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The Causal Link between Foreign Direct Investment, GDP Growth, Domestic Investment and Export for Kenya: The New Evidence

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Abstract
This study investigates on how foreign direct investment (FDI) relates with host country's GDP growth, domestic investment and export in Kenya. Therefore the causality relationship between FDI, Export, domestic investment and GDP growth of Kenya from the year 1980 to 2013 is examined by using co integration and granger causality test .The co integration test results indicates that there is a long run relationships ship among the four variables being analyzed in this study. The Granger causality test results shows that the *causal unidirectional relationships exist between export(EXP) and domestic investment (DI)at 5 percent level with the direction running direct from export(EXP) to domestic investment(DI) implying that export(EXP) is a good predictor of domestic investment(DI) in Kenya and that export led strategy is appropriate while the results found the bidirectional relationship between export (EXP) and foreign direct investment(FDI) at 5 and 10 percent level respectively implying that there is a feedback linkage of predicting each other between these two variables suggesting that both the export led FDI growth and FDI led Export growth are appropriate strategy to be adopted for Kenya. Finally the results showed domestic investment (DI) and foreign direct investment (DI) to have a unidirectional relationship at 1 percent level with a direction of linkage running from direct investment (DI) to foreign direct investment(FDI) which implies that domestic investment(DI) is important in predicting the inflow of foreign direct investment(FDI) in Kenya economy* and not vice versa therefore the policy makers should cautiously base on the obtained results for right decision in policy making that could enable Kenyan economy reach its desired developments objectives.
Keywords: Foreign direct investment (FDI), Gross domestic product growth (GDPG), exports (EXP), Domestic investment (DI), co integration test, Granger causality, Kenya.

1. Introduction

Studies on the linkages between the variables such as Foreign direct investment ,domestic investment, Export and GDP growth has been one of the hot topic in the past and present time especially the fact these variables have a major impact on the economy of a country in achieving developmental objectives.

The economic theory, states that exports growth contribute to economic growth (export led growth) first through what is known as the foreign trade multiplier effect Stolper (1947). The foreign trade multiplier analysis proposes that, given the spending function, an export surplus will have an expansionary effect whose magnitude depends on the marginal propensity to import. Transfer of scarce resources from

Low-productivity domestic industries to higher-productivity export industries results in an increase in overall productivity, accelerating output growth. Economic theory also states that a higher level of exports might contribute to economic growth as export revenues provide an important source of foreign exchange, which is crucial when domestic savings are inadequate for making imports of capital goods possible. Finally, export growth might also trigger economic growth through the expansion of the efficient market size, bringing in substantial economies of scale that accelerate the rate of capital formation and technical change.

The causality relation between exports and economic growth can also be in both directions i.e. there may as well exist the bidirectional causality relationship running from the economic growth to export growth (growth-led export) which implies that economic growth dynamics is more relevant for explaining export growth Jung and Marshall (1985). Theoretically it implies that the output growth triggers productivity growth, which in turn enhances international competitiveness of export products, and therefore accelerates export growth Kaldor (1967). Following the new trade theory this tendency is known as cumulative causation which means that the development of productive capacities and the growth of demand work to reinforce each other Markusen and Venables (1998) and UNCTAD (2010): 104–105.

Generally FDI can contribute to economic growth (FDI led growth) in many ways considering for example in neo-classical growth theory FDI tends to increase the capital stock and therefore promotes economic growth by financing capital formation. In this case the FDI impacts on economic growth is similar to the domestic capital investments which is domestic investments, and FDI has only a short run effect due to the presence of the diminishing returns to capital. On the other hand the new growth theory emphasize on the technological change and in this case contrary to the neo classical growth theory FDI is assumed to have both the

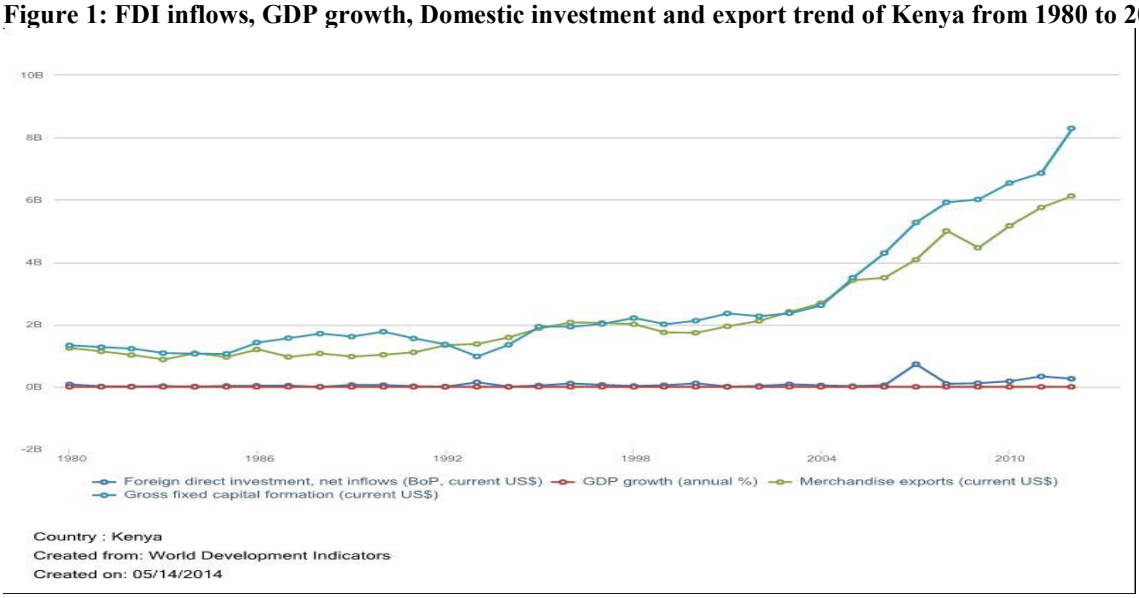
short run and long run positive impact on economic growth Herzer et al.(2008: 794).Basing on the new trade theory,FDI seems to be more than productive than the domestic investment since FDI related spillover effect tends to offset the impacts that comes from the diminishing returns to capital and therefore allow the economy to continue in the long run.

The causality relation between FDI and growth is not necessarily unidirectional, and causality can work on both directions (bidirectional). In this case, it is possible for a long-term process of economic growth which is basing on the development of productive capacities to create the new economic activities, new markets and also a higher demand for the new consumer products, which will in turn attract a higher level of FDI.However it should also be noted that the impact of FDI inflows is also dependent basing on the assumption that FDI does not 'crowd out' substantial amounts of investment from domestic sources Herzer et al.92008: 794). In the case of crowding-out effect, FDI inflows might as well have a negative impact on the recipient country this is a negative linkage between FDI and economic growth.

Theoretically the four variables being examined in this study tends to affect one another in a different levels in different countries which presents the need for more understanding of this variables by examining their linkage which could assist a certain country in policy making that could bring a significant development results in the economy hence it is also very reasonable and important to continue undertaking this study to achieve the country's expected development objectives for a specific developing country such as Kenya.

Following is a figure showing the trends on the four variables being examined in this study from the year 1980 to 2013.

Figure 1: FDI inflows, GDP growth, Domestic investment and export trend of Kenya from 1980 to 2012



Source: world development indicators 2013 (WDI).author's own drawing.

Figure 1 above shows the trend of the four variables under investigation i.e. foreign direct investment (FDI) inflows, domestic investment (DI), GDP growth and export (EXP) trend of Kenya from the year1980 to 2012.

Previous studies have been conducted basing on the subject with diverse findings but studies on the causality link focusing on Kenya on the selected variables are almost to inexistence which leads to the interest of my undertaking of this study.

The major objective of this study is to find out the causality link of the variables of interest in this study (i.e. unidirectional or directional) while the specific objective is to explore the relationship of the impact of the independent variable namely Foreign direct investment, domestic investment, export and GDP growth have on independent variable namely export in Kenya over the period between 1980 to 2013 so as to formulate the policy for the country.

In presenting the causal relation between the variables in question the granger causality technique will be applied a method developed by granger.

This study involves examining the four variables for the presence of unit root using Phillip Perron test, applying the co integration technique to test the long run relationship of the variables to be analyzed in case the variables have the same trend which will be followed by the use of granger causality technique to discover the directions of the variables of how they can be used to predict one another

This study comprises of four main sections. section 1 presents the introduction of the study ,section two that presents the selected literature review which is followed by section 3 that presents the Methodology of the study, source of the data and interpretation of the findings section 4 presents Concluding remarks and policy

advices.

2. The Literature Review

Previous studies present very diverse results regarding the causal link of the variables in question. So far there is more literature available for developed countries than developing countries moreover studies for African countries specifically Kenya basing on the causality link is still very limited. Generally most of the studies conducted are as presented below.

In their studies Chowdhury & Mavrotas (2006) analyzed the causality relationship between Foreign direct investment and GDP growth over the period between1969-2000 for three countries, which are Chile, Malaysia and Thailand. They employed the Toda and Yamamoto technique and find that GDP growth causes FDI in the case of Chile and not vice versa, while for both Malaysia and Thailand, there is strong evidence of a bi-directional causality between the two variables. Similarly, (Hansen & Rand 2006), examined the causality link between FDI and GDP growth in for 31 developing countries over the period between1970-2000. Their findings regarding the direction of causation between the two variables seem to vary significantly depending on the econometric approach adopted and the sample used. In another study by, (Zhang 2001) on a time series on 11 countries, results show strong Granger-causal relationship between FDI and GDP growth.

Shawa M.J (2013) analyzed on the Causality Relationship between foreign direct investment, GDP growth and Export for Tanzania. His results showed that there is existence of a long run association ship among the variables in question. While the granger causality results of the test suggest that there is a causality relationship which is unidirectional running from FDI to export and no causality was discovered between FDI and GDP growth suggesting that FDI is a good predictor of export and hence FDI led export growth for Tanzania seems to be necessary for the country to boost export.

According to M. Dritsaki, C. Dritsaki and A. Adamopoulos (2004) who examined the linkage of the three variables such as foreign direct investment,GDP growth and export over the period between 1960-2002 for a Greece economy. Their results discovered that there was a long run relationship and the causal relationship existence between the variables being analyzed.

The study by Dasgupta (2007) analyzed the long run relationship between imports, export and Foreign Direct investment inflows on the outflows of Foreign Direct investment in India. His findings revealed the existence of unidirectional causal link running from the export growth and import to Foreign Direct Investment out flows while he found no causal links from Foreign Direct investment inflows to the outflows.

The study by Ndikumana and Verick (2008) investigate whether domestic investment promotes FDI and is in turn affected by FDI by covering 38 African countries from 1970 to 2005. Their results indicate that the relationship between FDI and domestic investment run both way. But the positive impact of domestic investment on FDI, especially in the case of private investment, is stronger and more robust that the reverse relation.

In another study conducted by Miankhel, Thangavelu and Kalirajan (2009) for India, Pakistan, Malaysia, Mexico, Chile and Thailand on the relationship of foreign direct investment, export growth and GDP growth. the conclusion of the findings among six nations were different with India results showing that GDP growth attracting Foreign direct investment while for Pakistan it showed GDP impact on export growth. Thailand results revealed a bidirectional relationship between GDP growth and foreign direct investment indicating the feedback among the two variables of predicting each other.

The study by Shimul and Siddiqua (2009) discovered no causal relationship between foreign direct investment and economic growth for Bangladesh over a timeframe between 1973-2007.

According to Mohammad Sharif karimi (2009) who investigated the causal links between foreign direct investment and GDP growth by employing Toda and Yamamoto technique over a period covering between 1970 to 2005 for a Malaysian economy. His findings discovered no strong evidence to support the bi-directional causal links between the variables in question hence his main conclusion was Foreign direct investment had an indirect impact on GDP growth in Malaysia economy.

Syed Imran Ali Meerza (2012) analyzed the causality relationship between trade FDI and economic growth of Bangladesh over the period between 1973 to 2008.His findings discovered that there was a long run relationship among the variables in question while he also discovered that economic growth have an impact on both export growth and Foreign direct investment furthermore the unidirectional causal linkage between FDI and export existed with the direction that runs from export growth to Foreign direct investment.

The study by Chakraborty and Basu (2002) examines the causal links between GDP growth and foreign direct investment of India by using the co integration and error correction model technique they discovered that unidirectional linkage existed with direction running from GDP growth to foreign direct investment.

Chow P. (1987) examined the linkages between export growth and industrial development in eight newly industrializing nations. His findings showed that strong bidirectional causal links exist between the export growth and industrial development which supported the export led growth strategy which implies that export expansion lead to the GDP growth of the country.

While in a similar study conducted by Athukorala (2003) in Sri Lanka revealed that FDI inflows did not have influence on GDP growth and that the direction was running from GDP growth to foreign direct investment and not otherwise.

Bahmani-Oskooee and Alse (1993) in their study using Granger causality within an error-correction framework found evidence supporting bidirectional causality between exports and real economic growth while in the other similar study by Kugler and Dridi (1993) found some evidence for the bidirectional causality.

As noted above, basing on the previous studies that has been conducted so far, different methodology has been applied, different combination of variables been used plus the different period of study analyzed on different countries which produced different findings. Basing on these facts, there is still a need to re-examine the causality relationship particular in Kenya economy using the mentioned technique especially the fact that studies focusing on this country are limited in the existing literatures.

3. The Method, Data Source and Interpretation of the Findings

In examining the relationship between FDI, GDP growth, domestic investment and export of Kenya the granger causality test for the estimation is employed. The mathematical equation is as shown below:

$$EXP=f(FDI, DI, GDPG) \quad (1)$$

Where:
EXP= Export
FDI=Foreign Direct Investment inflows
DI=Domestic investment
GDPG= Gross Domestic Product Growth

The measurement of export (EXP) is measure as the real merchandise of export of Kenya. Gross Domestic Product Growth (GDPG) is measure as the real GDP growth rate annually, Domestic investment (DI) is measured as the gross fixed capital formation and Foreign Direct Investment inflows (FDI) is measured as the FDI inflows to Kenya.

The data mainly used for this study are basing on secondary time series collected annually over the period between 1980 to 2013.The choice of the data and the timeframe are basing on data availability and the relevance that they have on the economy of Kenya. The data we sourced from the world development indicators of the year 2013 and Kenya bureau of statistics.

The model specified with the selected variables such as foreign direct investment denoted as FDI, Gross domestic product growth denoted as GDPG, Export denoted as EXP and Domestic investment denoted as DI.All the variables were put in logarithmic form for the best results.

The first step the study will employ the Phillip perron unit root test instead of the widely used method of ADF test basing on the fact that it always produces the robust results over the latter method. The second step will be to use the co integration technique developed by johansen to find out the presence of the long run relationships of the variable only if on the first step the variables shows the same trend however there is an exception to that as noted by Harris (1995), Enders (2004; 323),pagan and wickens (1989) Shawa M.J(2013) that even the variable with different trends can still be co intergrated.the final step will be to conduct the granger causality test technique developed by granger(1969) in order to find out the causal linkage of the variables in questions.

3.1 Phillips–Perron Unit root Test

Phillips–Perron tests the presence of a unit root . That is, it is used in time series analysis to test the null hypothesis that a time series is integrated of order 1 or not. It builds on the Dickey–Fuller test of the null hypothesis $\nabla = 0$ in

$$\nabla y_t - \nabla y_{t-1} + u_t \quad (2)$$

Where ∇ is the first difference operator. Like the augmented Dickey–Fuller test, the Phillips–Perron test addresses the issue that the process generating data for y_t might have a higher order of autocorrelation than is admitted in the test equation—making y_t-1 endogenous and thus invalidating the Dickey–Fuller t-test. While the augmented Dickey–Fuller test addresses this issue by introducing lags of ∇y_t as repressors in the test equation, the Phillips–Perron test makes a non-parametric correction to the t-test statistic. The test is robust with respect to unspecified autocorrelation and heteroscedasticity in the disturbance process of the test equation.

Table 1: Phillips–Perron Test (constant and trend)

Variables	At levels	Critical Values	First differences	Critical Values	Remarks
lnEXP	1.611890	1% = -4.262735	-6.191850* (0.0001)	1%=-4.273277	stationery
	(1.0000)	5%= -3.552973		5%=-3.557759	
		10%=-3.209642		10%=-3.213261	
lnFDI	-5.766300*	1% = -4.262735	-23.59703* (0.0000)	1% =-4.273277	stationery
	(0.0002)	5%= -3.552973		5%=-3.557759	
		10%=-3.209642		10%= -3.213261	
lnDI	0.387619	1% = -4.262735	-4.753599*	1% =-4.273277	stationery
	(0.9983)	5%= -3.552973	(0.0031)	5%=-3.557759	
		10%=-3.209642		10%= -3.213261	
lnGDPG	-3.391672**	1%= -4.273277	-3.318490**	1% =-4.273277	stationery
	(0.0698)	5%=-3.557759	(0.0000)	5%=-3.557759	
		10%=-3.212361		10%= -3.213261	

Source: world development indicators 2013(WDI).
Note: *, **, *** indicates 1%, 5%, 10% level of significance respectively.
First of all we conduct the Phillip perron unit root tests for each variable in a model which is a method developed by Phillip and perron in order to test for the significance of the independent variables .The results are presented in Table 1.

The Phillip perron results in table 1 shows that the two variables which are FDI (Foreign Direct investment) and GDPG (Gross Domestic Product Growth) were stationery at level and they even became more stationery after the first differences while the results found out that the remaining two variables such as is EXP (Exports) and DI (domestic investment) were not stationery at level which became stationery after the first differences. By following Harris (1995), Harris (1995), Enders (2004; 323), pagan and wickens (1989) Shawa M.J (2013) who argued that the variables which are integrated of different orders may still be co integrated especially when the theory supports that variable is relevant and that should be included on the research, FDI (Foreign Direct investment) and GDPG (Gross Domestic Product Growth) are therefore included in the regression model to proceed with the following steps in the analysis. Most of the time when the I (1) variables are put together, their linear combination will become I (1). On the other hand, when it happen that the variables have not the same order of integration, then in that case their combination will attain an order of integration of highest order Brooks (2008). Brooks indicated that a linear combination of I (1) variables will only become I (0), when the variables are co integrated.

3.2 Johansen Co integration

When time series variables are non-stationary, it is interesting to see if there is a certain common trend between those non-stationary series. If two non-stationary series such as $X_t \sim I(1)$, $Y_t \sim I(1)$ has a linear relationship such that.

$$Z_t = m + \alpha \cdot X_t + \beta \cdot Y_t \qquad (3)$$

Where $Z_t \sim I(0)$, (Z_t is stationary), then we call the two series X_t and Y_t are co integrated. Two broad approaches to test for the co integration are Engel and Granger (1987) and Johansen (1988). Broadly speaking, co integration test is equivalent to examine if the residuals of regression between two non-stationary series are stationary. If it is stationary, two series X_t and Y_t are co integrated. Johansen uses more complicated VAR structure to test the co integration. In a multiple non-stationary time series, it is possible that there is more than one linear relationship to form co integration. This is called the *co integration rank*.
Johansen test usually involves two test namely "trace statistics" and "maximum eigenvalue" .The null hypothesis to be tested for the case of trace test is there at most" r "number of co integration vectors while the null hypothesis for the Eigen value test is there "r" co integrating vectors against the existence of alternative r+1.The null hypothesis of no co integration against the presence of co integration is checked on this test. Johansen and juselius (1990).

Table 2: Johansen Co integration Test
Series: lnFDI lnGDPG lnDI lnEXP

Hypothesized no of CE(s)	Eigen value	Test (Trace) Trace Statistics	0.05 Critical value	Prob. **
None *	0.747110	91.67485	47.85613	**0.0000**
At most 1*	0.644028	51.80561	29.79707	**0.0000**
At most 2*	0.431656	21.85141	15.49471	**0.0048**
At most 3*	0.171773	5.465579	3.841466	**0.0194**
Hypothesized no of CE(s)	**Eigen value**	**Test (Maximum Eigen value) Max Eigen Statistics**	**0.05 Critical value**	**Prob. ****
None *	0.747110	39.86924	47.85613	**0.0008**
At most 1*	0.644028	29.95420	29.79707	**0.0022**
At most 2*	0.431656	16.38583	15.49471	**0.0228**
At most 3*	0.171773	5.465579	3.841466	**0.0194**

Source: world development indicators 2013(WDI)
Note; both trace and max Eigen test indicates 4 co integrating eqn (s) at the 0.05 level (**)

In conducting this test the number of lags determination is very important therefore by selecting Akaike information criterion and Schwarz criterion an optimal number of lags 5 is achieved hence on performing the co integration test we get 4 co integration vectors from both the trace statistics and max-Eigen value statistics at 5 percent level. Table 2 above indicates all the results.

3.3 ***Granger Causality Test***

The Granger-Causality test is conducted in order to find out the existence of causality linkage among the variables in questions. Therefore in order to do that, we use the method developed by (Granger, 1969). The main assumption on this method is if two variables e.g. X_t and Y_t, affect each other with some lags then the relationship of these variables can be put in a VAR model .Then, if we test whether X_t causes Y_t, we check that how much of the present Y_t can be represented by lagged values of Y_t and X_t. In the Granger causality we check the null hypothesis that X_t does not granger cause Y_t; and if we can reject the null hypothesis, it implies that X_t does Granger cause Y_t. As Granger-causality tests require stationary data therefore all the variables have to be tested for the existence of unit roots. Only when we fail to find the presence of a unit roots then the estimation models will be employed with only long-run coefficients to be used for the estimation hence, the estimated VAR model will be as shown below.

$$X_t = \sum_{i=1}^{m} \gamma_i X_{t-i} + \sum_{j=1}^{m} \alpha_j Y_{t-j} + \eta_t \quad (4)$$

$$Y_t = \sum_{i=1}^{n} \varphi_i Y_{t-i} + \sum_{j=1}^{n} \delta_j X_{t-j} + \mu_t \quad (5)$$

Where X_t and Y_t indicates the variables to be estimated at time t.The η_t and μ_t are the residual prediction errors which are uncorrelated to each other. Equation 4 depicts the variable x is decided by a lagged variable of Y and X.the same applies to equation 5 except that in this equation its dependent variable is represented by a variable Y instead of X.In this test usually we check if the estimated lagged coefficient γ_i are φ_i different from zero by using the F-statistics. When the jointly test rejects the two null hypothesis that φ_i and φ_i are both different from zero, then in that case the casual relationships between X and Y are confirmed. Generally speaking granger causality has been used by many researchers for investigation of the causal relationship although it is not without limitations for example being sensitive to the number of lags to be used and the model specifications as pointed out by Gujarat (1995).so it must always be used with care.
Following is the results of the granger causality test as indicated by table no.3 below

Table3: Pair wise Granger causality test

Null Hypothesis	Obs	F-Statistic	Prob	Remarks
LNDI does not Granger Cause LNEXP	29	1.93075	0.1389	
LNEXP does not Granger Cause LNDI		**3.34198**	**0.0261**	**lnEXP→LNDI**
LNFDI does not Granger Cause LNEXP	29	**2.55335**	**0.0648**	**lnFDI→LNEXP**
LNEXP does not Granger Cause LNFDI		**4.51966**	**0.0076**	**lnEXP→LNDI**
LNGDPG does not Granger Cause LNEXP	29	0.80892	0.5583	
LNEXP does not Granger Cause LNGDPG		0.83055	0.5446	
LNFDI does not Granger Cause LNDI	29	2.01773	0.1246	
LNDI does not Granger Cause LNFDI		**4.88922**	**0.0053**	**lnDI→LNFDI**
LNGDPG does not Granger Cause LNDI	29	1.47770	0.2458	
LNDI does not Granger Cause LNGDPG		0.52238	0.7562	
LNGDPG does not Granger Cause LNFDI	29	0.63533	0.6755	
LNFDI does not Granger Cause LNGDPG		0.88036	0.5140	

Source: world development indicators 2013(WDI)

The Granger causality test results shows that the causal unidirectional relationships exist between export(EXP) and domestic investment (DI)at 5 percent level with the direction running direct from export(EXP) to domestic investment(DI) implying that export(EXP) is a good predictor of domestic investment(DI) in Kenya while the results found the bidirectional relationship between export (EXP) and foreign direct investment(FDI) at 5 and 10 percent level respectively implying that there is a feedback linkage of predicting each other between these two variables. Finally the results showed domestic investment (DI) and foreign direct investment (DI) to have a unidirectional relationship at 1 percent level with a direction of linkage running from direct investment (DI) to foreign direct investment(FDI) which implies that domestic investment(DI) is important in predicting the inflow of foreign direct investment(FDI) in Kenya economy and not vice versa therefore the policy makers should base on the obtained results for right decision making that could enable Kenyan economy reach its desired developments objectives.

4. Concluding Remarks and Policy Advices

The study has been conducted using the annual data spanning from 1980 to 2013 for the sake of identifying the causality relation between foreign direct investment (FDI), gross domestic product growth (GDPG), domestic investment (DI) and export (EX) of Kenya. We first started with the test of stationarity of the four variables in question using phillip perron test and the results showed that the two variables which are FDI (Foreign Direct investment) and GDPG (Gross Domestic Product Growth) were stationery at level and they became even more stationery after the first differences while the remaining two variables such as are export (XP) and domestic investment (DI) were not stationery at levels but they became stationery after first differences. By following Harris (1995), Harris (1995), Enders (2004; 323),pagan and wickens (1989) Shawa M.J(2013) who argued that the variables which are integrated of different orders may still be co integrated especially when the theory supports that variable is relevant and that should be included for further analysis. Since the two variables such as FDI (Foreign Direct investment) and GDPG (Gross Domestic Product Growth) were important variables in this study therefore there were taken in the regression model to proceed with the next techniques of the co integration analysis.

The co integration test results found four co integration equations on both the max-Eigen and Trace statistics indicating the existence of a long run association ship on the variables of interest. While The Granger causality test results shows that the *causal unidirectional relationships exist between export and domestic investment at 5 percent level with the direction running direct from export* to *domestic investment which implies that export can be used to predict on the level of domestic investment in Kenya while the results found the bidirectional relationship between export and foreign direct investment at 5 and 10 percent level respectively which means the two variables can be used to predict one another in Kenya economy. Finally the results showed domestic investment and foreign direct investment to have a unidirectional relationship at 1 percent level which also implies that domestic investment is important in predicting the foreign direct investment in the economy. In general both the Export led FDI growth and FDI led export growth might be appropriate strategy to be adopted in Kenya basing on the findings in this study.*

The findings of this study may contribute to the existing literature especially for Kenya economy and other east African countries on the variables being examined for policy formulation. However it should also be noted that this study is not without limitation basing on the fact that it has only covered Kenya economy with only few variables to be covered and about 34 period of study. In this regard cautious interpretations of the results and further future studies is very important.

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