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FOREIGN DIRECT INVESTMENT AND ECONOMIC PROGRESS: APPLICATION OF A DYNAMIC MODEL

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─Abstract─

Capital movements, whether in the form of foreign direct investment or foreign portfolio investment are considered to have a positive multiplier effect on the economy. The study contributes to the empirical literature by investigating whether foreign direct investment affects economic growth using Namibia as a test centre. The study made use of vector autoregression method to examine this relationship. A quarterly data covering 1990:Q1 to 2014:Q4 was employed. The results found cointegrating relationships among the four variables that were investigated. The estimated long-run equation also suggests a positive relationship amongst the variables that have been examined in the study. Surprisingly, no evidence of causality was found pertaining to the variables assessed in the study. Moreover, real exchange rate and net foreign direct investment contributed more towards innovations in economic growth during the forecast horizon compared to the openness index. The study concludes by crafting opportunities for further inquiries.

Key Words: Trade, growth, cointegration, empirical, developing countries, Namibia.

JEL Classification: C5, F14, F21, F41, F43.

1. INTRODUCTION

Development economists have over the years widely acknowledged the potential benefits arising from foreign direct investment on developing countries through direct and indirect ways. Biswas (2002) concisely points out some of the acclaim benefits of foreign direct investment (FDI) on the host countries. These include improvement of the competitiveness of the host countries' economies in the international arena, as well as better access to global markets. Further, FDI improves the quality of products and processes across sectors. Besides, profits generated by FDI contribute to corporate tax revenues of the host country. Employment opportunities are created, especially in sectors that are heavily driven by labour-intensive technologies such as the agriculture sector. In addition, FDI in manufacturing will in most cases boost the level of productivity in the local economy. Also, the research findings of (Blonigen and Wang, 2005), (Li and Liu, 2005), as well as, (Ayanwale, 2007) supports the view that FDI stimulates growth, especially in the context of developing countries.

Further strengthening the case for FDI-growth nexus, Karimi and Zulkornain (2009) found that FDI could be used to explain the growth pattern that has taken place in the economy of Malaysia over time. In addition, Emin (2011) implicated FDI, trade surplus and inflation as sources of growth in the economy of Turkey during the period, 1970-2006. Besides, studies by Agrawal and Khan (2011), Farkas (2012), Roy (2012), as well as, Iamsiraroj and Doucouliagos (2015)) further strengthens the positive influence of FDI in the process of economic growth for selected developing countries.

However, some other documented empirical studies in the literature pertaining to FDI and economic growth questions this relationship (Vu and Noy 2009; Chaitanya and Tamazian 2010; Aga 2014; Tang 2015). Despite these conflicting results in the existing literature, most developing countries still considers FDI as a potent tool for the promotion and acceleration of economic growth in their economies. In case of Namibia, quantitative studies measuring the impact of FDI on the country's economic growth are mainly qualitative in nature. It is also pertinent to mention at this juncture Namibia has been able to attract a huge amount of FDI through its export processing zone scheme. Therefore, the study is driven by the following prime objectives:

- To determine the impact of foreign direct investment on the economy of Namibia for the period 1990:Q1 to 2014:Q4, and thereafter make appropriate recommendations,
- To estimate a long-run relationship between foreign direct investment and economic growth in Namibia,
- To assess the possibility of a causal relationship between foreign direct investment and Namibia's economic performance for the period under consideration.

This study contributes to the existing literature in three ways: Firstly, the study was carried out within a dynamic framework through the application of cointegration methods as against static analysis. This enabled the study to establish the possibility of long-run relationships among the variables used in the model. Secondly, by making use of only one country and in this case Namibia, the study was able to comprehensively elaborate upon issues that specifically relates to Namibia. Moreover from a policy standpoint, the study adds value to Namibia's export policy through its findings and the recommendations that have been put forward. The rest of the research article is structured in the following way: Literature review. This is followed by data sources and research method. Thereafter, the estimated results are discussed. Finally, the study makes appropriate recommendations, and concludes by creating opportunities for further research.

2. EMPIRICAL LITERATURE

A variety of theoretical and empirical studies are found in the literature pertaining to the impact of foreign direct investment on economic growth in both developed and developing countries. The main findings arising from some of these studies are hereby presented in a chronological fashion.

Hsu and Wu (2008) investigated the relationship between FDI and economic growth using regression method. FDI alone was found to be a good predictor of economic growth. A sample of sixty two countries covering the period from 1975 to 2000 was used in the study.

Nuzhat (2008) using regressing method probed into the influence of FDI on economic growth of Pakistan for the period 1980 to 2006. Domestic capital,

foreign owned capital and labour force were used in the study model. The study found a negative relationship between GDP and FDI inflows in Pakistan.

Abel and Nikki (2011) investigated the effect of some selected macroeconomic variables on FDI for thirty African countries for the period stretching from 1995 to 2008 and with the application of regression method. The study found that financial development, market size and infrastructural development are important factors that contribute to economic performance of the countries that were examined.

Behname (2012) employed a dynamic model to determine the impact of FDI on economic growth in selected Southern Asian countries. The study found reasons to suspect that FDI could potentially promote economic growth in the countries used in the study.

Onakoya (2012) using disaggregated datasets employed a structural macro-econometric model consisting of four blocks, namely; supply, private demand, government and external sectors to measure the impact of FDI on economic growth. The findings indicated that FDI contributes to the promotion of economic growth in Nigeria. However, the growth effect of FDI varies across sectors.

Kashif and Muhammad (2013) investigated the impact of FDI on Pakistan economic growth. The study developed an auto regressive distributed lag (ARDL) model. The model examines long run relationship between the variables and found absence of long run relationship between FDI and economic growth.

Ould (2015) made use of cointegration procedures to assess the influence of FDI on the economic growth of Mauritania for the period 1976 to 1995. The researcher utilised quarterly data in the study and found long-run relationships amongst the variables in the model. The researcher concludes that FDI and gross fixed capital formation are necessary requirements for accelerating economic growth in Mauritania.

Mohammed and Mahfuzul (2016) with the use of annual time series data for the period running from 1973 to 2014, as well as cointegration method estimated the effect of FDI on the economy of Bangladesh. The findings of the study suggests that trade and FDI had a significant impact on Bangladesh economic performance. The study also indicates a long-term relationship amongst the variables used in the model. The study concludes by recommending that the government of Mauritania should put in place policies that would potentially make the country's macroeconomic environment competitive so as to encourage FDI.

Abdouli and Hammami (2017) using panel data and dynamic model determined the role of economic growth, human capital and the environment in attracting FDI inflows for four selected African Mediterranean countries over the period 1990–2013. The analysed estimated results' suggests that higher human capital attracts FDI inflows in the four countries considered in the study. Furthermore, the results' indicates that weak environmental regulations increase FDI inflows. Besides, the findings' demonstrates that FDI inflows do not lead to economic growth in the countries considered in the study.

The literature reviewed points to conflicting results pertaining to the role of FDI in the promotion of economic growth. Therefore, whether FDI inflows would necessarily lead to economic growth in a country remains unsolved. This study employs the method of vector autoregression to examine the relation between FDI and economic growth in Namibia.

3. DATA SOURCES AND RESEARCH METHOD

3.1 Data sources

The following served as vital sources for the collation of macroeconomic data that were used in this study: The Bank of Namibia's statistical publications, the Namibia Statistical Agency's Bulletins, the World Bank statistical publications, as well as the Namibia's National Planning Commission's bulletins. The annual macroeconomic data used in the study stretches from the period 1990 to 2014. All the data used in the estimation process were first converted into quarterly datasets, and thereafter transformed into their respective natural logarithms so as to help with the process of determining the responsiveness of the dependent variable to changes in respect of the explanatory variables in the model. Furthermore, all the macroeconomic data used in the study were deflated by using selected GDP deflator.

3.2 Research Method

The study focused on the estimation of the impact of foreign direct investment on Namibia's economic performance using the vector autoregression method (VAR). In this context, the estimation procedure conformed to the following sequencing: Unit root tests, cointegration tests, estimation of the long-run equation, and diagnostic checks for autocorrelation, heteroscedasticity and normality, causality

tests, as well as the forecast-error variance decomposition analysis. Based on empirical literature, theoretical economic knowledge and the driving objective of the study, the following variables were included in the econometric model for purposes of estimation: Real gross domestic product (RGDP) served as the dependent variable, while real exchange rate (RER), openness index (OPI) and net foreign direct investment (NFDI) were used as the explanatory variables. Thereafter, the study employed a simple VAR model, which is specified below to estimate the econometric model:

$$K_t = bi + \sum_{i=1}^{k} C_i K_{t-1} + \mu_t$$

Where K_t is further expressed as:

$K_t = (RGDP, RER, NFDI, OPI)$, the vector of real gross domestic product, real exchange rate, net foreign direct investment and openness and

bi = intercepts of autonomous variables

C_i = matrix of coefficients of all the variables in the model

K_{t-1} = vector of the lagged variables

μ_t = vector of the random error terms

A wide range of benefits results from the application of VAR models in econometric time series studies. Firstly, the use of VAR models does not require the orthogonalisation of shocks and is, therefore, not affected by the ordering of the variables used in the VAR models. Indeed, the method is unique and takes full account of the historical patterns of correlations between different shocks. Moreover, in a non-diagonal error variance matrix, the orthogonalised and the generalised impulse responses are equivalent only for the first equation in the VAR (Pesaran and Shin, 1998). However, the use of VAR models does not allow the researcher to obtain the variance decomposition for any single equation of the system. This limits the researcher to distinguish between the direct impact of the policy shock on any single variable in the system and the impact resulting from innovations in other variables of the system.

Another argumentative issue pertaining to the use of VAR models is that of non-stationarity, as there is no clear cut on the choice of estimating the variables in levels and differenced. However, it is argued that, if the system of a set of non-

stationary variables is cointegrated, it is recommended to perform the VAR analysis using the variables in levels, while if cointegration does not exist, it is recommended to use the differenced variables (Mousa, 2010) and (Sheefeni, 2013). Enders (2004) advocates for the traditional approach of transforming the data to stationary regressors prior to estimation, regardless of whether the point of focus is long-run or short-run relationships. Against this background, the study adopted the method of VAR to analyze the relationship between foreign direct investment and economic growth by using Namibia as a test hub.

4. RESULTS AND DISCUSSION

4.1 Unit root tests

The empirical estimation process regarding the study began with testing for unit roots. In this regard, the study employed the Augmented Dickey-Fuller (ADF) procedures in testing for unit roots. Table 1 summarises the unit root test results.

Table-1. Unit root tests: Augmented Dickey-Fuller (ADF) test

Variables	Levels	First Difference	Remarks
	ADF stat	ADF stat	
lnRGDP	-0.671170	-3.621812**	1 (1)
lnNFDI	-4.404844	-4.696419**	1 (1)
InRER	-2.848827	-2.854002**	1 (1)
lnOPI	-1.668310	-3.053193**	1 (1)

Note that ** implies rejection of the null hypothesis at the 5% level.

Source: Author's compilation

Table 1 indicates that all the four variables used in the model, namely net foreign direct investment, real gross domestic product, real exchange rates and the openness index only became stationary after first differencing. Therefore, from a technical point of view estimation based on the time series datasets are not likely to yield spurious results.

4.2 Cointegration tests

The study resorted to the use of the Johansen cointegration test in determining the existence of long-run relationships among the variables in the model. That is, the existence of a long-run equilibrium to which an economic system converges over time. Table 2 displays the cointegration test results.

Table-2. Cointegration check: Johansen cointegration test

Maximum Eigen test				Trace test			
H0: rank = r	Ha: rank =	Statistic	95% Critical value	H0: rank = r	Ha: rank =	Statistic	95% Critical value
r = 0	r =1	34.14090	27.58434	r = 0	r =1	66.78759	47.85613
r <=1	r =2	23.29428	21.13162	r <=1	r =2	32.64669	29.79707
r <=2	r =3	9.287694	14.26460	r <=2	r =3	9.352412	15.49471
r <=3	r =4	0.064718	3.841466	r <=3	r =4	0.064718	3.841466

Note: Both Maximum-Eigen test and Trace test shows two cointegrating equations at the 5% level.

Source: Author's compilation

It is apparent from the results reported in Table 2 that the variables under investigation are cointegrated. In other words, long-run relationships do exist among the four variables under examination, since both Maximum-Eigen test and

Trace test consistently shows two cointegrating equations at the 5% level. These results are displayed in Table 2.

4.3 Estimating the long-run equation

Afterwards, the study proceeded with the estimation of the long-run equation which yielded the following result:

$$\Delta InRGDP = -2.385002 + 0.051201\Delta InNFDI + 1.047525\Delta InOPI + 0.399553\Delta InRER \quad (1)$$

The equation (1) confirms a long-run relationship among the dependent and independent variables used in the study. Indeed, all the independent variables were positively related to real gross domestic product. A further scrutiny of the estimated model suggests that a 1 percent increase in net foreign direct investment leads to approximately 0.05 percent increase in economic growth, while a 1 percent increase in openness is also expected to lead to approximately 1 percent jump in economic growth. Furthermore, a 1 percent increase in real exchange rate will result to approximately 0.4 percent rise in economic growth. In effect, the long-run equation indicates a positive relationship amongst the variables under examination, since the coefficients of the estimated regressors in the long-run equation (equation 1) are consistently positively signed.

4.4 Diagnostic check

The study also tested for serial correlation, conditional heteroscedasticity and normality. The results confirm the absence of both serial correlation and heteroscedasticity. Besides, the model was also found to be normally distributed. This is so since all the computed probability values indicated in column 4 in Table 3 are consistently greater than 0.05. Note that the level of significance used in the study was 5%, which was further expressed in probability terms to give 0.05. Therefore, the results obtained are, at least robust from an econometric perspective. The results are reported in Table 3.

Table-3. Diagnostic tests for serial correlation, conditional heteroscedasticity and normality

Test	Null hypothesis	t-statistic	Probability
Lagrange Multiplier	No serial correlation	11.99615	0.7442
Jarque-Bera (JB)	There is normality	7.245	0.526
White (Chi-square)	No conditional heteroscedasticity	20.21451	0.082

S***ource***: Author's compilation

4.5 Causality tests

Next, the study reports on the pairwise Granger-causality tests. The Granger-causality results are displayed in Table 4.

Table-4. Pairwise Granger-causality test

Null Hypothesis	**Observation**	**Probability**
LnRER does not Granger Cause LnRGDP	96	0.2962
LnRGDP does not Granger Cause LnRER	96	0.7481
LnNFDI does not Granger Cause LnRGDP	96	0.1050
LnRGDP does not Granger Cause LnNFDI	96	0.1163
LnOPI does not Granger Cause LnRGDP	96	0.1617
LnRGDP does not Granger Cause LnOPI	96	0.0672
LnNFDI does not Granger Cause LnRER	96	0.1690
LnRER does not Granger Cause LnNFDI	96	0.4594
LnOPI does not Granger Cause LnRER	96	0.6875
LnRER does not Granger Cause LnOPI	96	0.7862
LnOPI does not Granger Cause LnNFDI	96	0.1567
LnNFDI does not Granger Cause LnOPI	96	0.2916

Note that ** means the rejection of the null hypothesis at the 5% level

Source: Author's compilation

Upon inspection of Table 4, none of the pairs demonstrated causality relationships between themselves. This is very surprising considering the fact that most of the related literatures that the study reviewed alluded to a positive and causal relationship between FDI and growth, especially for developing countries. This result could have arisen as a result of the use of highly aggregative data.

Next, the study reports on the Forecast error variance decomposition. The variance decomposition results are displayed in Table 5.

Table-5. Forecast error variance decomposition results

Variance Decomposition of LOGRGDP				
PERIOD	**LnRGDP**	**LnRER**	**LnOPI**	**LnNFDI**
1	100.00	0	0	0
2	99.28290	0.281495	0.071123	0.364485
3	97.46371	1.284279	0.136139	1.115870
4	94.65897	2.864612	0.193056	2.283358
5	91.33872	4.697347	0.239095	3.724842
6	88.09487	6.468595	0.264418	5.172114
7	85.38043	7.992371	0.264418	6.363508
8	83.39757	9.216015	0.241161	7.145258
9	82.12562	10.16893	0.208114	7.497334
10	81.41215	10.91085	0.176826	7.500174

Source: Author's compilation

Table 5 presents forecast error variance decompositions for each variable in the model over a 10-period forecast horizon. The results depict that consistently, economic growth itself accounted for most of the changes or innovations that occurred with respect to economic growth for the period under consideration.

Indeed, the results show that in the first period the fluctuations in economic growth are 100 percent purely driven or explained by economic growth itself. This result conforms to theoretical expectations. Amongst the three explanatory variables used in the model, real exchange rate and net foreign direct investment contributed more towards innovations in economic growth during the forecast horizon. The openness variable consistently made the weakest contribution towards explaining economic growth for the forecast period.

5. CONCLUSION, POLICY IMPLICATION AND FURTHER RESEARCH OPPORTUNITIES

The increasing significance of FDI in the promotion of growth is extensively recognised and as a matter of fact has become one of the highest policy agendas in many developing countries, Namibia inclusive. The study sets out to investigate the possibility of a positive and causal relationship between FDI and growth, using Namibia as a test hub. In this context, cointegration methods were employed with quarterly datasets covering 1990:Q1 to 2014:Q4. The results' indicates that FDI is positively correlated with growth in Namibia. But whether FDI leads to growth or growth leads to FDI still remains an empirical question. Besides, amongst the three explanatory variables used in the model, real exchange rate and net foreign direct investment contributed more towards innovations in economic growth during the forecast horizon compared to openness. The research article affirms the need for policymakers to design and broaden strategies that are capable of attracting FDI, while contemporaneously improving upon the general macroeconomic management policies of the country. The research article is of the view that such policy direction would likely lead to greater success in economic performance. The empirical literature (Agrawal and Khan 2011; Farkas 2012; Roy 2012; Iamsiraroj and Doucouliagos 2015; Ould 2015; Mohammed and Mahfuzul 2016) also strengthens the findings arising from the study.

In consideration of the findings of the study, it is recommended that additional inquiry into the FDI-growth paradigm in Namibia should include the following possibilities: First, the number of explanatory variables used should be increased. Secondly, disaggregated data should be considered. Besides, sectoral impact analysis should be incorporated. Lastly, the need to employ other competing methods in forthcoming inquiries cannot be overstated.

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