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An empirical examination of Ethiopia's economic growth Potentials: A Time Series Approach

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Abstract:
Issues: Economic growth is a prerequisite for a country's development aspirations. As a result, determining the cause of the problem is imperative. **Methods:** Using the Johansen Cointegration test, this study intends to empirically analyze the long-term term link between Ethiopia's labor force, gross capital formation, openness, and foreign direct investment with economic growth from 1975 to 2018. **Findings:** The Johansen cointegration test reveals a long-term relationship between LAB, GCF, OPENESS, and FDI. The short run dynamics also reveal that the factors in the growth equation have a favorable impact on growth. **Conclusion:** The study recommended that proper policies be implemented to stimulate LAB, GCF, OPEN, and FDI, all of which will contribute to Ethiopia's economic growth.

Keywords: 1. Economic Growth 2. Long run relationship 3. Short Run Dynamics

1. Introduction

Recently, the people of developing countries and government have been at the progress to arrive at more developed economy renewing the backward history such as food insecurity, illiteracy, lack of transport facility, inadequate health sector, less infrastructure facilities and also low level of saving and investment. Pritchett (1998) stressed that economic growth was reasonably strong in much of Sub-Saharan Africa (SSA) between 1960 and 1973. For most countries, however, The subsequent two decades were a period of stagnation that shows there was typically a single main break in the growth trends for most African economies occurring at some point between 1973 and 1980, followed by persistent stagnation until 1992. Many countries have shown a modest recovery since about 1994,

but levels of growth have tended to remain far below the early phase. For the four decades as a whole, SSA's average per capita income growth of 0.9% falls short by 1.5%point in comparison with other developing income countries, and approximately 3% points below that of the high performing African (Botswana and Mauritius) and East Asian Economies.

Even if Ethiopia is the second most populous country in Sub-Saharan Africa which has long standing history, diverse cultural heritage and massive resource for development, the majority of the population lives in absolute poverty. The period 1980s was marked by a state of crises. Thus, by the turn of the 1990s economic policies and management under the command economic system resulted weak economy where growth blocked in most of the years and accompanied by loss of self sufficiency, increase food insecurity and social crisis. Its growth has been poor and deteriorated continually. The average annual GDP growth rate has decline from4.4% in 1960s to 2.3%in the 1970s and to 2.1% in the 1980s (Ministry of Finance and Economic Development, MoFED, 2002).

Generally, sources of economic growth in Less Developing Countries (LDC) in general and in Ethiopia in particular has been modified by different types of studies and reports based different results obtained showing that the accurate source of economic growth is still in question. Different studies undertaken to assess the source of economic growth came with different results and different policy implication that makes difficult to conclude their findings for all. This is so because some come with positive relationship between the variables affecting growth and economic growth, others come with negative result and even others come with inconclusive result. Due to this it is difficult to get a plausible result with appropriate policy implication.

Thus, this paper tries to explain the sources of economic growth in Ethiopia and fill the gap whether variables taken into account labor, capital, openness, and FDI has a significant and positive impact on economic growth of Ethiopia i.e., using recent year's data (from 1975-2018). In doing so the current study differs from the previous study in three major ways. The first, the study applies a broader data set. Secondly, the study uses a time series approach for data analysis and finally the study opts to use a multivariate cointegration technique to know the long run relationship between variables used for the study at hand.

2. Literature Review

Economic growth is related to quantitatively sustainable increase in the country's per capita income that is accompanied by expansion of labor of force, consumption, capital and volume of trade.

Economic growth involves not only more output derived from greater amount of input but also greater efficiency such as the increment of output per unit of input (Berger,2003).

Prichetti (1998) showed that there was typically a single main break in the growth of trends for most African economies at the same point between 1973 and 1980 followed by persistent stagnation until 1992.

Ethiopia's per capita gross national income in 2002 was US$100 much lower than the corresponding SSA of US$480 (World Bank,2005). Over the last 40 years, the country has not been able to sustain high growth rate except short lived growth spurs.

3. Objective of the Study

The objective of this study is to analyze the Ethiopian growth potentials using time series approach.

4. Methods of the study

Using the time series approach, this section deals with the methodology of the study. The unit root test for stationarity of variables, Johnson cointegration test was used to test long run relationship among the variables and (VECM) was used to estimate the short dynamics of short dynamics of the growth equation. All estimations were carried out using econometric software packages.

5. Data Used

The data used in the analysis were collected from National Bank of Ethiopia (NBE) from 1975 to 2018 to analyze the potential sources of economic growth in Ethiopia.

6. Data Analysis

Table 1 below shows the unit root analysis of the macroeconomic variables taken into account as a potential source of economic growth in Ethiopia during the period.

Table 1: The Result for the Augmented Dickey-Fuller (ADF) and Philips-Perron (pp) Unit Root Tests at Level and First Difference;

Variables	Specification	ADF Unit Root Test					Order of Integration
		ADF test Statistic		1% critical Value	5% critical value	p-value	
		Test statistic	Lag length				
LRGDP	With C and T	3.138645	7	-4.262735	-3.552973	1.0000	I(1)
DLRDGP	With C and T	-6.601766	1	-4.219126	-3.533083	0.0000**	
LLAB	With C and T	-0.69273	1	-4.211868	-3.529758	0.9666	I(1)
DLLAB	With C and T	-9.277948	0	-4.211868	-3.529758	0.0000**	
LGCF	With C and	-	2	-	-	0.1317	I(1)

	T	3.054101		4.219126	3.533083		
DGCF	With C and T	-3.45035	1	-4.219126	-3.533083	00.0016**	
LOPEN	With C and T	-1.826854	0	-4.205004	-3.526609	0.6728	I(1)
DLOPEN	With C and T	-5.878772	0	-4.212868	-3.529758	0.0001**	
LFDI	With C and T	-2.539593	0	-4.205004	-3.526609	0.3086	I(1)
DLFDI	With C and T	-8.062417	0	-4.211868	-3.529758	0.0000**	

* and ** indicates the rejction of null hypothesis (unit root) at 5% and 1% respectively . Where C and T are constant and Trend.

Source: Own Computation, 2021

As results has shown in Table 1, both the ADF (adjusted for lag length by Akaike information criteria) LRGDP is non –stationary in levels which indicates the null hypothesis of unit root is not rejected at the 1% and 5% level of significances.

However, when the first difference of LRGDO is taken, both the ADF test indicate stationary of LRGDP at the 1% and 5% level of significance. The tests also revealed that LLAB, LGCF,LOPEN, and LFDI are all non-stationary at levels. But when differenced once they became stationary. Harris (1995:15) noted…. A data series is said to be stationary if its error term has zero mean, constant variance, and the covariance between any two-time periods depends only on the distance or lag between the two periods and not on the actual time at which it is computed.

Generally, the ADF test from the above table shows that all variables are integrated of the same order that means they are all integrated of order one, I (1). Co- integration analysis is reasonable in carrying out the specified growth model estimation because of the fact that the determination of co-integrating relationships doesn't suffer from mixed order of integration.

Table 2. Results of the Johansen Co-integration Test

Null Hypothesis	Alternative Hypothesis	Eigen Value	Statistic	5%Critical value	Prob.	Hypothesized No.CE(s)
Trace test(trace)						
r=0	r≥ 0	0470990	70.81889	69.81889	0.0444*	None
r≤1	r≥ 1	0.432234	45.62468	47.85613	0.0798	At most 1
r≤2	r≥ 2	0.303190	23.54890	29.79707	0.2201	At most 2
r≤3	r≥ 3	0.199557	9.460442	15.49471	0.3245	At most 3
r≤4	r≥ 4	0.019788	0.779452	3.841466	0.3773	At most 4

Source: Own Computation, 2021

Thus, we can conclude that there is only unique one co-integrating vector linking RGDP to the variables used in this study.

Table 3: Result of the Final Long Run Growth Equation

Variable	LLAB	LGCF	LOPEN	LFDI
Coefficient	4.986872	0.2351874	0.1753929	0.0122
P value	0.000**	0.015*	0.032*	0.158

From table 3 above, the long run growth equation is presented thus:

LRGDP= 4987LLAB+ 0.235LGCF+0.15LOPEN+0.0122LFDI

P value [0.000]** [0.015]* [0.032]* [0.158]

**(*) significant at 1% and 5% respectively

As shown in the above equation, the long run result shows that all explanatory variables are significant in affecting growth at conventional level of significance as can be seen from p value. Moreover, the variables from the long run equation are with their expected sign though FDI is not affecting GDP at conventional level of significance.

The adequacy of model and stability of the parameters in the long run is tested by the plot of the recursive estimates of non –zero eigenvalues.. As can be seen from the graphs, all the vectors corresponding to each variable are stable. Thus, the null hypothesis of overall parameter consistency from the VAR cannot be rejected based on the 1-step recursive residuals (1-step-residuals+/-2nd SE).

As the standard growth theory, the regression result shows that, both labor force and gross capital formation variables produced significant and positive influence on growth. The result implies that (LLAB and LGCF) variables play major role in inducing growth. Referring to the result, a one percent increment in the labor force ration results in increasing the real GDP of a country by 4.99% and this result is significant at conventional level of significance. The long run elasticity of LRGDP with respect to LGCF is 0.23%, implying one percent increase in investment produces 0.23% increment in output. The result coincides with the findings of Fosu (1991) for the case of Bangladesh, and also Asante, (2000) in case of Ghana.

As many times argued in the development arena that foreign direct investment and openness are two important contributing factors for economic growth, the present study also find out strong relationship which can be used for an evidence for this claim for Ethiopia. Labor force is more important engine of growth. This finding provides some important policy implications. Firstly, attracting the FDI can necessarily bring economic development and hence Government's all out effort should be to attracting the FDI investments and also ensures that the investment can be used in such a way that can contribute the economy positively. GCF is also significant predictor of GDP. The short run dynamic equation for growth function is reported as follows:

Table 4: Short Run Dynamics Result (Dependent: DLRGDP)

Variable	Coefficient	Standard Error	t-value	t-prob	Part.R^2
Constant	-0.0100244	0.009918	-1.09	028	0.0358
DLRGDP-1	0.906020	0.1537	5.89	0.000	0.5205
DLLAB	0.721513	0.2509	2.88	0.007	0.2054
DLLAB	1.63882	0.2417	6.78	0.000	0.5895
DLGCF	0.112430	0.03600	3.12	0.004	0.2335
DLFDI-2	0.0244992	0.004670	5.25	0.000	0.4623
ECM-1	-0.977536	0.2400	-4.07	0.000	0.3414
R^2 = 0.73051		**F(6,32)= 14.46 [0.000]****		**Dw=1.92**	

Diagnostic Tests

AR 1-2 test: **F(2,30)=0.52137[0.5990]**

ARCH 1-1 test **F(1,30)=0.410[0.4677]**

Normality test: **Chi^ 2(2)=0.31718[0.8533]**

Hetero test: **F(12,19)= 0.9566[0.5175]**

RESET test: **F (1,31)= 1,4503 [0.2376]**

Source: Own Computation, 2021

The result of table 4 shows that the estimated coefficients are significant with the theoretical expected sign. Goodness of fit of the model(R ^2) shows, 73% of a variation in the dependent variable (DRGDP) is explained by the combined effects of all the determinants of RGDP in the short-run so that the variation in the explanatory variables is included in the model. All the coefficients in the model are jointly significant under F statistics this means the null hypothesis that states all variables are jointly insignificant is rejected. The Durban Watson (DW) test also results suggests that there is no auto-correlation. Moreover, the various diagnostic tests performed do not detect any problem about the regression analysis. That is, the test does not

Reject the null of white noise error terms suggesting no problem of error auto-correlation. In addition, the test for autoregressive conditional hetroscedasticity (ARCH) points that not ARCH structure of constant variance. The Jacque Bera test for normality cannot reject the null hypothesis of normality. It points out that the error term is normally distributed.

The result shows that the short run changes in RGDP growth is affected positively and significantly by the one period lagged labor force and investment. A current GCF and two periods lagged FDI affects the change in the RGDP growth positively and significantly.

The lagged error correction term (ECT-1) included in the model to capture the long run dynamics between the co-integrating serious is correctly signed by negative. This coefficient indicates a speed of adjustment 97% from actual growth in the previous year to equilibrium rate of economic growth. This implies that in one year RGDP adjusts to the equilibrium by 97%.

7. Conclusion

Low level of domestic saving and shortage of capital, is faced by most developing countries, Specifically. Ethiopian has ample of development programs to be undertaken. This is in turn necessitating the country to rely on potential factors that leads to economic growth and development. However, there is no clear idea about factors responsible for the source of economic growth in Ethiopia. As result, the main objective of this study is to identify and empirically analyze the source of economic growth in Ethiopia using annual time series data from 1975 to 2018.

The estimation is made by using the Johanson maximum likelihood estimation method. Multivariate co-integration technique is used for the analysis of the long run relation whereas VECM analysis is used to assess the short run relationship and its linkage with the long run equilibrium path. However, before looking to their co-integration relationship, each variables were tested for their time series property using ADF and pp test of stationary and all variables are identified that they are co-integrated of order one, I(1). The test for the number of co-integrating vectors; and test statistics were employed and the result shows that the null hypothesis of zero co-integrating vectors is rejected in favors of one co-integration relationship.

In accordance with the objective of the study RGDP growth and its potential relationship with explanatory variables were tested. The result showed that all explanatory variables are with expected, LAB, GCF, OPEN and FDI have a positive contribution on the RGDP both in the short and long run which confirms that all those variables are the core determinants of economic growth of Ethiopia.

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