4124	Non-Stationary
LOG FORM	LGDP	-3.181	-3.4124	Non-Stationary
	LINF	-2.7446	-2.8323	Non-Stationary
	LINT	-1.742	-2.8323	Non-Stationary
	LXR	-0.25256	-2.8323	Non-Stationary

Table 2a

	VARIABLE	T-STAT.	C.V.	RESULT
	DREP	-4.5538	-3.5405	Stationary
	DREM	-11.001	-3.5405	Stationary
1ST DIFFERENCED FORM	DGDP	-7.7416	-3.5405	Stationary
	DINF	-4.9419	-3.0065	Stationary
	DINT	-4.192	-3.0065	Stationary
	DXR	-3.7719	-3.0065	Stationary

Table 2b

4.1.3 KPSS TEST

	VARIABLE	T-STAT.	C.V.	RESULT
LOG FORM	LREP	0.14028	0.13417	Non-Stationary
	LREM	1.0048	0.41669	Non-Stationary
	LGDP	0.25371	0.13417	Non-Stationary
	LINF	0.15377	0.41669	Stationary
	LINT	0.60934	0.41669	Non-Stationary
	LXR	0.83004	0.41669	Non-Stationary

Table 3a

	VARIABLE	T-STAT.	C.V.	RESULT
1ST DIFFERENCED FORM	DREP	0.057488	0.13417	Stationary
	DREM	0.052628	0.13417	Stationary
	DGDP	0.10997	0.13417	Stationary
	DINF	0.036032	0.41669	Stationary
	DINT	0.1457	0.41669	Stationary
	DXR	0.19454	0.41669	Stationary

Table 3b

4.2 Test for Lag Order Selection

Before testing for cointegration we need to determine the optimum lag order of VAR. The Schwartz-Bayesian Criterion (SBC) and Akaike Information Criterion (AIC) are used to estimate the optimal number of lags included in the test. Both the AIC and SBC unanimously recommended the lag order of 1.

Order	AIC	SBC	p-Value	C.V.
1	456.4	410.5	0.09	5%

Table 4

4.3 Tests for Cointegration

4.3.1 Engle-Granger Test

Assuming that all the variables are I(1), we move on to test the cointegration among the variables to identify whether there are variables moving together in the long run which basically indicates a theoretical relationship between the variables.

	Test Statistic	C.V	Result
ADF (1)	-2.9607	-5.0823	**No Cointegration**

Table 5

The Engle Granger test does not show any cointegration. However, we shall also employ the Johansen Test for Cointegration not only to ensure the result above is correct, but also it is able to identify the presence of 2 or more cointegrations unlike the EG test above.

4.3.2 Johansen Cointegration Test

This involves two tests namely the Maximal Eigenvalue test (Table 6a) and the trace test (Table 6b).

Cointegration LR Test Based on Maximal Eigenvalue of the Stochastic Matrix				
Null	Alternative	Statistic	90% Critical Value	Result
r = 0	r = 1	42.236	40.76	**1 cointegration**
r<= 1	r = 2	30.972	35.04	-

Table 6a

Cointegration LR Test Based on Trace of the Stochastic Matrix				
Null	Alternative	Statistic	90% Critical Value	Result
r = 0	r>= 1	115.4879	110.6	**1 cointegration**
r<= 1	r>= 2	73.2519	82.88	

Table 6b

Both Johansen tests above (Table 6a and 6b) indicate the presence of the cointegration if we reject the null hypothesis which assumes no cointegration. Based on the tests above, there is one cointegration which means all the variables reach the equilibrium in the long-run.

These results from EG and Johansen tests conflict with each other with the former indicating no presence of cointegration while the latter indicating that there exists at least one cointegration. Therefore due to the inconsistent outcomes above and the other limitations stated earlier, we employ ARDL bound test as the final test for cointegration among variables which takes care of the limitations mentioned earlier.

4.3.3 ARDL Approach to Cointegration

The ARDL bounds testing procedure involves two stages. First we test for the existence of a long-run relationship between the respective variables by computing the F-statistic for testing the significance of the lagged levels of the variables in the error correction form of the underlying ARDL model. The calculated F-statistic is a test of the null hypothesis that the coefficients of the level variables are jointly zero which indicates that there exists no long-run relationship between them. asymptotic distribution of the F-test computed in the first stage is non-standard, regardless of whether the regressors of I(0) or I(1).

M. H. Pesaran et al., (2001) provide the asymptotic critical values – an upper and lower bound – for different numbers of regressors (k), distinguishing the different scenarios including whether the ARDL model contains an intercept and/or trend. This covers all possible classifications of the variables into I(0) and I(1), or even fractionally integrated and rules out the possibility of a spurious relationship. If the computed F-test is above the upper bound, then we have sufficient evidence of cointegration and if it is below the lower bound

there does not exist enough evidence for cointegration. Furthermore, if it falls with the lower and upper bounds, the result is seen as inconclusive.

In the second stage, we estimate the coefficients of the long-run relations and interpret their values.

Models	F-statistics	Lower Bound (10%)	Upper Bound (10%)
FLGDP (LGDP | LREM, LREP, LINF, LXR, LINF)	5.3831	1.9479	3.1382
FLREM (LREM | LGDP, LREP, LINF, LXR, LINF)	2.69	1.9479	3.1382
FLREP (LREP | LREM, LGDP, LINF, LXR, LINF)	3.2653	1.9479	3.1382
FLINF (LINF | LREM, LREP, LGDP, LXR, LINF)	1.7395	1.9479	3.1382
FLXR(LXR | LREM, LREP, LINF, LGDP, LINF)	4.28	1.9479	3.1382
FLINT (LINT | LREM, LREP, LINF, LGDP, LXR)	3.92	1.9479	3.1382

Table 7

The ARDL bound test above in table 7 reveals that cointegration and hence a long run relationship is found when GDP, REP, XR and INT is taken as the dependent variable since the F-statistic falls above the upper bound hence rejecting the null hypothesis of no cointegration. Furthermore, it is inconclusive when REM is taken as the dependent variable at the 95% significance level since it fall within the upper and lower bounds. Lastly when INF is the dependent variable there is no evidence that there exists a long run relationship amongst the variables.

As mentioned earlier, we can only proceed to estimate the second stage of the ARDL

procedure if we are satisfied that a long-run relationship between the variables exists. This is the case when GDP, REP, XR and INT is treated as the dependent variable.

	LGDP	LREM	LREP	LINF	LINT	LXR
K	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
LGDP		0.14028	-0.0368	0.47916*	0.0983**	-0.021
LREM	0.014839		0.0163	0.052	0.0547*	-0.0018
LREP	0.18091***	-0.134		0.518*	0.5607***	-0.6188***
LINF	0.0084	0.00195	-0.0055		0.0516***	0.737
LINT	0.0419	0.35784	0.1555	3.109***		-0.1683
LXR	-0.071**	-0.4246	-0.763***	2.7513**	0.026	

***Significant at 1%,**Significant at 5%, *Significant at 10%

Table 8

The table above shows the existence of a long run relationship between GDP and Real Estate prices which is indicated by a significant and positive relationship. This implies that a 1% increase in REP increases the GDP 0.18%. This supports several empirical studies as well as the earlier notion which stated that real estate sector to Kenya's gross domestic product (GDP) was 10.6 per cent in 2014. We also find significant and negative relationship between the GDP and the exchange rates (XR) which implies a 1% increase in XR causes a 0.07% decrease in GDP which is widely supported by the literature. However, interestingly we find no long term relationship between the GDP and diaspora remittances in Kenya as the is a positive but insignificant relationship shown in table 8 above. This is in line with Spatafora, (2005) who found no relationship between gdp growth and remittances.

We are also able to find the existence of a long run relationship between the real estate prices and exchange rates which exhibited a significant and negative relationship implying that a 1% increase in XR (Depreciation of the Kenyan Shilling) will cause a 0.76% fall in real estate prices. This is an important finding indeed for the policy makers. There is also no evidence of long term relationship between the real estate prices and remittances. Some other significant relationships can be seen, however since they are not the focus of our study, we chose not to delve into them. It is also important to note that Breusch–Godfrey LM test for autocorrelation, the Jarque–Bera normality test, and the Ramsey RESET test for the correct functional form had satisfactory results indicating that the model need not be re-estimated.

5.0 Error Correction Model (ECM)

While the models above establish the existence of a long-run relationship between investment and savings, it does not describe the short-run adjustment that takes place in order to bring about the long-run equilibrium. Instead, this is interpreted from error correction models (ECM). The ECM helps to identify which variable is exogenous (strong) and which is endogenous (weak), whereby the coefficient of ecm(-1) is taken as the speed of adjustment. If the value is zero, then there exists no long-run relationship. If the speed of adjustment value is between -1 and 0, then there exists partial adjustment. A value which is smaller than -1 indicates that the model over adjusts in the current period. In the following table, the ECM's representation for the ARDL model is selected with AIC Criterion. We identify two exogenous variable namely Real Estate prices and Inflation.

Variable	Coefficient	Std.Error	Decision
dLGDP	-0.0163***	0.0561	Endogenous
dLREM	-0.2151	0.0886	Exogenous
dLREP	0.0474*	0.028	Endogenous
dLINF	-0.1762	0.107	Exogenous
dLINT	-0.341***	0.0696	Endogenous
dLXR	-0.0762**	0.0338	Endogenous

Table 9

This above suggests that when we shock inflation which is a leading variable, the followers such as GDP will follow. It is imperative that policymakers take better care of these variables that are known to have a profound effect on the country's economy as a whole due to their ability to transmit shocks to the endogenous variables. Furthermore, the positive coefficient of REP indicates that it moves away from equilibrium in the long run which is as expected.

6.0 Variance decomposition Analysis

Unlike the ECM, which gives information about the absolute endogeneity or exogeneity the variance decomposition (VDC) gives us information about the relative endogeneity or exogeneity of the variables. The VDC decomposes the variance of the

forecast error of each variable into proportions attributable to shocks from each variable in the system including its own.

The variables that depend most on its own past is the most exogenous. For instance, it discloses to what proportions of the changes in a particular variable can be associated to changes in the other lagged explanatory variables. Moreover, if a variable explains most of its own shock i.e exogenous, then it does not permit variances of other variables to assist to its explanation and is therefore said to be relatively exogenous. Policymakers will set the exogenous variable as an intermediate target in order to affect the endogenous variable.

There are two types of VDC that may be employed, they are orthogonalised and generalised methods. We employ the latter as error VDC permits one to make robust correlation of the strength, size and persistence of shocks from one equation to another (Payne, 2002).

	Horizon	LGDP	LINF	LINT	LREM	LREP	LXR	TOTAL	**RANKING**
LGDP	4	62.80%	0.36%	2.70%	1.60%	14.39%	18.14%	100%	**3**
LINF	4	1.84%	77.92%	3.90%	3.00%	2.50%	10.84%	100%	**2**
LINT	4	6.96%	6.63%	53.78%	1.14%	15.25%	16.24%	100%	**4**
LREM	4	2.59%	6.92%	2.04%	81.99%	1.77%	4.70%	100%	**1**
LREP	4	11.83%	0.61%	13.30%	1.54%	45.29%	27.44%	100%	**6**
LXR	4	13.82%	0.69%	13.41%	3.12%	21.10%	47.86%	100%	**5**

Table 10

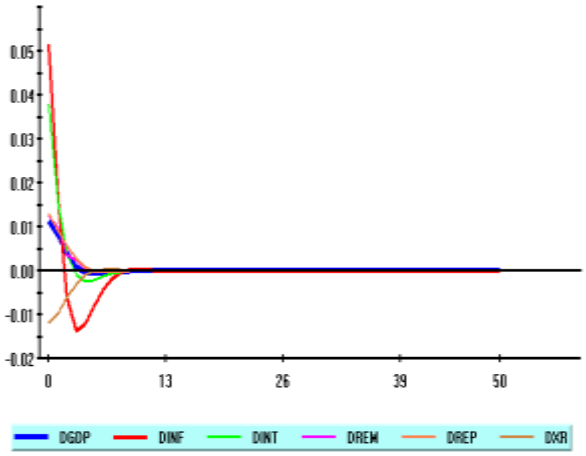
Table 10 above indicates that the strongest variable is remittances which is understandable as remittances would be affected by the conditions of the host countries rather than the home countries who will be on the receiving end of those remittances. Inflation also unsurprisingly is seen as a strong variable and hence exogenous as indicated under the error correction model analysis. This is useful to policy makers as they should closely monitor inflation levels and try and control it because if left unattended, it may transmit some of its shocks to the weaker variables who are susceptible to absorbing those shocks.

We have chosen to include only one horizon (comprising of four quarters or one year) since the other time horizons barely made any impact to the rankings. Moreover, the highlighted boxes in table 10 indicate 'self-dependence' of its shocks with the higher figure indicating that the respective variable reacts mostly to its own shocks thereby showing the relative exogeneity or endogeneity.

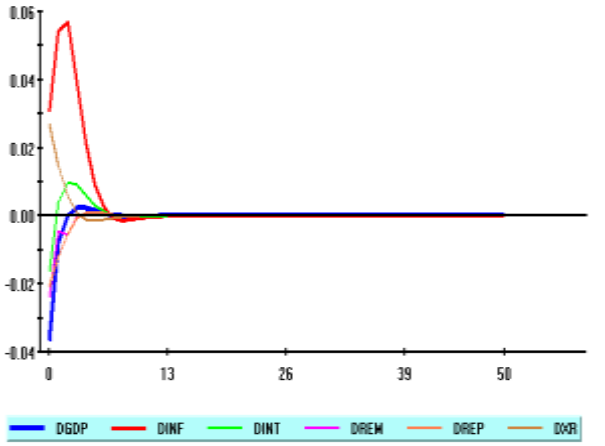
7.0 Impulse Response Function (IRF)

The impulse response function (IRF) displays the impact of a shock of one variable on others, their degree of response and how long it would take to normalize. It basically gives us a graphical representation of the VDC analysis above. We expect that if a leading variable is shocked, the response of the weak variables will be significant.

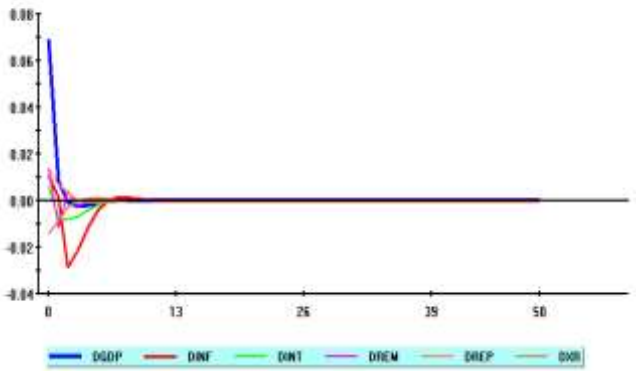
Generalised Impulse Responses to one SE shock in the equation for DINT



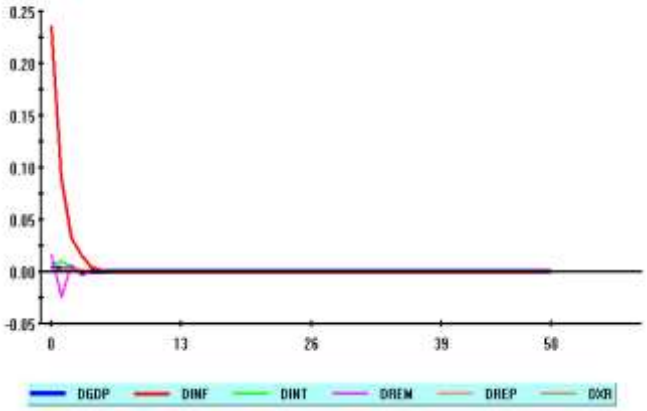
Generalised Impulse Responses to one SE shock in the equation for DXR



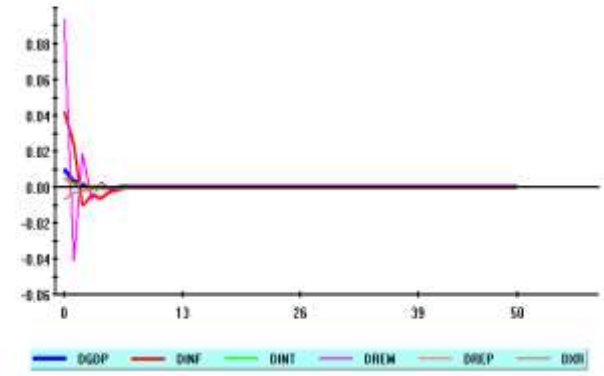
Generalised Impulse Responses to one SE shock in the equation for DGDP



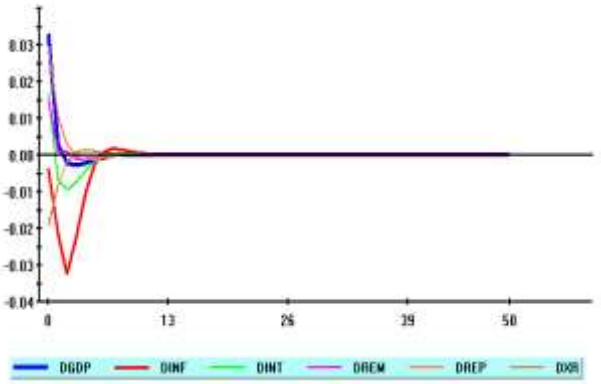
Generalised Impulse Responses to one SE shock in the equation for DINF



Generalised Impulse Responses to one SE shock in the equation for DREM



Generalised Impulse Responses to one SE shock in the equation for DREP



Consistent with our predictions, we observe that if the inflation and remittances variables are shocked, the response from other variables appear significant and they also take a longer time to normalise as compared to shocks from the endogenous variables. We can also observe the effect from a shock to exchange rate towards GDP which is fairly significant albeit both being endogenous variables and this is captured by the short time they take to normalise back to equilibrium hence showing a short term impact.

8.0 Conclusions and Policy Implications

We have attempted to clarify whether indeed the Kenyan diaspora were rightly accused of causing the real estate bubble that has perplexed many in the industry. We attempted to identify whether there exists a causal relationship between remittances, the GDP and Real estate prices. Interestingly, we found no causal relationship between the growing Kenyan GDP and diaspora remittances. This is in line with Spatafora, (2005) who found no relationship between GDP and remittances. This is however against the pure self interest theory which finds indicates a positive relationship between the GDP and remittances implying a one way causal relationship which induces the diaspora to invest more when there are positive prospects in their home country. This may signify that majority of the funds repatriated by the diaspora could be for their families personal consumption and hence supports the pure altruism theory demonstrates that a positive utility is developed by emigrants when the welfare of their family in their home country improves.

Furthermore, we also fail to find a significant causal relationship between the real estate bubble in Kenya and the inward remittances. This could help the policy makers focus on the relevant areas such as rural urban migration, improving infrastructure for city expansion to create space and avail cheaper land which is in scarce in the cities and to improve and maintain the exchange rate which we found to have a negative and significant relationship with the real estate prices in Kenya. The policy makers also need to exercise caution in dealing with the exchange rate as it has a negative and significant relationship with both the GDP and the Real estate prices thereby indicating a tradeoff since a currency depreciation may reduce the real estate prices due to higher foreign investments in the construction industry thereby increasing the supply of real estate, however it also have a negative impact on the Kenyan GDP growth. Therefore, since GDP would be a priority for any government, the exchange rate depreciation cannot be used as a tool for reducing real estate prices. For a long-term solution, supply side avenues in the economy should be pursued.

Finally, on the 'brain drain' syndrome, since we find no evidence to suggest a positive impact on the home country's GDP, we may concur with conventional literature views brain drain as being detrimental to sending economies. However, we also reiterate

that the Kenyan diaspora neither brings about harm (in terms of higher property prices) nor does it bring about the good (a positive impact to the GDP).

9.0 Limitations and Future Research

There has been very limited data available for the real estate prices and this was sourced from one institution mainly focused on the urban cities and the suburbs. A longer data period would be very useful as well as incorporating more micro and macro-economic variables including land utilization capacity among others for a more comprehensive study in the future.

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