



Assessing Foreign Direct Investment and Export Performance in Tanzania: A Granger Causality Analysis (1970-2011)

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Abstract

The underlying purpose of this study was to investigate the causal relationship between foreign direct investment (FDI) and export performance in Tanzania by using annual time series data from 1970 to 2011. All the time series variables were not stationary at their level, but they became stationary and integrated of order one $I(1)$ after they were differenced once. The long run relationship between FDI and export was explored by using cointegration analysis. Since the variables were co-integrated, Vector Error Correction Model (VECM) was used as the estimation technique. Finally, Granger causality analysis revealed that there is long run bi-directional causality between FDI and export. These results suggest that FDI is a good predictor of export, and also export is a good predictor of FDI. Hence, FDI-led export growth and export-driven FDI could be necessary for Tanzania to boost both its export sector and attract more FDI inflows.

Keywords: foreign direct investment (FDI), export performance, vector error correction model (VECM), granger causality, and Tanzania

INTRODUCTION

Since the late 1980s Tanzania gradually began to switch from a centrally planned economic system to one based on market forces. A lot of economic reforms to improve its regulatory environment were made. A great deal of rules and regulations were made and new institutions were created to govern the establishment of a private sector led market economy. Some of the major reforms included but not limited to: trade liberalization, financial sector reforms, privatization, and tax reforms. These reforms helped Tanzania to improve its efficiency and weed out ills that impeded growth.

In June 1990 the government launched its first market oriented investment code that allowed foreign investments to be established in Tanzania. It opened up some sectors of the economy to the private sectors and provided for the establishment of the Investment Promotion Centre (IPC). The IPC operated as a government institution with the mandate of promoting and managing domestic and inward foreign direct investment (TIC, 2004).

According to Tanzania Investment Centre (TIC) Report of 2004, the government of Tanzania came up with a new investment law named the Tanzania Investment Act of 1997 and introduced a number of measures to improve the institutional investment environment in the country. These measures included the establishment of the Tanzania Investment Centre as a one stop shop, Identification of investment priorities, streamlining the investment approval process, new investment incentives and investors rights. Today Tanzania Investment Act of 1997 remains the main FDI regime, and also provide a fiscal stability clause [Section 19(2)] that guarantees investors that incentives provided to TIC certificate holders will not be amended or modified to the detriment of the investors enjoying those benefits.

All these transformations were made bearing in mind that Tanzania exports success and the

comparative trade advantage still lie traditionally in primary commodities and unskilled labour intensive manufactures, which need to be upgraded as competition in the world market intensifies. The country has to upgrade its primary and labour intensive exports into higher value added items, and move into new, more advanced, export oriented activities. Both require greater inputs of skills and technology which can be attained either by improving and deepening the capabilities of domestic enterprises or by attracting foreign direct investment into export activities and upgrading these activities over time.

Tanzanian government saw in FDI a potential non debt creating source of finance and a bundle of assets, *viz.*, capital, technology, market access (foreign), employment, skills, management techniques, and environment (cleaner practices), which could solve the problems of low income growth, shortfall in savings, investments and export, and unemployment. It was argued that FDI would also help Tanzania in the expansion of production and trade and increase opportunities to enhance the benefits that could be drawn from greater integration with the world economy (Rutihinda, 2001).

A considerable number of studies have been done to determine the nature of causality between FDI and export. However these studies provide mixed results. Sultan (2013), found a unidirectional causality which runs from export to FDI in India in the long run, but did not find any causality between the variables in the short run. Liu, Burrige, and Sinclair (2002), investigated the causal relationship between inward FDI, trade and economic growth in China using quarterly data at aggregate level for the period 1981 to 1997 and found bidirectional causal relationship between inward FDI and export. Khan and Leng (1997) examined the causal link between FDI, export and economic growth for Singapore, Taiwan and South Korea. Their results revealed no evidence of causality between FDI and export in Taiwan and South Korea. However, a reverse causal relationship that runs from export to inward FDI was

found in Singapore. Alici and Ucal (2003) concluded in their study that the Turkish economy has not found any significant positive spillovers from FDI to export suggesting any kind of FDI-led export growth linkage.

Despite the fact that there are a lot of studies that explain the relationship between FDI and export with very mixed results, empirical investigations in that area in Tanzania remain considerably few. Therefore, the main objective of this study is to provide recent analysis of the causal relationship between the variables and eventually add up to the existing literature for Tanzania.

The remaining part of this paper is organized as follows: Part 2 covers the review of literature, part 3 deals with the methodology and data sources and part 4 covers the empirical results analysis and discussion followed by the last part that covers the conclusion and policy implication.

LITERATURE REVIEW

Theoretical Framework

This section intends to obtain theoretical evidence of how FDI affects the host country's export performance but before getting into a detailed discussion of the impact of FDI on exports, it is important to clarify the term FDI. This term refers to the flow of funding provided by a firm to establish or acquire a foreign company or to expand or finance an existing foreign company that the investor owns and controls (Pugel, 2004). This study has selected the following three theories to explain the relationship between FDI and export performance.

Firstly an important theory that establishes a complementary relationship between FDI and export is the Flying Geese (FG) model. This model was developed basing on the observation

of the Asian economies, and therefore provides a migratory image where Japan is the leading country in industrialization, while other countries fly behind and emulate the Japanese model (Kwan, 1996). According to this model, in order to reduce the cost of production and retain its competitiveness, the Multinational Corporations (MNCs) shift their location of production from high labour cost home country to low labour cost host country.

The implication of the FG model is that MNCs subsidiaries increase the host country's export competitiveness by using the host country's factor endowments. Moreover, the transfer of FDI also brings new technology, capital equipments, manufacturing and managerial expertises into host countries, and spillover effects to local firms improve the productivity and competitiveness of the indigenous firms thereby increase in competitiveness and exports of the host countries (Kwan, 1996). Tanzania can be incorporated into FG model due to its abundant resources and cheap labour, and the country's encouraging investment environment which successfully attracted much FDI in labour intensive industries and light manufacturing industries.

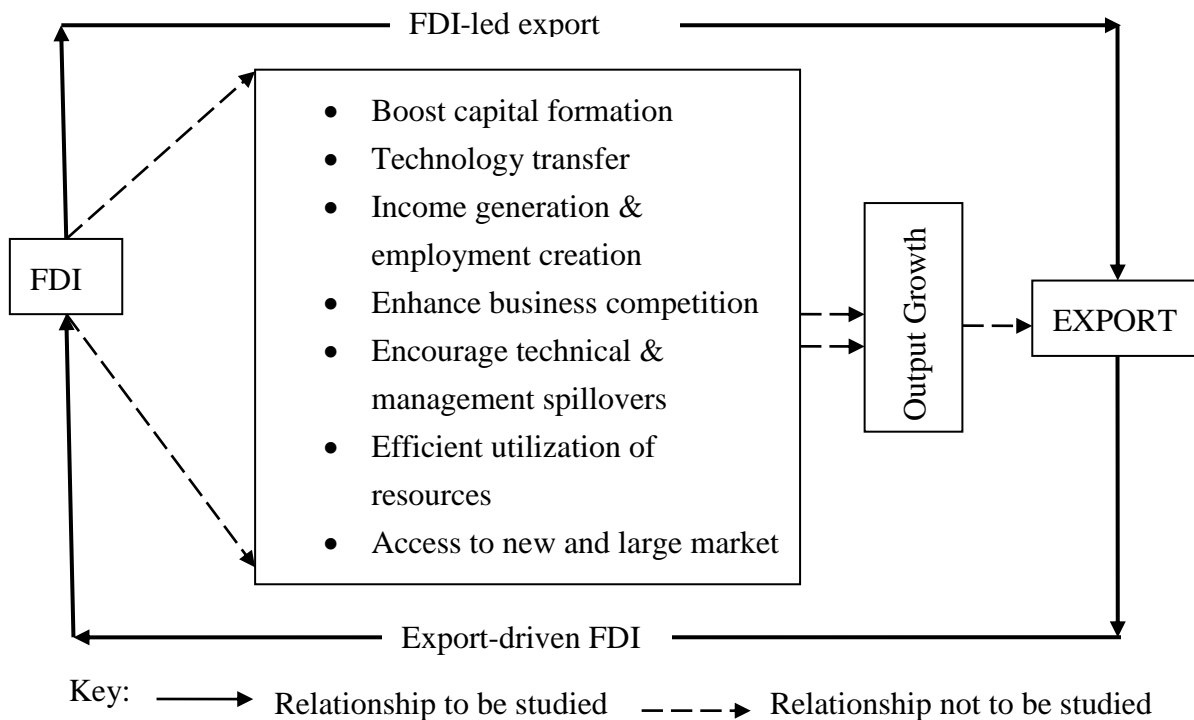
Secondly, Vernon's Product Life Cycle (PLC) theory (1966) proposes four stages of production which include innovation, growth, maturity, and decline. In the third stage of maturity, FDI is undertaken to reduce the cost of production and protect them from imitating competitors. Therefore, production in foreign countries starts and part of production is export to home country. In the last phase, product and technology becomes mature and standardized, and becomes accessible to local imitators that thanks to the low labour cost become international competitors (Sultan, 2013). Applying Vernon model at industry level, Kojima (1973), found that when FDI is made in the sector in which the country of origin has comparative disadvantage and the host country has comparative advantage, then this kind of investment has trade creating effect implying that the host country's export will increase.

Thirdly, the New Growth theory carries two important views that technology progress is a product of economic activity and knowledge and technology are characterised by increasing returns which drive the progress of growth. Investment in knowledge capital contributes to increasing returns in production function and the more resources devoted to research and development, the faster the rate of innovations and the higher the rate of growth (De Castro, 1998)

According to Shan, Tian and Sun (1997), the capital accumulation FDI is expected to generate non-convex growth by encouraging the incorporation of new inputs and foreign technologies in the production function of the FDI recipients' economies. In addition, the transfer of advanced technology strengthens FDI recipients' existing stock of knowledge through labour training, skills acquisition, the introduction of alternative management practices and organizational arrangement.

2.2 Conceptual Framework

Figure 2.1: Possible FDI and Export Transmission Mechanism



Source: Author's own construction, 2013

Figure 2.1 depicts the causal link that subsists between FDI and export performance. The literatures and previous studies reveal trade as the main engine of growth and therefore claims that outward oriented policies and export in particular, improve productivity growth through, enabling the adoption of foreign technologies, greater and efficient utilization of physical and human capital, utilization of advantage of economies of scale and comparative advantage, creating a conducive and stable macroeconomic environment through increasing employment, labour productivity and enhancement of the country's external earning power (Edward, 1998).

Thus the issue of which variable is driving the other and the nature of any link between FDI and export and is not clear cut. Figure 2.1 illustrates some of the possible transmission mechanisms whereby these two variables influence each other. However, given the divergent opinions on the causal link between FDI and export, this assessment primarily focused on the causality between these variables in Tanzania from 1970 to 2011. Since it was not obvious that any of the links between FDI and export can be ruled out, our investigation used a Granger causality test to ascertain the direction of causality that exists between the two variables.

METHODOLOGY

Data Source and Description

The study used documentary sources (secondary sources) to collect annual time series data for foreign direct investment (FDI) and export of goods and services which is a proxy for export performance in Tanzania from 1970 to 2011. The foreign direct investment data (FDI net inflows in USD at current prices), and gross domestic investment were taken from the

World Bank database at <http://data.worldbank.org> which were later converted into Tanzanian shillings; export of goods and services (at current prices, National currency) data were taken from African Development Bank databases at www.afdb.org.

General econometric model

Borrowing the ideas of Sultan (2013), the causal relationship between FDI and export in Tanzania was specified as follows:

$$EXP_t = f(FDI)_t \dots \dots \dots (i)$$

In an explicit and econometric form, equation (i) can be stated as

$$lEXP_t = \alpha_0 + \alpha_1 lFDI_t + \varepsilon_t \dots \dots \dots (ii)$$

Where EXP_t is export; FDI_t is Foreign Direct Investment; l is natural logarithm of the variable concerned; and t refers to time period.

The Estimation Model

According to Gujarati (2004), if the variables are co-integrated, Granger causality test on the basis of multivariate vector error correction model (VECM) will be more appropriate than the causality within the first difference vector autoregressive (VAR) model. Therefore if the two variables are co-integrated the VECM for FDI and export is formulated as follows:

$$\Delta EXP_t = \alpha_1 + \sum_{i=1}^k \beta_{1i} \Delta EXP_{t-i} + \sum_{i=1}^k \beta_{2i} \Delta FDI_{t-i} + \phi_1 ECT_{t-1} + \varepsilon_{1t} \dots \dots \dots (iii)$$

$$\Delta FDI_t = \alpha_2 + \sum_{i=1}^k \gamma_{1i} \Delta FDI_{t-i} + \sum_{i=1}^k \gamma_{2i} \Delta EXP_{t-i} + \phi_2 ECT_{t-1} + \varepsilon_{2t} \dots \dots \dots (iv)$$

Where Δ represents first difference operator, $lEXP$ and $lFDI$ represent the natural logarithms of the time series for export and foreign direct investment (FDI) respectively, ECT_{t-1} is the one period lagged error correction term derived from the long term cointegration equations ε_{1t} and ε_{2t} are residual terms which are assumed to be normally distributed and white noise.

A three step procedure is employed to examine the causal relationship between FDI ($= FDI_t / GDP_t \times 100$) and export (as a % of GDP). The first step involves conducting a unit root test by using the Augmented Dickey-Fuller test and Phillip-Perron test, and establishing optimal lag order using the lag order selection criteria. The second step is to use Johansen test for cointegration to determine the long run relationship between the variables. The third step is to apply the Vector Error Correction Model to estimate the model, and lastly Granger causality test is employed to determine the direction of causality.

Empirical Results and Discussion

Unit Root Test

The causality test among the variables that are used in the above model requires previously the test for the existence of unit root for each variable. This is done to avoid what we call spurious econometric results, analysis and conclusion. The Augmented Dickey-Fuller unit-root test and Phillips-Perron unit-root test were used and the test results are reported in Table 4.1 (a and b) respectively.

Table 1a: Unit Root Test Results (ADF Test)

Variables		Level	First Difference
lnEXP		-0.265	-4.906
lnFDI		-1.502	-7.081
Critical Values	1%	-3.641	-3.648
	5%	-2.955	-2.958
	10%	-2.611	-2.612

Source: Computed by the Author, 2013

Table 1b: Unit Root Test (PP Test)

Variables		Level	First Difference
lnEXP		-0.643	-4.956
lnFDI		-1.075	-7.224
Critical Values	1%	-3.641	-3.648
	5%	-2.955	-2.958
	10%	-2.611	-2.612

Source: Computed by the Author, 2013

The results suggest that the null hypothesis of a unit root in the time series cannot be rejected at a 1% 5% and 10% level of significance in variable levels. However, when the natural logarithms of the time series were differenced once and tested for stationarity, they became stationary even at 1% level and therefore characterized as integrated of order one $I(1)$.

Lag Order Selection Criteria

Since multivariate cointegration analysis is very sensitive to lag length selection, the lag order selection criteria was employed to establish the optimal lag length. Table 4.2 presents the output of the selection criteria. On the basis of the results, the Adjusted LR, AIC, and FPE selected lag 4, while HQIC and SBIC selected lag 0. Therefore, this study chose lag 4 as the optimal lag length. According to Baum, (2013) introducing too many lags wastes degrees of freedom, while too few lags leave the equations potentially misspecified and are likely to cause autocorrelation in the residuals.

Table 2: Lag Order Selection Criteria Results

Lag	LL	LR	df	P	FPE	AIC	HQIC	SBIC
0	-65.431				.131229	3.64492	3.67562*	3.732*
1	-62.3536	6.1548	4	0.188	.138034	3.69479	3.78688	3.95602
2	-61.0571	2.593	4	0.628	.160173	3.84092	3.99442	4.27631
3	-60.0225	2.0691	4	0.723	.189132	4.00122	4.21611	4.61075
4	-48.5043	23.037*	4	0.000	.127323*	3.59482*	3.87111	4.37851

Source: Computed by the Author, 2013

*Indicates lag order selected by the criterion

LR is the sequential modified LR statistics. FPE denotes Final prediction error

AIC refers to Akaike Information Criterion. HQIC denotes Hannan-Quinn Information Criterion. SBIC refers to Schwartz Bayesian Information Criteria

Johansen Test for Cointegration

After we have established that the variables under examination are integrated of order one $I(1)$, the cointegration test was performed. The testing hypothesis is the null of no cointegration against the alternative that is the existence of cointegration using Johansen's approach (Johansen, 1988); Johansen and Juselius, 1990). Johansen test of cointegration was performed with appropriate assumptions on trends and lags.

Table 3: Cointegration between EXP and FDI

Hypothesized No. of CE(s)	Eigen Value	Trace Statistic	5% critical value
None*	.	31.5127	12.53
At most 1*	0.13021	5.1614	3.84

Source: Computed by the Author, 2013

Trace test indicates at least 1 co-integrating equation(s) at the 5% level

*denotes rejection of the hypothesis of no cointegration at 5% level

Starting with the null hypothesis of no cointegration among the variables, trace statistics is 31.5127, which is above the 5 percent critical value of 12.53 (shown in Table 4.3). Thus we

reject the null hypothesis of no cointegration among these variables at 5 percent. Again considering the null hypothesis of at most one cointegrating relation, trace statistics is 5.1614 which is greater than 5 percent critical value of 3.84 (see Table 4.3). Here we also reject the null hypothesis of at most one cointegrating equation at 5 percent significance level. Therefore, we conclude that there is stable long run equilibrium relationship of export with FDI in Tanzania from 1970 to 2011.

Vector Error Correction Model (VECM)

Since we have determined that the natural logarithms of the model variables are cointegrating among themselves, we then proceed to estimate the VECM model. The long run relationship between FDI and export was estimated using the VECM model of the following form:

$$\Delta \ln EXP_t = \alpha_1 + \sum_{i=1}^k \beta_{1i} \Delta \ln EXP_{t-i} + \sum_{i=1}^k \beta_{2i} \Delta \ln FDI_{t-i} + \phi_1 ECT_{t-1} + \varepsilon_{1t} \dots \dots \dots (iii)$$

$$\Delta \ln FDI_t = \alpha_2 + \sum_{i=1}^k \gamma_{1i} \Delta \ln FDI_{t-i} + \sum_{i=1}^k \gamma_{2i} \Delta \ln EXP_{t-i} + \phi_2 ECT_{t-1} + \varepsilon_{2t} \dots \dots \dots (iv)$$

Table 4 displays the estimates of long run co-integrating vectors from the error correction model

Table 4: Vector Error Correction Model

Sample: 1975 – 2011 No. of obs = 37
AIC = 3.679805
 Log likelihood = -51.07639 HQIC = 3.940743
 Det(Sigma_ml) = .0542112 SBIC = 4.419956

Equation	Obs	Parms	RMSE	R-sq	Ch ²	P>ch ²
lnEXP _{t-1}	37	8	.166061	0.6129	45.91585	0.0000
lnFDI _{t-1}	37	8	1.79142	0.6940	65.75981	0.0000

lnEXP		Coef.	Std. Err	z	P> z	[95% Conf. Interval]	
		ECT _{t-1}	-.3252098	.1050318	-3.10	0.002	-.5310684
	lnEXP _{t-1}	-.3201622	.1818367	-1.76	0.078	-.6765555	.0362311
	lnFDI _{t-1}	.0988568	.0254166	3.89	0.000	.0490412	.1486723
	_cons	.0112517	.0273203	0.41	0.680	-.0422951	.0647984
lnFDI	ECT _{t-1}	-5.396332	1.133058	-4.76	0.000	-7.617085	-3.175579
	lnEXP _{t-1}	3.200384	1.961611	1.61	0.103	-.6443021	7.4507
	lnFDI _{t-1}	.4690837	.2741879	1.71	0.087	-.0683148	1.006482
	_cons	.0006781	.2947247	0.00	0.998	-.5783279	.5769717

Source: Computed by the Author, 2013

The vector error correction model (VECM) allows the long run behaviour of the endogenous variables to converge to their long run equilibrium relationship while allowing a wide range of short run dynamics. Basing on the estimation results in Table 4.4 we do not reject the error correction term (ECT) estimations, according to the statistical and diagnostic tests at 5% level of significance. The error correction term (ECT) of export variable is statistically significant and has a correct sign (negative sign), with the 32.5% speed of convergence to equilibrium that adjusts past year's deviations from the equilibrium. The restoration to equilibrium path will take long time because the value of error correction term is not big enough (0.325).

The coefficient of error correction term of FDI in Table 4.4 has a negative sign and it is statistically significant at 5% level. It implies that due to any disturbance in the system convergence to equilibrium will take place and the system will be stable. Large absolute values of the coefficients on the error correction term show that equilibrium agents remove a large percent of disequilibrium in each period. Significant coefficients of the error correction terms for each time series variable depict that they all cause one another in the long run. Moreover, the results in Table 4.4 depict short run causality running from FDI to export but there is no short run causality that runs from export to FDI.

Granger Causality Test

Recall that although cointegration between two variables does not specify the direction of a causal relation, if any, between the variables, Economic theory guarantees that there is always Granger causality in at least one direction (Order & Fisher, 1993). This study considers F-statistic and chi-square statistic for the significance of the lagged endogenous variables in the equations under the null hypothesis of non Granger causality. The results for the existence of Granger causality between export and foreign direct investment are presented in Table 4.5.

Table 5: Granger Causality Test Results

Null Hypothesis	Lag	F-statistic	Prob > F	Ch ² -statistic	Prob > ch ²	Decision
FDI \nrightarrow EXP	4	1.0047622	.419	3.8363647	0.4286	Reject
EXP \nrightarrow FDI	4	1.7169888	.17	6.5557754	0.1613	Reject

Source: Computed by the Author, 2013

\nrightarrow Denotes “does not Granger cause”

Table 5 depicts that export and foreign direct investment Granger-cause each other. This study rejects the null hypothesis of no Granger causality between the variables because F-statistic and chi-square statistic values exceed their respective critical values in both cases. This validates our previous findings in the vector error correction model that there is a long run relationship between export and foreign direct investment (FDI). Therefore, we conclude that there exists bi-directional long run Granger causality between export and FDI in Tanzania for the period 1970 to 2011

CONCLUSION AND RECOMMENDATION

The underlying purpose of this study was to investigate the causal relationship between foreign direct investment (FDI) and export performance in Tanzania. Our results suggest that during 1970 - 2011 FDI contributed to higher supply capacity in Tanzania, leading to more exports, which in turn motivated more inflow of FDI. Therefore, there is FDI-led export and

export-driven FDI linkages, and this is the existence of a bi-directional causality between export and foreign direct investment in Tanzania.

These results have important implications for policymakers in Tanzania and other transition economies. First, our results support the notion that foreign direct investment and export are good predictors of each other. Hence, policymakers should design appropriate policies to promote the export sector and attract more foreign investment into the country. On the face of burgeoning supply constraints even for the internal market, there is a need to encourage more production and foreign direct investment in production sectors to offset the supply constraints.

This study did not investigate the causal relationship between foreign direct investment and import. Researchers may investigate the flow of causality between these two variables in the country. Results from such a study may help to give a clear picture of the relationship between foreign direct investment and trade, and therefore ascertain whether foreign direct investment and trade can further improve the balance of trade of the host country without restricting import. We believe that this is an important research agenda that we plan to tackle in the near future.

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