LONG-TERM GROWTH OPPORTUNITIES IN ETHIOPIA[1]

Mihret Alemu[2]

Abstract

The paper attempts to investigate the role of institutions in the long-term growth performance of Ethiopia. In this study, it is hypothesized that the long-term growth of the country, apart from traditional factors of production i.e. capital and labor is largely influenced by institutional factors. To examine this, the study uses a times series data on important variables for the period 1967/68-2002/03, and employed Johansen cointegration analysis. The variables used are, institutional quality indicators, human capital, labor force, capital stock, road network, and rainfall. The findings of the paper support the above stated hypothesis. Institution and physical capital are found to be significant in both the long and short run models while human capital is found important only in the long run.

1. Introduction

Nations in the world have witnessed a variety of growth experiences in the past half century. Countries have been categorized as "growth disasters", in which per capita income has fallen since early 1960s, and "growth miracles", where per capita income has risen rapidly. Between 1985 and 1995, East Asia experienced the fastest growth of GNP per capita (more than 7 percent a year) while in sub-Saharan Africa the average annual growth rate during the same period was –1.1 percent Temple (1999).

Income differences between the developed and most developing nations are getting considerably high. Asia is the only major region that has achieved significant convergence toward developed countries' level of GNP per capita. Per capita income in the newly industrializing economies of Asia-China, Korea, Singapore, and Taiwan increased from 18 percent of the developed countries' average in 1965 to 66 percent in 1995. At the same time, most of Africa became even poorer in relative terms. The relative average per capita income of many African countries, which was 14 percent

[1] The final version of this article was submitted in July 2006.
[2] National Bank of Ethiopia, email: amihret@yahoo.com

of the developed countries' level in 1965, declined significantly to just 7 percent in 1995 Soubbotina and Sheram (2000).

Explaining such disparities has drawn attention of most researchers in the economics field. However, we find no set of identical reasons for growing or not growing. In fact, the real world episode of growth is not fully explained by the growth theories (either the neoclassical or endogenous growth theories). This is one of the reasons why researchers of economic growth kept on investigating for additional explaining factors apart from the conventional factor accumulation, technological progress, education, etc. These factors, according to North & Thomas (1973) don't explain growth, rather they are growth themselves.

North (1990) stated that poor growth performance of less developed countries is explained by the institutional constraints, which define a set of payoffs to political/economic activity that do not encourage productive activity. He proposed insights of economic growth are better found in the institutional context in which economic activities take place. Institutions are considered to provide the "missing links" in efforts made so far in explaining growth disparities Johannes (2003).

Following this insight, the paper aims at answering whether the long-term growth of Ethiopia is determined mainly by the traditional factors of production (capital and labor) or variables which have been getting emphasis in recent years in explaining growth in the African context, particularly institutional changes. Researchers like Easterly and Levine, Sala I Martini, and others give emphasis for the factors like Geography, Colonization, Ethnic fictionalization, and more importantly, institutional qualities in explaining disastrous performance of Sub Sahara Africa.

Conceptualizing institutions

Definitions of institutions are given in a wide continuum. There is no universally agreed single definition for the term institution. As Commons (1931) puts it, it sometimes mean "a framework of laws or natural rights within which individuals act like inmates, or the behavior of the inmates themselves" or, "anything additional/critical of the classical economics" or, anything that is "economic behavior" or, anything that is "dynamic" instead of "static," or a "process" instead of "commodities", or "activity" instead of "feelings", or "mass action" instead of "individual action," or "management" instead of "equilibrium", or "control" instead of "laissez faire", seems to be institutional economics, all of these notions are involved in the definitions of institutional economics Commons (1931).

Commons (1970) as reviewed by Osmani Prates Silveira (2004) define institutions as "established societal organizations, which included *inter alia* universities, labor unions, churches, political parties and government". Williamson (1985) on the other hand, defined institutions as "alternative organizational mechanism: markets, hybrids and hierarchies".

The recent and widely used definition of institutions is given by North (1990)[3]. North (1990) defines institutions as the "formal and informal constraints on political, economic, and social interactions". According to North (1990) the informal institutions are unwritten laws, which are normally expressed in norms of informal interaction (within the family, or external social relations, or in business activities) of a given society. Informal institutions are represented by codes of conduct, norms of behavior, conventions, taboos, customs, and traditions. On the other hand, formal institutions include political (and judicial) rules, economic rules, and contracts. Political rules broadly define the hierarchical structure of the polity, its basic decision structure, and the explicit characteristics of agenda control. Economic rules define property rights that are the bundle of rights over the use and the income to be derived from property and the ability to alienate an asset or a resource. Contracts contain the provisions specific to a particular agreement in exchange.[4]

Channel of influence on growth

The quality and type of institutions countries acquire as in North (1990), both formal and informal, shape their development outcomes. This insight is missing from prominent growth theorizing works, neoclassical and endogenous growth theories. The neoclassical growth theory which was largely attributed to Ramsey (1928) in the early days and recently to Solow (1956) focused on the importance of factors like investment, population and technological changes without considering the importance of institutions. Incorporating institutions formally into economic theory is a recent practice, attributed particularly to various works of Douglas North. North (1990) attempted to unravel what the neoclassical economics lacks and fill the gap with formally theorizing institutional economics. According to him the rational expectation assumption makes the neoclassical school an institution free school and further emphasized the systemic absence of institutions from economic theory by stating:

> *"Neo-classical economists have implicitly assumed that institutions (economic as well as political) don't matter and that the static analysis embodied in allocative-efficiency models should be the guide to policy; that is*

[3] IMF (2003)
[4] Only the formally institution aspect of the definition given by North (1990) is put into use in this paper.

> *"getting the prices right" by eliminating exchange and price controls. In fact the state can never be treated as an exogenous actor in development policy and getting the prices right only has the desired consequences when you already have in place a set of property rights and enforcement that will then produce the competitive market conditions."*
>
> *Douglas North (1990)*

The rationality assumption of the neoclassical economics imply that markets are always efficient and there is no room for ideas, ideologies and hence, institutions. However, in real world, human interaction in the process of exchange, is constrained by incomplete information and limited mental capacity to process available information. The need to backup development efforts by quality institution arises here. Societies entail institutions as a means to reduce transaction costs that arise from asymmetrically held and costly information.

Hence, appropriate institutions contribute to growth by establishing an incentive structure that reduces uncertainty and promotes efficiency. According to Lora and Panizza (2002), good quality institutions can affect economic outcome of a given country by reducing transaction cost and facilitating market exchange, and by setting up a system of incentives, which involve societies in a productive activity.

How important are institutions empirically?

The central story of economic growth over the last 50 years has been the contrast between the years 1950-74 and 1975-2000. The former was a time of general prosperity, in which all strategies yielded positive outcomes; rich and poor countries, open and closed economies, temperate and tropical countries everyone did well. The twenty-year period between 1974 and 1994, however, was disastrous for virtually everyone except the East Asian Tigers and India; the developing world suffered a twenty-year growth collapse, from which it has only recently emerged. While the causes of the global recession in the 1974-1994 are fairly well-known, it is instructive to examine some of the differences between those countries that weathered the storm, and those that did not. In his study of a large sample of developing countries, Rodrik (1999) finds compelling evidence that weak public institutions and ethnically divided societies responded worse to the shock than did those with high quality institutions and united societies Ritzen, Easterly, and Woolcock (2000).

Moers (1999) empirically examined the relationship between institutions, and investment and growth for the period 1990-95 for 25 countries with a special focus on transition economies where the author believes institutional transformation plays a prominent role in the transition process. With the argument that the robustness of

objective institutional measures is limited in many empirical studies of growth, mainly due to the reason that their economic content is small and they don't capture uncertainties that economic agents perceive as crucial the author used subjective institutional measures[5]. Estimation results suggest that particularly public institutions are significant for growth especially through their influence on foreign direct investment. This suggests that macroeconomic stabilization and peace should be the main policy priorities in transition, closely followed by institution building. Generally, the significant results suggest that some 25 to 30% of the variation in growth across transition countries can be explained by variations in formal institutions. Current estimation results moreover indicate that the quality of institutions is *more* important than a host of variables which are generally considered to have a strong effect on growth and investment. Out of 15 control variables only inflation and war seem to have been relatively more important for growth performance in transition economies than institutions per se, with the latter again gaining some importance on inflation during the more recent period. This suggests that macroeconomic stabilization and peace should be the main policy priorities in transition, closely followed by institution building Moers (1999).

Rodrik, Subramanian and Trebbi (2002) empirically analyzed the respective contributions of institutions, geography, and trade in determining income levels among countries of the world. The authors attempted to answer questions like, how much of the astounding variation in cross-national incomes around the world can geography, integration, and institutions explain? Is there any interaction between these factors or do they operate additively? Does any one of the factors trump the other two? and what is the relative importance of each factor? To address such questions, the authors estimated a series of regressions in which incomes are related to measures of geography, integration, and institutions. Their findings on causal links among the determinants suggest that, there is a two-way positive link between institutional quality and integration/trade, which imply that an indirect effect of trade on income. In terms of the relative importance of the factors under consideration, their result indicates that the quality of institutions "trumps" everything else. According to the authors, once institutions are controlled for, measures of geography have weak direct effects on income, and a strong indirect effect through influencing the quality of institutions while the trade is almost always insignificant and the unexpected sign though it has a positive effect on institutional quality Rodrik, Subramanian and Trebbi (2002).

[5] Objective institutional measures refer to universally observable indicators while subjective institutional measures are based on surveys and opinions (Moers 1999)

On the other hand, Sachs (2003) claims the findings and conclusions of Rodrik, Subramanian and Trebbi, 2002 and similar findings of Acemoglu, Johnson, and Robinson (2001); Easterly and Levine (2002) as surprising conclusions. According to Sachs (2003), many of the reasons why geography seems to have affected institutional choices in the past (e.g. the suitability of locations for European technologies, the disease environment and risks to survival of immigrants, the productivity of agriculture, the transport costs between far-flung regions and major markets) are indeed based on *direct* effects of geography on production systems, human health, and environmental sustainability, and many of those very same channels would still be likely to apply today. Thus, the logic of the geography-institutions linkage is also the logic of a direct geography-productivity linkage. Based on these arguments, Sachs (2003) ran a two stage least square regression to estimate income as a function of institutional quality and an alternative measure for geography, malaria risk. Despite the findings of previous studies, in Sachs (2003) after controlling for the quality of institutions, the hypothesis that geography matters only through institutions was rejected. His findings suggest a direct effect of malaria transmission on income. Nevertheless, he also argues that the development process reveals complex interactions of institutions, policies, and geography Sachs (2003).

When we see the case of Ethiopia, though the country shares the same fate of underdevelopment with the other sub-Sahara Africa countries, there is no much record of an attempt to disentangle the factors behind the poor growth and standard of living records. Easterly's (2002) attempt among the few. He examines the growth process in Ethiopia first by conducting a growth accounting exercise. This is done by classifying the data into three distinct periods: the Monarchy, the Derg and the Reformist. He argued that negative total factor productivity is the main source to the recorded slow growth during all the three periods. Total factor productivity was persistently negative for the Derg period while it was positive in the other two periods. The negative total factor productivity during the Derg period, explained a general fact that capital accumulation was overstated since it was directed to non-productive uses, which could not truly be a capital accumulation. On the other hand, about half of the growth during the Reformist period came from policy changes such as financial deepening, real depreciation, and the reduction of the black market premium on foreign exchange. He finally analyzes what he considers the fundamental determinants of economic growth like good institutions, high literacy, high openness to trade, and a high degree of structural transformation. According to Easterly, these are the fundamental determinants, which go a long way towards explaining Ethiopia's currently low level of development Easterly (2002).

Alemayehu and Befekadu (2002) attempt to determine the factors of growth in Ethiopia focusing on the role of political economy factors, institutions/markets and

agent's behavior in explaining the growth process in Ethiopia using a cross-country framework. They made regime-based classification of the last four decades: Imperial, Derg and EPRDF. Unlike the findings of Easterly (2002), applying the augmented Solow model total factor productivity in this case was negative irrespective of the regimes under consideration. Their finding suggest that, in the four decades under consideration, GDP growth was mainly due to the extensive use of capital and labor instead of total factor productivity growth. Factors like drought, international commodity prices, peace and security are the major determining factors of economic growth performance of the country mediated through institutions in a form of underdeveloped product, factor markets and the reaction of economic agents.

Netsanet (1997) attempts to see the relationship between economic growth and human resource development in Ethiopia for the period 1967/68-1994/95. In his study, apart from the physical capital and labor force size, education and nutrition are used as a proxy for human resource development. The conclusion of the study is that education particularly primary education has a positive impact on growth while nutrition is found to be insignificant though positive.

Another empirical work on growth performance of Ethiopia was done by Seid (2000) covering the period 1960/61-1998/99. In this study, in addition to physical capital and labor, variables like export, human development and rainfall are considered. According to his findings, the major determining factors of long run growth are labor, human capital, export, and rainfall.

Some correlations:

	GDP	K	INV	L	INF	h	INS
GDP	1						
K	0.98635	1					
INV	0.97477	0.98382	1				
L	0.97253	0.97461	0.957643	1			
INF	0.97235	0.97260	0.964502	0.987834	1		
h	0.95541	0.93605	0.925845	0.974018	0.980142	1	
INS	0.74784	0.79451	0.840169	0.702468	0.707118	0.613862	1

2. Econometric analysis

Most growth theories predict that long-term economic growth is determined by accumulation of factors of production, physical and human capital, along with the increasing productivity of these factors. Empirical modeling of long term growth however, could easily get complex mainly due to the fact that factors that determine

long-term growth are numerous and could be economic, social, political, and ecological conditions. Not only that the factors are diverse but many of them could also be immeasurable and interrelated in a complex manner. This study adopts the following model as it is applied by most studies with the objective of analyzing the role of institutions in economic performance of either a given country or in a set of countries of interest[6].

$$Y = \alpha + \beta_i I + \beta_z Z + \bar{\varepsilon} \quad \textbf{(1)}$$

Where, Y is GDP, I represents measure of institutions, and Z represents other control variables

The Parameters β_i and β_z indicate the effects of institutional measures and other variables on economic outcome.

$$Y_t = (N_t^{\beta n}, K_t^{\beta k}, Lr_t^{\beta l}, H_t^{\beta h}, Inf_t^{\beta i}, Rf_t^{\beta r}) \quad \textbf{(2)}$$

Taking log form,

$$\ln Y_t = (\beta_n \ln N_t + \beta_k \ln K_t + \beta_l \ln Lr_t + \beta_h \ln H_t + \beta_i \ln Inf_t + \beta_r \ln Rf_t^{\beta r}) \quad \textbf{(3)}$$

Where $\mathbf{Y_t}$ is GDP, N_t is institutional indicator, K_t is capital stock, Lr_t is labor force size, ht is human capital indicator proxied by Human development index, Inf_t is the total road network, Rf_t is rainfall. Where, the **β**s represent individual parameters.

The data

The analysis covers the time period 1967/68-2002/03. Initial and recent years data, unavailable for some variables is calculated based on respective average growth rates of immediate following and preceding years. Also some data are generated by own calculation using standard methods like for example, UNDPs human development index calculation method is used to calculate the human capital and International country risk Guide to calculate to measure the quality of financial an economic institutions. Similarly the capitals tock is calculated base on the perpetual inventory method. Individual methods of generating indicators or proxies are explained as follows.

[6] Such modeling was used by IMF (2003), Sachs (2003), Rodrik, Subramanian & Trebbi (2002), Moers (1999).

GDP (Y_t)

The dependent variable, Yt represents real GDP. The available data for real GDP from the Ministry of Finance and Economic Development (MOFED) has two different series. One for the period 1960/61-1980/81 and the other for 1980/81 – to date. The two GDP series have been linked using the growth rate of the latter series.

Capital Stock (K_t)

There is no ready-made data for capital stock. Hence, the stock of capital used in this paper is generated by own calculation adopting the perpetual inventory method (PIM)[7].

Human Capital (h_t)

The human capital is proxied by *Human Development* index, which is generated using UNDP's calculation method as a composite index of health and education. According to UNDP's calculation, the composite human development index is given by education: measured by enrollment rate and adult literacy and health status: measured by life expectancy at birth and income[8]. Each index is calculated based on:

$$\text{Index} = \frac{Actual - Minimum}{Maximum - Minimum}$$

[7] Capital stock is calculated using the PIM method following the work of (Hoffman 2000).

The general formula is given by:

$K_1 = K_o - Dep + I_1$

$K_1 = K_o (1 - \lambda) + I_1$

Where, K is capital stock

λ is depreciation &

I is investment

However, the challenging issue in this task is to estimate the initial year capital stock so as to apply the above formula and get the level of capital stock for consecutive years. According to the following table the average life of capital in Ethiopia is 16.9 years.

Average life years of capital assets

Type of Asset	Asset life year (Service year)	Depreciation Rate
Construction	30	3.33
Machinery	15	6.67
Vehicle	10	10.00
Cultivated Asset	5	20.00
Total	16.9	5.9

Source: MoFED

The assumption used in calculating the capital stock for the year 1968-2003 is that whatever initial capita the country is endowed with it is going to wear out between 15-20 year of time. To allow this assumption the calculation went as back as 1943 taking investment of the beginning year as equal to the capital stock. Then after the above formula is used to calculate the stock of capital up to the year 2003.

[8] Income is not included in the calculation of human development index used in this study.

Where, Minimum and Maximum are the minimum possible observed value for that specific variable. In the case of life expectancy the minimum is 25 years of age where the maximum is 85 years of age. While in the case of enrollment rate and adult literacy the minimum is 0 percent and the maximum is 100 percent. To calculate the composite human development index, health and education index are assumed to have 50 percent weight each.

Labor force size(Lr_t)

As there is no time series data on the active labor force size, the year 1999 is taken from the 1999 national labor force survey and extended for the years before and after 1999 by the average population growth rate. Source for the 1999 national labor force survey is Central Statistical Authority.

Institutional Quality index (N_t)

Institutional quality index is calculated for the whole period under consideration based on the international country risk guide. According to the international country risk guide, the institutional quality index is a composite index of economic, financial and political risk indicators. The economic risk indicator is composed of variables like, GDP per head, real GDP growth, Annual Inflation Rate, Budget Balance as a percent of GDP, and Current Account Balance as a ratio of GDP. The financial risk indicators are, Foreign Debt to GDP ratio, Debt service, Current account balance as percent of Export of Goods and Services, Net international reserve in months of Imports, and Foreign Exchange Rate. The political risk indicator is composed of indicators like, Government Stability, Socioeconomic Condition, Investment Profile, Internal Conflict, External Conflict, Corruption, Military in Politics, Religion in Politics, Law and Order, Ethnic Tension, Democratic accountability and Bureaucracy Quality. According to the international country risk guide all the indicators are given different level of maximum points while the minimum point is zero. In this study, economic and financial indicators are calculated using actual time series data of the indicators and the corresponding risk points given by the international country risk guide. Data for political risk indicator is taken from the international country risk guide and for the years unavailable it is extended by average growth rate[9]. Finally, the composite of this three country risk indicators is taken as a proxy for institutional quality index.

Road network (INF_t)

Total road network per 1000 km^2. The data source is Ethiopian Roads Authority.

[9] Since there is no other data source for the institutional quality indicators, extrapolation has been employed with all its limitations, to fill unavailable data of political indicators for some of the years the analysis covers.

Estimation procedures

Econometric analysis involving time series data, commonly encounter difficulties due to the presence of unit root or non-stationarity of variables where the mean and variance of the variable are not time invariant. Such characteristic of a time series data, if not addressed appropriately leads to either ignoring important information about the underlying data generating process or to a nonsensical regression results. To avoid such a problem the Box-Jenkins methodology suggests differencing or detrending the non-stationary variables. Differencing non-stationary variables removes the problem of nonsensical regression results but it leads to elimination of important long run information. Nevertheless, in a univariate models, this was the conventional way of dealing with non-stationary variables while in multivariate models the possible presence of a linear combination of integrated variables that is stationary /the presence of cointegrated variables/ makes the univariate Box-Jenkins methodology inappropriate. Variables are generally said to be cointegrated if a linear combination of non-stationary variables which are integrated of order d form a series which is integrated of a lesser order. To suppose any long run relationship, cointegration between non-stationary variables is required. Hence, cointegration between non-stationary variables implies the existence of a long run equilibrium to which an economic system converges over time while the absence of cointegration leads to the problem of spurious regression. In the case of multivariate models, the appropriate test strategy for unit root is based on the Augmented Dickey-Fuller test with a generous lag structure which allows for both constant and trend terms. The ADF test in addition to constant and trend terms, involves adding an unknown lagged first differences of the dependent variable to capture auto-correlated omitted variables that would otherwise, by default enter the residual Enders (1995) and Harris (1995).

In principle it is important to test the order of integration of each variable in a model, to establish whether it is non-stationary or not and how many times the variables needs to be differenced to result in a stationary series. Accordingly, the variables in this specific case are tested for unit root and order of integration using the Augmented Dickey-Fuller test. All the variables are non-stationary at level and their first difference is stationary implying an order of integration of I(1). The only exception is the capital stock which is I(2).

Cointegration analysis

Following the Johansen approach, the general representation of a multivariate autoregressive model with k lags is given as follows.

$$X_t = A_1 X_{t-1} + \ldots + A_k X_{t-k} + u_t \quad , u_t \sim IN(0, \Sigma) \qquad \textbf{(4)}$$

Where, X_t is an $(n \times 1)$ vector of all possibly endogenous variables

A_i is an $(n \times n)$ matrix of parameters

Such a VAR model is given to estimate dynamic relationship among jointly endogenous variables without imposing strong priory restrictions on exogenity and endogenity of variables. Each variable in X_t is regressed on lagged values of itself and the other variables (Harris, 1995).

Reformulating equation [4] into a vector error correction form:

$$\Delta X_t = \Gamma_1 \Delta X_{t-1} + \cdots + \Gamma_{k-1} \Delta X_{t-k+1} + \Pi X_{t-k} + u_t \qquad \textbf{(5)}$$

Where, estimates of Γ_i and Π contains information about the short run and long run adjustments to changes in X_t, respectively. Moreover, $\Pi = \alpha\beta'$ where, α represents the speed of adjustment to disequilibrium and β represents a matrix of long-run coefficients. For such a system of equation with n possibly endogenous variables, one may face possibilities of 1) no cointegrating vectors and 2) $r \leq (n-1)$ cointegrating vectors. Where, r is rank of matrix Π. The rank of Π determines the number of cointegrating relationships. There is a possibility that Π has a full rank where, $r = n$ and it has a rank of zero where there are no cointegrating relationships. However in practice, the usual case is where Π has a reduced rank, i.e. $r \leq (n-1)$ cointegrating vectors are present. It is generally not possible to apply ordinary regression techniques to the individual system such as [4:12] since what is obtained is an $(n \times n)$ estimate of Π. For such a reason, Johansen (1988) presupposes that Π can be factorized into $\alpha\beta'$, where α and β both can be reduced in dimension to $(n \times r)$ and use the procedure of reduced rank regression to obtain estimates of α and β [See Harris 1995, pp 79].

Following this, equation [5] is rewritten using the specific variables as:

$$\begin{bmatrix} \Delta LGDP_t \\ \Delta L_t \\ \Delta LH_t \\ \Delta LINV_t \\ \Delta LINS_t \\ \Delta LINF_t \end{bmatrix} = \Gamma_i \begin{bmatrix} \Delta LGDP_{t-i} \\ \Delta LL_{t-i} \\ \Delta LH_{t-i} \\ \Delta LINV_{t-i} \\ \Delta LINS_{t-i} \\ \Delta LINF_{t-1} \end{bmatrix} + \begin{bmatrix} \alpha_{11}\alpha_{12}\alpha_{13}\alpha_{14}\alpha_{15} \\ \alpha_{21}\alpha_{22}\alpha_{23}\alpha_{24}\alpha_{25} \\ \alpha_{31}\alpha_{32}\alpha_{33}\alpha_{34}\alpha_{35} \\ \alpha_{41}\alpha_{42}\alpha_{43}\alpha_{44}\alpha_{45} \\ \alpha_{51}\alpha_{52}\alpha_{53}\alpha_{54}\alpha_{55} \\ \alpha_{61}\alpha_{62}\alpha_{63}\alpha_{64}\alpha_{65} \end{bmatrix} \begin{bmatrix} \beta_{11}\beta_{21}\beta_{31}\beta_{41}\beta_{51}\beta_{61} \\ \beta_{12}\beta_{22}\beta_{32}\beta_{42}\beta_{52}\beta_{62} \\ \beta_{13}\beta_{23}\beta_{33}\beta_{43}\beta_{53}\beta_{63} \\ \beta_{14}\beta_{24}\beta_{34}\beta_{44}\beta_{54}\beta_{64} \\ \beta_{15}\beta_{25}\beta_{35}\beta_{45}\beta_{55}\beta_{65} \end{bmatrix} \begin{bmatrix} LGDP_{t-1} \\ LL_{t-1} \\ LH_{t-1} \\ LINV_{t-1} \\ LINS_{t-1} \\ LINF_{t-1} \end{bmatrix} \quad \textbf{(6)}$$

Testing for the number of cointegrating vectors that exist in β is equivalent to testing which columns of the α matrix are zero. Cointegration test results of equation [6], using the Johansen procedure are summarized below.

Table 2.1: Cointegration analysis

H_o: rank=p	*n-p*	*λ_{max}=T ln(1-λ_{r+1})*	*T-nm*	*95%*	*λ_{max}=T ln(1-λ_i)*	*T-nm*	*95%*
P=0	*5*	*48.45***	*40.15**	*39.4*	*114.3***	*94.73**	*94.2*
P≤1	*4*	*23.98*	*19.87*	*33.5*	*65.87*	*54.58*	*68.5*
P≤2	*3*	*20.6*	*17.07*	*27.1*	*41.89*	*34.71*	*47.2*
P≤3	*2*	*11.92*	*9.875*	*21.0*	*21.29*	*17.64*	*29.7*
P≤4	*1*	*7.94*	*6.579*	*14.1*	*9.372*	*7.765*	*15.4*
P≤5	*0*	*1.432*	*1.187*	*3.8*	*1.432*	*1.187*	*3.8*

*** and * indicate rejection at 1% and 5% level of significance, respectively.*

As the above table shows, at 5% level of significance, both the λ_{trace} and the $\lambda_{\max}$ statistics reject the null hypothesis that there is no cointegrating relationship and support the presence of one cointegrating vector. For the procedures and details of λ_{trace} and the $\lambda_{\max}$ statistics [see Enders, 1995, PP 390-91]

Table 2.2: Standardized β eigenvectors

LGDP	LL	LH	LINVMIH	LINS0.6	LINF
1.0000	-0.14438	-0.43540	-0.11862	-0.88285	0.078636
0.35921	**1.0000**	0.40372	0.28532	0.1772	-1.3830
0.53937	-0.73221	**1.0000**	0.059174	-0.57775	-0.62003
-1.1919	0.95198	0.81203	**1.0000**	-3.0730	-0.64152
-1.3711	-5.0727	-4.4063	0.21254	**1.0000**	5.4891
0.71413	-2.5100	0.31575	0.0111087	-0.22952	**1.0000**

Table 2.3: α coefficients

LGDP	-0.37131	-0.11761	-0.23759	0.028928	0.0065050
LL	0.037116	-0.033123	0.067664	0.0067795	0.00046715
LH	0.062095	0.061149	0.051477	-0.031183	0.0070984
LINV	0.42558	-0.86838	-0.74333	-0.23374	-0.051255
LINS	0.31185	0.028685	-0.094614	0.0080438	-0.0078961
LINF	-0.40861	0.075750	0.059623	-0.012364	-0.014192

Vector AR 1-2 F(50, 17) = 1.4233 [0.2148]
Vector normality Chi^2(10)= 15.623 [0.1110]
Testing for vector error autocorrelation from lags 1 to 2
*Chi^2(50)=110.6 [0.0000] ** and F-form(50,17)=1.4233 [0.2148]*

Once the cointegration test is conducted and a vector of one cointegrating relationship is obtained, the next step is to identify the unique cointegrating vector that forms a long run relationship. In order to do this, α and β coefficients restriction tests should be conducted. The α coefficient test is equivalent to weak exogenity test while the β coefficient tests the level of significance of each variable in the unique vector.

Table 2.4: Zero restriction tests on α coefficients

	LR-test χ^2 (1)	P-Value
LL	0.7004	0.4027
LH	0.37058	0.5427
LINV	0.17607	0.6748
LINS	7.0888	0.0008**
LINF	8.9482	0.0028**

** indicates rejection at 1% level of significance.*

According to the α coefficient tests all the variables are found to be weakly exogenous except the variables LGDP and LINS and LINF. Rejection of the weak exogenity of the variable indicate a possible simultaneous relationship with LGDP.

Table 2.5: Zero restriction tests on β Coefficients of Variables

	LR-test χ^2 (1)	P-Value
LL	1.2011	0.2731
LH	11.076	0.0009**
LINV	9.7451	0.0018**
LINS	22.55	0.0000**
LINF	0.39408	0.5302

*** rejection at 1% level of significance*

As it is clearly seen in the above table zero restriction tests for β coefficients indicate that all the variables, except for LL and LINF, are significant in the long run model. With this, getting a unique vector of the long run relationship requires further restriction tests on α and β coefficients. Combined restriction test results on endogenous and insignificant variables is summarized bellow.

LGDP	LL	LH	LINV	LINS	LINF	LR-Tests
1.0000	0.0000	-0.45530	-0.10524	-0.87020	0.0000	**χ^2(1)=1.2152(0.5447)**
-1.1492	0.0000	-0.52321	-0.12094	1.0000	0.0000	**χ^2(1)=1.2152(0.5447)**

Based on the probability of the above test, both the endogenity of the variable LGDP& LINS and insignificance of the variable LH is accepted. Hence we can proceed with the unique long run vector that is obtained from this test:

$$LGDP = \alpha_{11}\left(\beta_{11}LL + \beta_{21}LH + \beta_{31}LINV + \beta_{41}LINS + \beta_{51}LINF\right)$$
$$LGDP = -0.37131\left(0.45530LH + 0.10524LINV + 0.87020LINS\right)$$

At this stage though the estimation is not fully complete, the above vector from the Johansen cointegration analysis provides indicative information about the long run relationship between the dependent variable, LGDP and the explanatory variables. The sign and magnitude of the coefficient α_{11} shows that there is moderate adjustment towards equilibrium.

Once the Cointegration analysis is complete and the unique vector is obtained, the next step is to estimate the short run model. The short-run structure of the model is also important in terms of the information it conveys on the short-run adjustment behavior of economic variables. In modeling the short run, Hendry approach of general-to- specific modeling is adopted. To obtain the parsimonious representation of the system, a short run VAR is modeled in error correction form (VECM) with the cointegration relationships included.

$$\Delta \ln X_t = \sum_{i=1}^{k} \Gamma_i \Delta \ln X_{t-i} + \alpha\left(\hat{\beta}_1' \tilde{X}_{t-1} + \hat{\beta}_2' \tilde{X}_{t-1}\right) + u_t \qquad \textbf{(7)}$$

Where, $\Delta \ln X_t$ represents a vector of change in endogenous variables, in this case LGDP and LINS. $\Delta \ln X_{t-i}$ represents a vector of lagged explanatory variables including lagged values of LGDP and LINS. $\alpha\left(\hat{\beta}_1' \tilde{X}_{t-1} + \hat{\beta}_2' \tilde{X}_{t-1}\right)$ represents the error correcting terms. The equation is estimated simultaneously using full information maximum likelihood (FIML). As stated by Johnston (1997), in estimating a system equation, FIML is superior than single equation methods of two stage least squares.

Following the above argument the short run dynamics is estimated simultaneously using Full Information Maximum Likelihood Method. The estimation results are summarized below.

Table 2.6: Estimation results of PVECM

The dependent variable is ΔLGDP			
Variable	**Coefficient**	**t-value**	**t-probability**
ΔLINS	0.83596	3.316	0.0033
$\Delta LGDP_{t-1}$	0.56398	3.525	0.0023
$\Delta LGDP_{t-2}$	-0.45846	-2.600	0.0176
$\Delta LINS_{t-1}$	-0.41958	-2.908	0.0090
$\Delta LRFDM_{t-1}$	0.00278	2.663	0.0154
ΔLL	0.63844	2.479	0.0227
Constant	2.4525	3.564	0.0021
$VECGDP_{t-1}$	-0.60887	-3.500	0.0024

From the system estimation results summarized in the above table, the variables significant in determining the short run growth in Ethiopia are institutions, labor, and rainfall of the previous period. This variables affect growth performance of the country positively. The error correcting term, $VECGDP_{t-1}$ indicates that a 60.8 % adjustment towards equilibrium every year.

From the long run model it is to be recalled that we found labor to be insignificant. One of the possible reasons for this is perhaps the existence of surplus labor in the economy. Institutions on the other hand are found to be significant in both the short and long run models indicating that one of the possible reason for the disappointing economic performance of the country is weak institutional quality.

Given Human capital on the other hand is only significant in the long run. This should not be surprising the development stage of the economy where traditional agriculture, which highly depends on the vagaries of nature, contributes to nearly half of the annual GDP. Moreover, since activities in the agricultural sector are not modern technology oriented, the importance of human capital in determining growth of the country is unlikely to be apparent unless structural transformation occurs. Note that this only implies skilled labor may not be efficiently used in traditional economies without undermining the role of the former in transforming the latter.

3. Conclusion and policy recommendations

Although attaining growth is crucial for sustainable development, many developing countries in the world failed so far to achieve persistent growth. Hence, societies suffer from the consequential effect of poor development. Ethiopia is one of the least developed countries in the world where nearly half of its population are living in absolute poverty. Attaining growth and development to bring changes in the livelihood of the people has been a challenge for policy makers for quite a long period of time. In this regard understanding the growth process of the country becomes important as good knowledge about sources of growth is key to designing appropriate policy framework. However, only few researches have attempted to explain long-term growth in Ethiopia.

This study has attempted to study the role of institutional factors in determining growth performance of the country. In doing so the paper has employed a time series econometric technique of cointegration analysis on long-term time series data that covered the period 1967/68-2002/03.

As many empirical works on growth suggest, the paper assumed a two-way link between economic growth and the explanatory variables. Nevertheless, such an interrelationship is found only between economic growth and institutional quality. The research addressed this issue by solving the short run dynamics using Full Information Maximum Likelihood estimation technique.

The findings of the cointegration analysis support long run relationship between the dependent variable and the explanatory variables. In the unique cointegrating vector that forms the long run relationship, the variables labor and infrastructure are found to be insignificant. On the other hand, physical capital, human capital and institutional quality are found to be significant explaining factors in the long run model. The findings confirm the hypothesis of the paper, that accumulation of factors of production as well as institutional quality matter for the growth process of the country.

Furthermore, the error correction model also indicated change in the log of institutions, labor, and rainfall are found to be significant in the short run.

Overall, the results of this study indicate that in addition to factor accumulation, building a good quality and efficient institutions are crucial to free the country from underdevelopment. One of the reasons why institutions are important for growth theoretically is that good quality and efficient institutions reduce the cost of production and make markets work more efficiently. Hence, for better outcome, government policies at macro and micro level should be supported by good quality institutions which insure, law and order, bureaucracy quality, and accountability while preventing corruption and conflicts. Particularly to build a strong and successful market based economy setting appropriate institutions in place is important. Institutions that protect property rights, provide appropriate regulations for different markets (such as – product, factor and financial markets) and that institutions that support macroeconomic stabilization.

Details of institutional design. There is little understanding of what specific institutional forms will work best in any specific context. For example, high levels of income and wealth have been achieved among the advanced economies under a range of institutional structures—including various legal and regulatory approaches, and different degrees of state involvement in the economy. Similarly, fast-growing developing economies such as China, Botswana, and Mauritius have been able to achieve these results under substantially different institutional arrangements.

Reform strategies and priorities. Similarly, we know little a priori about what reform strategies—including priorities and sequencing—will be most effective in any particular set of circumstances. Countries that have experienced significant institutional change over recent decades—including China, Chile, and the central European economies—have done so using vastly different approaches.

It may not be possible—and indeed, as discussed below, may not be desirable—to draw general conclusions and "reform rules" from such experiences. What the two points above *do* imply is that institutional design and reform are likely to have important country-specific components (and sometimes time-specific ones as well). In particular, North (1990) and others have emphasized that institutional arrangements and reform strategies that appear to have worked well in one country are unlikely to perform as effectively if transplanted to another, at least without adaptation and innovation to suit local circumstances. For example, the particular institutional arrangements used to protect property rights and uphold the rule of law in China are in part an outgrowth of broader economic and political developments in that country, and may not be readily adopted elsewhere. Similarly, the concept of international

"best practice" is unlikely to be meaningful when applied to detailed specifications of institutional forms.

What can policy do to spur institutional reform?

That being said, there is a role for policies in fostering institutional development - development that will in turn promote policy sustainability and economic growth. Several mechanisms - some general, others more specific - have been stressed in the literature as being useful in promoting institutional improvement.

• ***Competition and trade openness***. A number of studies have found that strengthening competition, including through trade openness, tends to be conducive to institutional improve-

REFERENCE

Alemayehu Geda and Befekadu Degefe (2002). Explaining African growth performance: The case of Ethiopia final draft for the Cambridge series.

Acemoglu D., S. Johnson and J. A. Robinson (2001). The colonial origins of comparative development: An empirical investigation. *The American Economic Review*, Vol. 91, No. 5.

Artadi Elsa V. and Xavier, Sala-i-Martini (2003). The economic tragedy of the XXTH century: growth in Africa, NBER working paper sereies/9865

Bennett T. MacCalum (1996). Neoclassical vs endogenous growth analysis: An overview, economic Quarterly, Federal Reserve Bank of Richmond.

Charles I Jones (1995). *Introduction to Economic Growth*. Text book, W.W Nortorn & Company

Easterly W. (2002). Growth in Ethiopia: a retrospect and prospect center for global development

Easterly and Levine. (1995). Africa's growth tragedy: A retrospective 1960-1989. The World Bank, policy research working paper/1503

Enders W. (1995). *Applied econometric time series* Wiley series in probability and mathematical statistics

_____. (2002). 15 years of growth economics: What have we learnt? Colombia University and Universitat Pompeu Fabra.

Freeman B. and David L. Lindauer (1999). Why not Africa, NBER working paper/6942

Harris R. (1995). *Cointegration analysis in econometric modeling,* Oxford University Press.

Jo Ritzen, William Easterly and Michael Woolcock (2000). On "Good" politicians and "Bad" policies: Social cohesion, institutions, and growth. The World Bank working paper/2448

Johnston J. and DiNardo J. (1997). *Econometric Methods*, Text Book, MacGraw-Hill.

Jutting J. (2003). Institutions and Development: A Critical Review, OECD Development Center Technical Papers No. 210

Kalecki, Michal (1976). *Essays on Developing Economies.* The Harvester Press Limited.

Luc Moers (1999). *How important are institutions for growth in transition countries?*

Luc Moers, Romer D, and Weil N. David (1990). A Contribution to the Empirics of Economic Growth, National Bureau of Economic Research, Working Paper/3541

Masanjala W. and Papageorgiou C. (2003). *Africa Does Grow Differently*. LSU working papers

MoFED (2002). Ethiopia: Sustainable Development and Poverty Reduction Program

_____ (1999). Survey of the Ethiopian Economy, Pre and Post Reform Review

North, Douglass C. (1990): Institutions, Institutional Change, and Economic Performance, New York: Cambridge University Press

North, Douglass C. and Robert P. Thomas (1973). *The Rise of the Western World: A New Economic History*, Cambridge University Press.

Netsanet Walelign (1997). Human Resource Development and Economic Growth in Ethiopia, MSc Thesis, Addis Ababa University, School of Graduate Studies.

Prates Osmani S. (2004): Economic Growth in Bahia, Brazil: The Role of Institutions & Government George Washington University

Romer M, Paul (1990). Endogenous Technical Change, *Journal of Political Economy.*

Robert E. Hall and Charles I. Jones (1998). Why Do some Countries Produce so much more Output per Worker than Others?

Robert J. Barro (1996). Determinants of Economic Growth, A Cross Country Empirical Study, NBER Working Paper

Sachs D. Jeffrey (2003). Institutions Don't Rule: Direct effect of Geography on Per Capita Income, NBER working paper/9490

Sachs D. Jeffrey and Warner M. Andrew (1997). Sources of Slow Growth in African Economies, *Journal of African Economies*, Vol. 6, No. 3

Rodrik D., Subramanian A. and Trebbi F. (2002). Institutions Rule: The Primacy of Institutions over Geography and Integration in Economic Development, NBER Working Paper Series/9305

Scott L. Baier, Gerald P. Dwyer Jr. and Robert Tamura (2002). *How Important Are Capital and Total Factor Productivity for Economic Growth?* Federal Reserve Bank of Atlanta Working Paper 2002-2a

Seid Nuru (2000). Determinants of Economic Growth in Ethiopia, MSc Thesis, Addis Ababa University, School of Graduate Studies.

Solow, R. M. (1956). A Contribution to the Theory of Economic Growth. *Quarterly Journal of Economies*

Tatyana P. Soubbotina and Katherin A Sheram (2000). Beyond Economic Growth: The Challenge of Global Development, The World Bank.

Temple Jonathan (1999). The New Growth Evidence, *Journal of Economic Literature.*

Williamson, Oliver (1985): *The Economic Institutions of Capitalism,* New York: The Free Press.

Xavier Sala-I-Martin (1996). The Classical Approach to Convergence Analysis, *The Economic Journal*, Volume 106 Issue 437,