بسم الله الرحمن الرحيم

(هَلْ أَتَى عَلَى الإِنسَانِ حِينٌ مِّنَ الدَّهْرِ لَمْ يَكُن شَيْئًا مَّذْكُورًا(1)

إِنَّا خَلَقْنَا الإِنسَانَ مِن نُّطْفَةٍ أَمْشَاجٍ نَّبْتَلِيهِ فَجَعَلْنَاهُ سَمِيعًا بَصِيرًا(2))

صدق الله الله العظيم

سورة الإنسان

الاهـــــداء

ألي وآلـدتي المـرحـومـة (بـتول عـبدالله مـنصـور)

لا اله إلا الله وحده لا شريك له . له الحمد وله الشكر وله الفضل وله الثناء الحسن يحيي ويميت بيده الخير وهو على كل شيء قدير . لا اله إلا الله لا نعبد إلا إياه مخلصين له الدين ولو كره الكافرون ولا حول ولا قوة إلا بالله . اللهم صلى الله على سيدنا محمد خاتم النبيين والمرسلين عليه افضل الصلاة و أتم التسليم.

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-اللهم اغفر لحيينا وميتنا وشاهدنا وغائبنا كبيرنا وصغيرنا

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-اللهم ارحمها فوق الارض وتحت الارض ويوم العرض عليك . اللهم قها عذابك يوم تبعث عبادك .

-اللهم انزل نورا من نورك عليها , اللهم نور لها قبرها ووسع مدخلها وآنس وحشتها, اللهم ارحم غربتها وارحم شيبتها, اللهم اجعل قبرها روضة من رياض الجنة . لا حفرة من حفر النار.

-اللهم أغفر لها وارحمها واعف عنها واكرم نزلها, اللهم ابدلها دارا خيرا من دارها . واهلا خيرا من اهلها . وذرية خيرا من ذريتها وزوجا خيرا من زوجها وادخلها الجنة بغير حساب . برحمتك يا ارحم الراحمين, اللهم انقلها من ضيق اللحود ومن مراتع الدود الى جناتك جنات الخلود لا اله الا انت يا حنان يا منان يا بديع السموات والارض تغمدها) المتوفيه) برحمتك يا ارحم الراحمين.

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Abstract

Stimulated debate among economists (Swan in 1956 and Solow in 1957) on the role of technical change in economic growth was heated during the 1950's worldwide. The consensus is that technological change accounts for significant proportion of gross national product (GNP) growth in industrialized economies. In the case of Sub-Saharan Africa, the aggregate performance was picked up very strongly in 1990's. However, this high economic growth rate could not be sustained in some Sub-Saharan African countries, and this is why these countries started a slowdown in economic growth. This study empirically measures the performance of economic growth in Sub-Saharan Africa's economy for the period 1990-2007, using econometric approach. Time-series data are used to develop econometric models that capture the dynamic interactions between GDP, fixed capital, labour units, human capital, foreign direct investment (FDI) and information and communication technology (ICT). Cointegration techniques are used to establish a long-run steady-state relation between or among economic time series. The econometric analysis pays careful attention to the time series properties of the data by conducting unit root and cointegration tests for the variables in the system.

This study finds that Sub-Saharan Africa experienced economic growth in the 1990's. also the study finds evidence that FDI and ICT are very strong determinants of a long-run GDP in Sub-Saharan Africa along with Cobb-Douglas factors of production, But human capital is insignificant as a determinant factor of economic growth due the measurement used in these LDCs, as far as the brain drain of intellectual and skilled human capital by industrialized countries. This study finds that the three, four and the five factor models are likely to give better measure of performance (not including human capital) of economic growth of Sub-Saharan African countries in this study, as these models recognize human capital, foreign direct investment (DI) and information and

communication technology (ICT) as separate factors in the production function. This study finds evidence that the previous studies on Sub-Saharan Africa's economic growth puzzle have made a very significant omission by not considering human capital, foreign direct investment (FDI), and information and communication technology (ICT) as additional exogenous variables and by excluding them from the production function for economic growth analysis. Also the study finds the estimate of coefficients, that all variables are significant and with positive coefficients except the human capital.

الـمـسـتـخـلـص

دور التغير التقني في النمو الاقتصادي خلال خمسينيات القرن الماضي في جميع أنحاء العالم كان محفزاً و ساخناً بين الاقتصاديين (سوان في عام 1956 ، وسولو في عام 1957) وذلك فيما يخص الدعم الإداري والتشغيلي و أثره علي النمو الاقتصادي. توافقت الآراء فيما يخص حسابات التغير التكنولوجي بأنه يشغل نسبة كبيرة من الناتج القومي الإجمالي في نمو اقتصاديات الدول الصناعية و كذلك لا يمكن لارتفاع معدل النمو الاقتصادي أن يستمر في بعض البلدان الأفريقية جنوب الصحراء الكبرى ، بسبب أن هذه البلدان تمتاز بتباطؤ في النمو الاقتصادي.

هذه الدراسة تنظر الي تجريبة آداء النمو الاقتصادي في افريقيا جنوب الصحراء ،فيما يخص اقتصاد الخدمات الإدارية والتنفيذية للفترة 1990-2007 ، وذلك باستخدام نهج الاقتصاد القياسي .وتستخدم بيانات السلاسل الزمنية لوضع نماذج الاقتصاد القياسي التي تستحوذ على التفاعلات الدينامية بين الناتج المحلي الإجمالي ، رأس المال الثابت و وحدة العمل ورأس المال البشري ، والاستثمار الأجنبي المباشر ، وتكنولوجيا المعلومات والاتصالات .وتستخدم تقنيات التكامل المشترك لإقامة علاقة ثابتة للدولة على المدى الطويل أو بين السلاسل الزمنية الاقتصادية . هذا تحليل اقتصادي قياسي يولي اهتماما دقيقا لخصائص سلسلة زمنية من البيانات عن طريق إجراء اختبارات جذر الوحدة والتكامل المشترك للمتغيرات في النظام .
يوصلت هذه الدراسة إلى أن منطقة أفريقيا جنوب الصحراء شهدت نموا اقتصاديا في تسعينات القرن الماضي، نتيجة للدعم الإداري والتشغيلي .كما توصلت الدراسة إلى أدلة على أن الاستثمار الأجنبي المباشر وتكنولوجيا المعلومات والاتصالات هي محددات قوية للغاية من إجمالي الناتج المحلي على المدى الطويل في منطقة أفريقيا جنوب الصحراء إلى جانب عوامل كوب دوغلاس الأخري مثل ،رأس المال, العمل و رأس المال.

هذا و قد خلصت الدراسة إلى أن ثلاثة أو أربعة أو خمسة نماذج من المرجح أن تعطي أفضل قياساً (مع استبعاد رأس المال البشري) للنمو الاقتصادي في البلدان الأفريقية جنوب الصحراء الكبرى، وهذه النماذج تعتراف بأن رأس المال البشري ، والاستثمار الأجنبي المباشر وتكنولوجيا المعلومات والاتصالات ، باعتبارها من العوامل المهمة في وظيفة الانتاج .

هذه الدراسة توصلت الي أن الدراسات السابقة على منطقة أفريقيا جنوب الصحراء فيما يخص لغز النمو الاقتصادي , لم تضع في دراساتها رأس المال البشري ، والاستثمار المباشر الأجنبي ، وتكنولوجيا المعلومات والاتصالات و استبعادها من وظيفة الإنتاج لتحليل النمو الاقتصادي .كما توصلت الدراسة الي أن جميع المتغيرات مهمة وإيجابية ما عدا رأس المال البشري.

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Abbreviation

1-   OLS = Ordinary

2-   ECA = East Central Africa

3-   TFP = Total Factor Productivity

4-   TFPG = Total Factor Productivity Growth

5-   MFP = Multi Factor Productivity

6-   IRF = Impulse Response Function

7-   RSS = Residual Sum of Squares

8-   VEC = vector Error Correction

9-   ADF = Augmented Dickey Fuller

10-   ASEAN = Association of Southeast Asian Nations

11-   UNDP = United Nation Development Program

12-   UNCTAD = United Nation Conference on Trade and Development

13-   B2B = Business to Business

14-   B2C = Business to Consumer

15-   B2G = Business to Government

16-   ICT = Information and Communication Technology

17-   LDCs = Least Developed Countries

18-   IT = Information Technology

19-   OECD = Organization of Economic Cooperation and Development

20-   WTO = World Trade Organization

21-   ITC = International Trade Center

22-   G7 = Group 7

23-   SSA = Sub-Saharan Africa

24-   ITU = International Telecommunication Union

25-   WB = World Bank

26-   PWT = Penn World Table

27-   FDI = Foreign Direct Investment

28-   MPT = Motorola Phone Tools

29-   NICI = National Information and Communication Infrastructure

30-   SSCs = Sub-Saharan Countries

31-   ICAAN = Internet Corporation for Assigned Names and Numbers

32-   WIPO = World Intellectual Property Organization

33-   NRI = Networked Readiness Index

34-   PWT = Penn World table

35-   WITSA = World Information Technology and Services Alliance

36-   BEA = Bureau of Economic Analysis

37-   MFP = Multifactor Productivity

38-   VAR = Value at Risk. A technique, which uses the statistical analysis of historical market trends and volatilities to estimate the likelihood that a given portfolio's losses will exceed a certain amount.

38-   PPP = Parity Purchasing Price

39-   VECM = Vector Error Correction Model

40-   VAR = Vector Autoregression

Definitions

1-   Granger Causality Test

Granger causality test is a technique for determining whether one time series is useful in forecasting another. Ordinarily, regressions reflect "mere" correlations, but Clive Granger, who won a Nobel Prize in Economics, argued that there is an interpretation of a set of tests as revealing something about causality. A time series X is said to Granger-cause Y if it can be shown, usually through a series of F-tests on lagged values of X (and with lagged values of Y also known), that those X values provide statistically significant information about future values of Y.

2-   Unit Root Test

In statistics, a **unit root test** tests whether a time series variable is non-stationary using an autoregressive model. The most famous test is the augmented Dickey–Fuller test.

Another test is the Phillips–Perron test. Both these tests use the existence of a unit root as the null hypothesis.

3- *A*ggregation

A process that transforms microdata into aggregate-level information by using an aggregation function such as count, sum average, standard deviation, etc.

4- Labour Force

In economics, the people in the **labor force** are the suppliers of labor. The **labor force** is all the nonmilitary people who are employed or unemployed.

5- Univariate Analysis

Univariate analysis explores each variable in a data set, separately. It looks at the range of values, as well as the central tendency of the values. It describes the pattern of response to the variable. It describes each variable on its own.

5- Economic flows

Economic flows reflect the creation, transformation, exchange, transfer or extinction of economic value; they involve changes in the volume, composition, or value of an institutional unit's assets and liabilities.

7- Economic production

Economic production is an activity carried out under the control and responsibility of an institutional unit that uses inputs of labour, capital, and goods and services to produce outputs of goods or services.

8- Education level

The highest level of an educational programme the person has successfully completed.

Context: The highest level of an educational programme the person has successfully completed is also called "educational attainment of a person". At international level, the ISCED is the standard classification of educational attainment.

9- Tertiary Education

Tertiary education, also referred to as third stage, third level, and post-secondary education, is the educational level following the completion of a school providing a secondary education, such as a high school, secondary school, or gymnasium.

10- ICT

ICT (information and communications technology - or technologies) is an umbrella term that includes any communication device or application, encompassing: radio, television, cellular phones, computer and network hardware and software, satellite systems and so on, as well as the various services and applications associated with them, such as videoconferencing and distance learning.

11- FDI

FDI stands for Foreign Direct Investment, a component of a country's national financial accounts. Foreign direct investment is investment of foreign assets into domestic structures, equipment, and organizations. It does not include foreign investment into the stock markets.

12- *Impulse Response*

In economics, and especially in contemporary macroeconomic modeling, impulse response functions describe how the economy reacts over time to exogenous impulses, which economists usually call 'shocks', and are often modeled in the context of a vector autoregression. Impulses that are often treated as exogenous from a macroeconomic point of view include changes in government spending, tax rates, and other fiscal policy parameters

13-   Fixed Capital

The amount of capital permanently invested in a business, or That is *employed* in *assets* of durable nature for repeated use over a long *period.* Also called *fixed investment.*

14-   Capital stock - gross

Gross capital stock is the value of all fixed assets still in use at the actual or estimated current purchasers' prices for new assets of the same type, irrespective of the age of the assets.

15-   Privatization

The process of moving from a government-controlled system to a privately run, for-profit system.

15-   Human Capital

Health, knowledge, motivation, and skills, the attainment of which is regarded as an end in itself (irrespective of their income potential) because they yield fulfillment and satisfaction to the possessor. In an organizational context, human capital refers to the collective value of the organization's intellectual capital (competencies, knowledge, and skills). Also, productive wealth embodied in labour, skills and knowledge.

17-   Foreign direct investment

Foreign direct investment is the category of international investment that reflects the objective of a resident entity in one economy to obtain a lasting interest in an enterprise resident in another economy.

18-   GDP per capita

GDP per head calculated as the aggregate of production (GDP) divided by the population size.

19- GDP deflator

GDP deflator is the implicit price deflator for GDP of which the movements in an implicit price deflator reflect both changes in price and changes in the composition of the aggregate for which the deflator is calculated.

20- Information systems

A system which supports decision-making concerning some piece of reality, the object system, by giving decision makers access to information concerning relevant aspects of the object system and its environment.

21- Cross-sectional data

cross section in statistics and econometrics is a type of one-dimensional data set. Cross-sectional data refers to data collected by observing many subjects (such as individuals, firms or countries/regions) at the same point of time, or without regard to differences in time. Analysis of cross-sectional data usually consists of comparing the differences among the subjects.

22- Metadata

Data that defines and describes other data.

23- Population

(1) All the inhabitants of a given country or area (province, city, metropolitan area etc.) considered together; the number of inhabitants of a country or area. (2) In sampling, the whole collection of units (persons, households, institutions, events etc.) from which a sample may be drawn.

24- Population change

Population increment over a period, that is, the difference between the population at the end of the period and that at the beginning of the period. Refers to five-year periods running from 1 July to 30 June of the initial and final years. Data are presented in thousands.

25- **Sample**

A subgroup of a group of persons or events used to represent the characteristics of the group as a whole for statistical purposes.

25- **Sample size**

The number of observation units which are to be included in the sample.

Context: In the case of a multi-stage sample this number refers to the number of units at the final stage in the sampling.

27- **Sample survey**

A survey which is carried out using a sampling method.

Context: In sample survey only a portion, and not the whole population is surveyed.

28- **Sampling error**

A type of false or mistaken result obtained in a survey or experiment which is due to chance (random error) when the result from the sample differs from the result that would have been obtained if the entire population were studied.

29- **Statistical population**

The total membership or population or "universe" of a defined class of people, objects or events.

Context: There are two types of population, viz., target population and survey population. A "target population" is the population outlined in the survey objects about which information is to be sought and a "survey population" is the population from which information is obtained in a survey. The target population is also known as the scope of the survey and the survey population as the coverage of the survey. For administrative data sources, the corresponding populations are the "target population", as defined by the relevant legislation and regulations, and the actual "client population" ("United Nations

Glossary of Classification Terms" prepared by the Expert Group on International Economic and Social Classifications).

30- Stationary Process

In the mathematical sciences, a **stationary process** (or **strict(ly) stationary process** or **strong(ly) stationary process**) is a stochastic process whose joint probability distribution does not change when shifted in time or space. As a result, parameters such as the mean and variance, if they exist, also do not change over time or position. Stationarity is used as a tool in time series analysis, where the raw data are often transformed to become stationary, for example, economic data are often seasonal and/or dependent on the price level. Processes are described as *trend stationary* if they are a linear combination of a stationary process and one or more processes exhibiting a trend. Transforming these data to leave a stationary data set for analysis is referred to as **de-trending**

31- *Cointegration test*

Cointegration is an econometric property of time series variables. If two or more series are themselves non-stationary, but a linear combination of them is stationary, then the series are said to be cointegrated. For instance, a stock market index and the price of its associated futures contract move through time, each roughly following a random walk.

32- Technology change

improvement on technology that allows for more output created by the same amount of inputs.

33- Time series

A set of ordered observations on a quantitative characteristic of an individual or collective phenomenon taken at different points of time.

Context: Although it is not essential, it is common for these points to be equidistant in time. The essential quality of the series is the order of the observations according to the time variable, as distinct from those which are not ordered at all, e.g. in a random sample chosen simultaneously or are ordered to their internal properties, e.g. a set arranged in order of magnitude.

In GESMES/TS, a time series is a time-ordered vector of observations. A time series is uniquely defined with in a data set by its key. (European Central Bank (ECB), Bank for International Settlement (BIS), Eurostat, International Monetary Fund (IMF), Organisation for Economic Co-operation and Development (OECD), "GESMES/TS User Guide", Release 3.00, February, 2003

34- **Unit value**

Expenditures or value of production of an item divided by the quantity.

35- **Value**

Value at the level of a single, homogeneous good or service is equal to the price per unit of quantity multiplied by the number of quantity units of that good or service; in contrast to price, value is independent of the choice of quantity unit.

35- **Weight**

The importance of an object in relation to a set of objects to which it belongs.

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