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Time Series Bounds Approach to Foreign Direct Investment, Unemployment and Economic Growth in Uganda

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Abstract

This is a causality study on Foreign Direct Investment (FDI), Unemployment and Economic growth in Uganda using time series Autoregressive Distributed Lag (ARDL) bounds approach based on FDI, unemployment rates and GDP datasets from 1993 to 2015. Curtailing levels of unemployment and simultaneously sparkling levels of economic growth are primary macroeconomic objectives of every country. This study intends to be instrumental in advising alternative policies that aim at reducing unemployment and sparkling economic growth; one of which is the attraction of FDI. Literature has no concrete premise for this hypothesis since evidences from some countries show positive results while others show negative results. Our study adopts dynamic ARDL bounds approach with efficient and successful record of undertaking empirical studies of this nature in time series. Using data series obtained from the world bank, our findings indicate no causalities between the variables considered. Therefore, there is no sufficient statistical evidence to suggest that FDI plays significant roles in reducing unemployment and sparkling economic growth. The short-run and long-run dynamics of the model do not point to any statistically significant relationships. Based on this specific country-case premise, the study recommends on the need to revitalize domestic industries and re-strategize FDI comprehensive policy frameworks to provide competitive edge to domestic firms and attract FDI in a pace consistent with the growth agenda of local industries.

Keywords

FDI, ARDL Bounds, Unemployment, Economic Growth

1. Introduction

Economic backwardness and poverty have for long consumed greater part of the economic history of Sub-Saharan Africa countries. This has continued to worsen over the recent decades. Uganda being part of this cluster of nations suffers from extreme levels of poverty, high unemployment, poor infrastructure, large fiscal deficits and very low levels of economic growth among others [1]. These chronic cycles of economic destitute have further been accelerated by global economic crises that have occurred over the recent history such as the 2008 crises when unemployment levels were very high and economic growth was negative. These issues have stimulated vigorous debates especially in the academia on appropriate measures to avert unemployment and spark high levels of economic growth. An alternative view that's lately of concern is the issue of FDI. Various scholarly works have been undertaken to empirically and theoretically examine how foreign direct investment may be instrumental in reducing unemployment and sparkling economic growth. In Sub Saharan Africa, policymakers have been brought to the task of revitalizing the economic potential of the region and accordingly, they rely mostly on FDI as the policy option for stimulating economic activity; Mickiewicz, Radosevic and Varblane [2]. The argument is that foreign direct investment enhances private investments, encourages the creation of new jobs, transfer of knowledge and technological skills of the labor force and generally boosts economic growth in host countries.

Recent statistics drawn from the world investment report indicate that global flows of FDI to developing countries declined from 1.5 trillion in 2012 to $1.2 trillion dollars in 2015 and FDI flows to Africa continued to decline in 2016, by three per cent to $59 billion, according to United Nations Conference on Trade and Development (UNCTAD) [3]. FDI has played positive roles in some African countries and experiences from countries such as Kenya and Zambia vindicate the role critical FDI plays in the economic transformation of a country. For instance, Kenya has made progress in creating employment opportunities given their frantic efforts in attracting FDI over the past decade WBO [4]. A clear example in point according to WBO [4] 300 job opportunities in 2012 were attributed to US$1 million of FDI inflows into Kenya. Such empirical evidence clearly vindicates the theoretical arguments that FDI has a significant direct effect on domestic employment. FDI is also believed to spark employment through indirect means such as movement of skilled labor from the foreign firms to other sectors of the economy.

However, against all these backgrounds of both theoretical and empirical justifications about the contributions of FDI in curtailing unemployment and sparkling growth in Sub Saharan countries like Kenya, it is noteworthy that there is no any clear link between FDI and employment and economic growth in host countries since several other empirical evidences show negative results. Therefore, given the inconsistency with which FDI relates to unemployment and eco-

nomic growth in various countries, this study focuses on Uganda to establish how FDI impacts on unemployment and economic growth.

2. Literature

Fluctuations in business cycles and subsequent spread of global economic crises have propelled scholars into devotion of huge amounts energy and anxiety in studying interdependence between macroeconomic variables and FDI inflows. These studies have considerably focused on labor markets imperfections by using employment or unemployment as a proxy variable for macroeconomic stability [5]. These studies are carried out against the traditionally held notion which suggests that FDI bolsters economic growth and reduces unemployment. Extensive work in recent literature has been done in bivariate and multivariate analysis between pairs of economic growth and unemployment, economic growth and FDI or unemployment and FDI. Despite various empirical outcomes establishing different hypotheses, causality among variables has received less attention among scholars.

A study employing dynamic panel causality carried out by Yayli and Deger [6] established a short run relationship running from the foreign direct investments towards employment and similar findings were realized by Adam P. *et al.* [7] using VAR model for Poland using data between 1995 and 2009.

Studies by Jayaraman and Singh [8] established a long run unidirectional causal relationship between FDI and employment with direction from FDI to employment in Fiji using data for the period 1970-2003 to analyze the relationship between FDI, employment and GDP (Gross Domestic Product). In a similar study, they found short run unidirectional causality.

Causality relationships between FDI, exports, unemployment and GDP for Turkey for the period of 2000-2007 carried out by Aktar and Oztur [9] found contradicting results using data from closely similar period and adopting VAR technique of variance decomposition and impulse response function for the period of 2001:1 to 2007:4 in Turkey. The study found that FDI does not have any impact on unemployment rate and economic growth in Turkey. They found that variations in GDP do not reduce the unemployment rate either. Variations in exports have positive but insignificant effects on GDP.

Similar studies were done in Poland to examine the relationship between FDI, unemployment and GDP over the period of 1995-2009 by Balcerzak and Żurek [10]. Their outcomes indicated that FDI is instrumental in reducing unemployment in the short run. Based ontheir findings they recommended that the government should continue implementing investment attraction policies.

Another similar study was on Sri Lanka by Velnampy, Achuchuthan & Kajananthan [11] investigated the impact of foreign direct investment on economic growth and unemployment. The statistic results from the third model indicated that there is long relationship between FDI and unemployment.

Studies done by Shaari, Hussain and Abralim [12] for the case of Malaysia in-

vestigating the impact of FDI on the unemployment rate and economic growth over the period 1980-2010 indicated that FDI is useful in reducing unemployment, creating more domestic jobs and also has a positive effect on GDP.

Studies by Habib and Sarwar [13] established that FDI and economic growth have a positive impact on employment level. They carried out their study for the case of Pakistan over the period 1970-2011. Other studies suggest no significant impact of FDI on unemployment for a section of countries (China, India and Pakistan for the time period 1985-2008) carried out by Rizvi and Nishat [14].

Based on the examination of the above scholarly works, it's evident that while several studies have alluded to the direction of a positive relationship between FDI and Unemployment and economic growth, it's worthy to make independent country-case studies since there are divergent results showing negative relationships for some countries.

3. Methodology

The ARDL model is an interventional method for time series models that do not clearly feature the elements of simple and standard OLS as well as Error Correction models (ECM). This method works with series that are of varying integral order I (0) or I (1), but not I (2). It carries more preferential weight among econometric researchers because different variables assume different lags as they are fitted into the model in additional to its ease and simplicity to execute among others, Pesaran and Shin [15].

In estimating ARDL models, we clearly and consistently undertook the following procedural steps:

1) We estimated the unrestricted VAR error-correction model as a particular form of ARDL model.

2) We then determined the optimal lag structure of the model.

3) Model diagnostics was thereafter performed by testing whether the errors of the model were serially correlated. This was done using LM test.

4) Dynamic stability of the model was then examined to ensure that the parameters of the model have not changed over the sample period.

5) We tested the evidence of long term relationship among variables by performing bound test.

6) The next procedure required that in case our results from the bound test indicate significant relations, we proceed to estimate long-run levels models and restricted error correction model.

7) Finally, we make use of the results to formulate short-run and long-run dynamics about the variables we are studying.

ARDL models are defined by having lags of dependent variables and other variables as regressors. In our study, our basic formulation for the models can be illustrated from the traditional ARDL as follows:

$$\Delta y_t = \beta_0 + \Sigma \beta_i \Delta y_{t-i} + \Sigma \gamma_j \Delta x_{1t-j} + \Sigma \delta_k \Delta x_{2t-k} + \varphi z_{t-1} + e_t \quad (1)$$

4. Data & Results

This study employs time series data of FDI, unemployment rates and economic growth using data obtained from the world bank data portal http://data.world.org/country/uganda between 1993-2015. This interval was selected because it had data available for the variables under study and the series was long enough to conduct a time series study.

4.1. Stationarity and Unit Root

Study of time series requires that the underlying series is stationary. A series is considered non-stationary when it has unit root. Such a series has no tendency to revert to its long-run deterministic path and its variance is dependent on time. There are many methods of testing unit root, but this study employs two superior methods: The Augmented Dickey Fuller (ADF) [16] and Phillips and Perron, (1988) [17]. The general specifications of the two methods can be stated as follows:

$$\Delta Y_t = \alpha_0 + p1Y_{t-1} + \alpha_2 T + \sum \alpha Y \Delta + u_t \tag{2}$$

$p = 0$ is tested and follows the same asymptotic distribution as DF statistic.

$$H0 : p1 = 0\left(p1 \sim I(1)\right), \text{against}$$
$$Ha : p1 < 0\left(p1 \sim I(0)\right).$$

The null hypothesis for ADF reads that the series is non-stationary and it's similar to that of PP. Our results of the test indicated that at initial levels, FDI and GDP were non-stationary while UNEM was stationary. FDI and GDP were made stationary by taking the first difference after which they became stationary. Our choice of the model for unit root was the one with intercept and no trend (Table 1).

4.2. Specification of the ARDL Model

The general ARDL model is presented as follows;

$$\Delta Y_t = \alpha_0 + \sum \Phi_i \Delta y_{t-i} + \sum \beta_j \Delta x_{t-j} + \sum \delta_k \Delta z_{t-i} + \theta_1 y_{t-1} + \theta_2 x_{t-1} + \theta_3 z_{t-1} + u_t \tag{3}$$

Table 1. Results of unit root tests.

Variables	Augmented Dickey Fuller Test(ADF)		Philips-Perron Test (PP)A	
	Intercept	Intercept & Trend	Intercept	Intercept & Trend
LN_FDI	−0.7409	−3.6194	−0.6604	−2.3142
DLN_FDI	−4.8652*	−3.6887**	−4.8795*	−4.7451*
LN_GDP	−0.7056	−1.5561	−0.7396	−1.8186
DLN_FDI	−3.84601*	−3.7444*	−2.8208*	−3.7023**
LN_UNEM	−4.6226*	−4.5646*	−4.6797*	−4.6069*
DLN_UNEM	−5.0694	−5.0084*	−14.5074*	−13.9953*

Notes: 1. *, **, *** imply significance at the 1% 5% and 10* levels respectively. 2. PP test suggests a non-parametric method of controlling for higher order autocorrelation in a series. The null and the alternative hypotheses tested are the same as for the ADF test.

This is typical of ECM, where Φ_i, β and δ_i are the short-run coefficients while θ_1, θ_2 and θ_3 represent the ARDL long-run coefficients and the error-correction term, z_{t-1} is replaced by the y_{t-1}, x_{t-1}, and z_{t-1} terms. Lagged residuals series therefore become $z_{t-1} = \left(y_{t-1} - a_0 - a_1 x_{1t-1} - a_2 x_{2t-1} \right)$.

In our study, we specify our ARDL models as follows (based on first lag differences):

$$\begin{aligned} \text{DLN\_FDI} = \alpha_0 + \Phi_1 \text{DLN\_FDI} + \delta_2 \text{DLN\_GDP} + \theta_3 \text{DLN\_UNEM} \\ + \Phi_1 \text{LN\_FDI} + \delta_2 \text{LN\_GDP} + \theta_3 \text{LN\_UNEM} + u_t \end{aligned} \tag{4}$$

$$\begin{aligned} \text{DLN\_GDP} = \alpha_0 + \Phi_1 \text{DLN\_FDI} + \delta_2 \text{DLN\_GDP} + \theta_3 \text{DLN\_UNEM} \\ + \Phi_1 \text{LN\_FDI} + \delta_2 \text{DLN\_GDP} + \theta_3 \text{LN\_UNEM} + u_t \end{aligned} \tag{5}$$

$$\begin{aligned} \text{DLN\_UNEM} = \alpha_0 + \Phi_1 \text{DLN\_FDI} + \delta_2 \text{DLN\_GDP} + \theta_3 \text{DLN\_UNEM} \\ + \Phi_1 \text{LN\_FDI} + \delta_2 \text{LN\_GDP} + \theta_3 \text{LN\_UNEM} + u \end{aligned} \tag{6}$$

Based on appropriateness from the diagnostics, we estimated the following model: (Table 2)

$$\begin{aligned} \text{DLN\_FDI} = \alpha_0 + \Phi_1 \text{DLN\_FDI} + \delta_2 \text{DLN\_GDP} + \theta_3 \text{DLN\_UNEM} \\ + \Phi_1 \text{LN\_FDI} + \delta_2 \text{LN\_GDP} + \theta_3 \text{LN\_UNEM} + u \end{aligned} \tag{7}$$

where DLN_FDI, LN_GDP & LN_UNEM are the short-run log differences/ changes for the study variables while the last three represent the long run dynamics.

The results below indicate initial regression results for both the long-run and short-run dynamics. The estimates guide in choosing appropriate dynamics of the model and they do not explain causality.

4.3. Selection of Optimal Lag Structure

After proper specification of the ARDL model, the next critical step is the choice of appropriate lags to be included in the model. This is necessary to determine the optimum lag length(k) by using proper model order selection criteria such as; the Akaike Information Criterion(AIC), Schwarz Bayesian Criterion (SBC) or Hannan-Quinn Criterion(HQC) to obtain Gaussian error terms that are free from serial correlation and heteroscedasticity. These criteria are based on a high

Table 2. Estimation results.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	−0.739908	7.139846	−0.103631	0.9189
D(LN_FDI(−1))	0.009157	0.290757	0.031495	0.9753
D(LN_GDP(−1))	−1.334785	1.088679	−1.226060	0.2404
D(LN_UNEM(−1))	−0.688412	0.497915	−1.382590	0.1884
LN_FDI(−1)	−0.064723	0.227299	−0.284746	0.7800
LN_GDP(−1)	0.081406	0.440376	0.184855	0.8560
LN_UNEM(−1)	0.389463	0.757263	0.514304	0.6151

log-likelihood value, with a "penalty" for including more lags to achieve this. The form of the penalty varies from one criterion to another. Each criterion starts with −2log(L), and then penalizes, so the *smaller* the value of an information criterion the better the result. As shown in Table 3, all the methods chose lag 1 to be the optimal lag to use.

4.4. Model Diagnostics: Serial Correlation

After estimating our appropriate model equation using the appropriate lag, we carried out model diagnostics by checking for autocorrelation using the Breusch-Godfrey Serial Correlation LM Test method under the null hypothesis that there is autocorrelation against that of the alternative that errors are either AR(p) or MA(q), for p and q = 1, 2, 3, ... This is a key element in the assumptions of the ARDL/Bounds Testing methodology of Pesaran *et al.* (2001). As presented, the P-value associated with the Chi-square statistic is way above 5% hence we cannot reject the null hypothesis that errors are serially independent (Table 4).

4.5. Model Diagnostics: Dynamic Stability

The second most important model diagnostics tests is the dynamic stability of the model to assess whether the model's parameters changed at one or more points in the sample period.

In our study, model stability was carried using Recursive OLS Estimates-CUSUM Test and our results indicates that the trend line lies within the boundaries as shown below. The CUSUM (Cumulative Sum) statistics are defined according to:

Table 3. Optimal lag selection.

Lag	LogL	LR	FPE	AIC	SC	HQ
0	−20.12573	NA	0.669700	2.434287	2.583409	2.459525
1	−11.41311	13.75677*	0.298480*	1.622432*	1.821262*	1.656082*
2	−11.11522	0.438988	0.323403	1.696339	1.944876	1.738402
3	−11.07017	0.061650	0.361075	1.796860	2.095104	1.847335
4	−8.720429	2.968095	0.317668	1.654782	2.002733	1.713669

Notes: *indicates lag order selected by the criterion LR: sequential modified LR test statistic (each test at 5% level) FPE: Final prediction error AIC: Akaike information criterion SC: Schwarz information criterion HQ: Hannan-Quinn information criterion.

Table 4. Breusch-godfrey serial correlation LM test.

F-statistic	0.209179	Prob. F(1,13)	0.6550
Obs*R-squared	0.332554	Prob. Chi−Square(1)	0.5642

Source: Researcher's estimations.

$$\text{CUSUM}_t = \sum_{i=k}^{t} w_{i+1,i}$$

for $t = k, k+1, \cdots, T-1$, where $k = 2p+s+1$ is the minimum sample size for which we can fit the model. Under the null hypothesis, the CUSUM$_t$ statistic is drawn from a CUSUM(t-k) distribution. The CUSUM(t − k) distribution is a symmetric distribution centered at 0. Its dispersion increases as $t-k$ increases. We reject the null hypothesis at the 5% significance level if CUSUM$_t$ is below the 2.5-percentile or above the 97.5-percentile of the CUSUM(t − k) distribution. The output will be a **Figure 1** of the CUSUM statistics and bands represent the bounds of the critical region for a test at the five-percent significance level.

4.6. Bound Test for Long Run-Relationship

Our choice for the ARDL model can be represented as follows;

$$\text{DLN\_FDI} = \alpha_0 + \Phi_1 \text{DLN\_FDI} + \delta_2 \text{DLN\_GDP} + \theta_3 \text{DLN\_UNEM} \\ + \Phi_1 \text{LN\_FDI} + \delta_2 \text{LN\_GDP} + \theta_3 \text{LN\_UNEM} + u_t$$

This test is carried out to examine the existence of long term relationships between variables under study. However, the statistical significance of the F-statistics is not based on the provided p-value because the distribution of the test statistic is totally non-standard. We therefore, use the Pesaran table since the exact critical values for the F-test are not available for arbitrary mix of I(0) and I(1) values and it provides *bounds* on the critical values for the *asymptotic* distribution of the F-statistic. For various situations (e.g., different numbers of variables, (k + 1)), they give lower and upper bounds on the critical values. In each case, the lower bound is based on the assumption that all of the variables are I
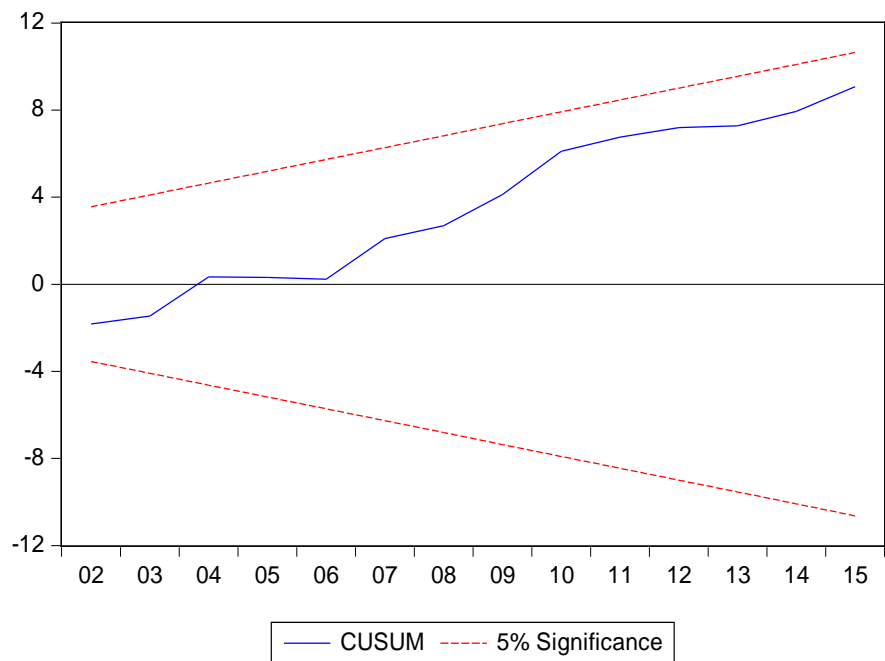

Figure 1. Dynamic stability of the model.

Table 5. Wald test.

Test Statistic	Value	df	Probability
F-statistic	3.472919	(3, 14)	0.0451
Chi-square	10.41876	3	0.0153

(0), and the upper bound is based on the assumption that all of the variables are I (1).

Ho: $\Phi_1 = \delta_2 = \theta_3 = 0$ (null, *i.e.* the long run relationship does not exist)

H1: $\Phi_1 = \delta_2 = \theta_3 \neq 0$ (Alternative, *i.e.* the long run relationship exists)

The task is a simple test of co-integration for *the absence* of a long-run equilibrium relationship between the variables. This coincides with zero coefficients for y_{t-1}, x_{1t-1} and z_{t-1}. A *rejection* of H_0 implies that we have a long-run relationship. From the Pesaran table, the Upper bound is I (1) = 4.35 and the Lower bound I (0) = 3.25 for our model with intercept and no trend (**Table 5**). Since we cannot reject the null hypothesis, we establish that there is no long-run relationship between the variables under consideration.

Our results are as follows:

Lower bound I (1) =3.23.

Upper bound I (0) =4.35.

5. Conclusions and Policy Recommendations

This study was carried out against the backdrop of varied experiences across the world on the relationship between FDI, unemployment and economic growth. While numerous theoretical and empirical evidences have seemed to suggest positive directional relationships in countries such as Kenya, Zimbabwe, Malaysia and Pakistan, other country cases found different results for the same kind of studies. Without any reliable claim to ascertain specific country experience, advising policy for such hot debates can be pretty much troublesome especially for impoverished countries like Uganda.

This study sought to reasonably provide unbiased understanding, insights and conclusions based on empirical assertions by employing time series bounds approach. Our findings did not provide any statistical evidence of cointegration among FDI and unemployment and economic growth. This suggests that FDI does less in curtailing unemployment and sparkling economic growth. These findings are similar to the experiences from Turkey (Yayli and Deger (2012) and Nigeria; Salami and Oyewale (2013). However, given the enormity of econometric tools employable to an intensive study of such debates, we cannot assertively conclude that Uganda is isolated from the rest of the world in terms of benefits from FDI. Findings of this nature, therefore, advise policy to reenergize the potential of domestic industries and first create suitable competitive environment for them instead of prematurely allowing in FDIs.

Uganda should, therefore, prioritize and revitalize its domestic potential in all sectors and re-strategize its FDI policy in a comprehensive framework that em-

bodies and prioritizes competitiveness for its domestic industries.

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