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ECONOMIC TRANSFORMATION AND INDUSTRIALIZATION: THE NIGERIAN EXPERIENCE

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ABSTRACT

Economic transformation and industrialization nexus has gained currency in policy debates circles in Nigeria in the past decades especially since the return of democratic rule in 1999. This is because sustainable development cannot be achieved without economic transformation that is skewed in favour of industrialization. The success stories of countries that have been able to transform their economies from agricultural to industrial and services based on the knowledge economy lend credence to these debates. This is the motivation for this paper. The paper adopted econometric tools of co-integration and endogenous growth theory to investigate the role fiscal authorities should play to strengthen the transformation agenda. The results of this paper showed that in order to drive transformation agenda to the desired threshold in Nigeria, fiscal authorities need to increase the country's expenditure on education, transportation and communication infrastructure.

Keywords: Economic Transformation, Co-Integration, Sustainable Development, Industrialization And Endogenous Growth Theory.

INTRODUCTION

Economic transformation which is the modernization of agriculture, manufacturing and service sectors away from the traditional subsistence system to a modern economy that can optimize resources has generated interest in development economics literature in recent decades. This is because economic transformation has a profound impact on industrial output, economic growth and development, sustainable development, standard of living, generates employment and enhanced productivity. It changes the incentive structures and knowledge base of an economy. Industrialization and by implication economic growth and development occurs when resources are optimally utilized and transformed into various forms and uses through dynamic interaction of demand, supply, wages and prices. This is why countries have adopted various forms of industrial and agricultural policies in an attempt to transform their economies.

In Nigeria various attempts have been made in the past by successive government to transform the economy through various industrial and agricultural policies, incentives and structural adjustment programme. Some of these policies include the import substitution that gained currency in the 1960s; the indigenisation policy that started in 1972; Structural Adjustment Programme (SAP) of the late 1980s; in 2000, Bank of Industry (BOI), and Small and Medium Equity Investment Schemes (SMEIS) was established to reduce credit constraints faced by entrepreneurs. And recently in 2007, the federal government adopted the National Integrated Industrial Development (NIID) blueprint (CBN Annual Report and Statement of Account, 2007 and Udah, 2010).

In late 1980s, Trade and Financial Liberalization Policy were enacted purposely to foster competition and efficiency in the financial sector. Its aims and objectives included, to stimulate competition among the domestic firms and between the domestic imports competing firms and foreign firms, reduction of both tariff and nontariff barriers, scrap the commodity marketing boards and market determination of exchange rate as well as deregulation of interest rates, meant to foster efficiency and productivity. The National Economic Reconstruction Fund (NERFUND) was set up in the same year as complementary institution to the industrial policy. NERFUND seeks to address the medium and long-term financial constraints experienced by small and medium scale entrepreneurs, provide the required financial resources to participating merchant and commercial banks to lend to small and medium scale firms and provide naira or foreign denominated loans to participating firms for a period of five to ten years with a grace period of one to three years (Udah, 2010).

Bank of Industry (BOI) established in 2000, was introduced as a development institution to accelerate industrial development through the provision of long-term loans, equity finances and technical assistance to industrial enterprises. The bank has the combination of the following institutions, Nigerian Industrial Development Bank (NIDB), Nigerian Bank for Commerce and Industry (NBCI), Industrial and Insurance Brokers (IDIB), Leasing Company of Nigeria Limited (LECON). The objectives of these banks were to provide long term loans, assist in employment generation and promote industrial dispersal of indigenous entrepreneurship.

As a complement to the Bank of Industry, Small and Medium Industries Equity Investment Scheme (SMIEIS) was also set up in 2000. The objective was to assist in the coordination of the scheme with a guideline that 60 percent of the SMIEIS fund should go to core real sector, 30 percent to services, and 10 percent to micro enterprises through NGOs. The other objectives

of SMIEIS include increased per capita income/output and initiating changes in the structure of business and the society through growth, increased output and employment opportunities, enhanced regional economic balance through industrial dispersal, moderate rural/urban migration, easy adaptation to local technology and promote efficient resource utilization.

As part of the efforts towards the implementation of Nigeria's Industrial Policy, which focused on the competitiveness of the industrial sector, finance, technological advancement, incentives to industries, research and development, among others, the National Integrated Industrial Development (NIID) blueprint was adopted by the Federal Government in 2007. The NIID is a country service framework developed by the United Nations Industrial Development Organization (UNIDO) in collaboration with Federal Ministry of Industry and other stakeholders. These efforts appear not to have yielded the desired outcome as the index of industrialization as measured by the share of industrial output in GDP was only 19.2 per cent in 2011 (World Bank Development Report, 2011).

Whereas Indonesia who at independence in 1960 was at the same level of development with Nigeria has been able to transform her economy from agrarian to industrialized economy. Their level of per capita income, incidence of poverty, income inequality, unemployment rate, level of industrialization and adult literacy rate were close or similar to that of Nigeria (see Table 1). For example the per capita GDP of $820 for Nigeria in 1960 is close to $1030 for Indonesia. The growth rate of real GDP in Nigeria which stood at 3.1 per cent in the period 1960-1970 is close to Indonesia's growth rate of 3.5 per cent during the same period. Also the life expectancy at birth in both Indonesia and Nigeria were identical at 41 years.

Table 1: Close Similarity in Major Development Indicators

S/N	Development Aggregate	Nigeria 1960	Indonesia 1960
1	Per Capita GDP	$820	$1031
2	Industry growth rate 1960-1970	-0.4	2.5
3	Industry growth rate 1970-1978	-1.5	4.0
4	Net Foreign Private Investment 1970	$205m	$83m
5	Industry contribution to GDP	11%	14%
6	Life Expectancy at birth	41	41
7	Adult Literacy rate	15	39

Source: World Bank database.

52 years after independence the economic development growth path of Nigeria has diverged significantly from that of Indonesia (see Figure 1). Indonesia has become more developed and is ranked 16th largest economy in 2011 while Nigeria is ranked 39th. Nigeria through vision 20:2020 is still planning to attain the 20th position in terms of economy size. Indonesia has significantly leaped from her low income status of underdeveloped economy in the 1960s to a relatively more modern, organized and developed economy than Nigeria. On the human development index (HDI) Nigeria is low at 0.459 compared to Indonesia at high 0.617.

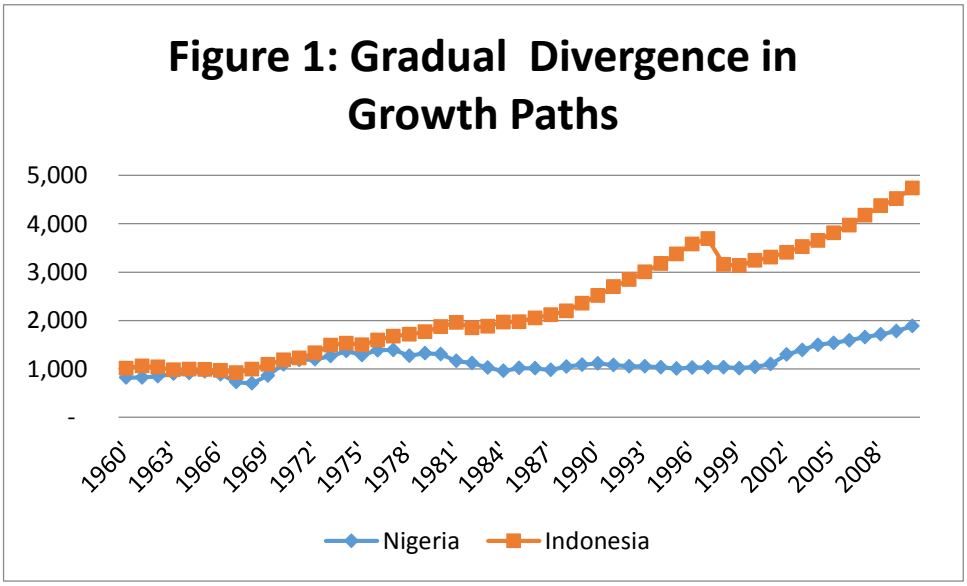
Income inequality as measured by the Gini coefficient is larger in Nigeria than in Indonesia. Unemployment is also high at 23.9 per cent in Nigeria as compared to single digit unemployment rate of Indonesia at 6.6 per cent in 2011. Poverty is widespread in Nigeria as measured by the headcount ratio. Life expectancy is also poor at 47.6 years as compared to Indonesia with a high 69 years. There is very little in terms of structural transformation as seen by the contribution of Industry to GDP.

The index of industrialization as measured by the share of industrial output in GDP is only 19.2 percent whereas Indonesia's industrial index is about 47 percent which is more than 2 ½ times the value recorded by Nigeria. The level of transparency and accountability as measured by the transparency international corruption perception index is disappointingly low at 139/174 as compared to Indonesia 118/174. This means that Nigeria is the 35th most corrupt country in the world.

Table 2: Current Developmental Gap between Nigeria and Indonesia

SN	Development Indicators	Nigeria	Indonesia
1	Human Development Index HDI 2012	0.459 (rank 156)	0.617 (rank 124)
2	Per capita GDP 2010	$1,883	$4,740
3	Size of Economy 2011	$243,986m (39th)	$846,825m (16th)
4	Transparency International CPI 2012	139/174	118/174
5	Population 2011	167.9m	237.42 m
6	Industry growth rate 2011	0.3%	4.1%
7	Industry/GDP 2011	19.2%	47%
8	Agriculture/GDP 2011	40.2%	14.3%
9	Unemployment 2011	23.9%	6.6%
10	Incidence of Poverty 2011	71.5%	12.5%
11	Life Expectancy 2011	47.6 years	69 years
12	Income Inequality (Gini)	0.447	0.368

Sources: World Bank Development Report 2012; CBN Annual Report 2011



Source: Drawn with data from Maddison 2012.

The results presented in Table 2 and Figure 1 points to the fact that Nigeria is still very much an underdeveloped country caught up in a poverty, low income and high unemployment trap. Although the country has grown rapidly as measured by the growth rate of real GDP of about 7 percent for more than five years, the country is an underdeveloped economy where the fruits of growth does not trickle-down to the people, a phenomenon known as growth without development, jobless growth or non-

inclusive growth. The intuitive question to ask is why has Nigeria economy failed to transform and achieve sustainable industrial development despite plethora of policies and incentives? This is the objective of this study.

CONCEPTUAL FRAMEWORK

The received economics development literature provides no single theory that explains economic transformation. However, it is generally agreed that the process of economic development is characterized by a period of rapid per capita growth combined with structural change. Whereas structural change could be define as an alteration in the relative importance of economic sectors, the interrelated processes of structural change that accompany the economic development are jointly referred to as economic transformation (Syrquin, 1988). The experience of newly industrialized countries of Asia and Latin America provides a good pattern to follow in what appears to be the major sources of economic transformation.

Kuznets (1973), Lewis (1979), Fei and Ranis (1961), Schultz (1968) and Tiffin and Irz (2006) raised the issue of technology led productivity in economic transformation. Kuznets (1973) argued that innovation and technology adoption is a necessary condition for economic transformation and that human capital play an important role in this process. Transformation of the agricultural and industrial sectors from traditional to modern is anchored on the capacity of a country to adopt technology adoption, as well as the skill content of the labour force. This guarantee optimal utilization of resources and economies of scale. Lewis (1979) motivated by personal experiences developed the dual economy theory. His theory centre on the characteristics of labour in the traditional sector. Surplus labour will not create additional value to workers because of the level of productivity, which may either be zero, low or perhaps negative. The novelty here is that since this traditional sector exist with the industrial sector, the economy is bound to benefit from this duality. The synergy created by differences in productivity level will eventually lead to a mono-economy dominated by wide spread increase in the level of productivity.

Schultz (1964, 1968), argued in favour of incentives and technology that farmers can easily adapt, in addition to allowing surplus labour and savings to flow from traditional sector to the industrial sectors. This mobility of factors between the agricultural and industrial sectors will modernize human and material resources. This creates the framework for increased productivity of factors. He opined that the low marginal productivity seen in agriculture before transformation is not just because of poor technique or skill of farmers but is attributed to the traditional nature of factors of production employed. Therefore with the right incentives and technology, agriculture can be an important driver of growth. Tiffin and Irz (2006) supported Schultz submission, by arguing that agricultural feeds the industrial and service sectors with the required raw materials and inputs and that unidirectional causality dominates, flowing from agriculture to other sectors. In similar vein Irz and Roe (2005) agreed that however little the variations in agricultural productivity is, it still attract considerable importance for the rate and pattern of economy wide growth.

The Green Revolution not only reinforce the argument that technology led productivity growth can transform traditional agriculture into a modern sector, but also showed that agriculture helps accelerate the economy wide transformation process. Experiences of Asia and Latin American countries in 1960s and 1970s lend credence to the argument that adoption of right technology and factors, agricultural sector can be an important driver of economic growth and development. The World Development Report (WDR) study which compared productivity growth in agriculture and non-agriculture showed that

productivity in agriculture grew faster than that in non-agriculture in the past decades (World Bank (2007). The growth rate of productivity in agriculture is even more pronounced than in non-agricultural sector in transforming economies.

WDR (2008) supports the argument of Hayami and Ruttan (1985) the successes of Green Revolution recorded in Asia and Latin America have not been replicated in most developing countries in Sub-Sahara Africa. Whereas developed economies in Europe, Asia and Latin America are experiencing high productivity, African countries are still experiencing low productivity in agriculture. Agricultural and development economists are in agreement that public investment in technology development, research in local adaptation of location specific technology that is consistent with the knowledge based of the locality, roads, transportation and irrigation combined with right public institutions are important factors for long term agricultural development (World Bank 2007). Deepening of capital in the overall economy as well as in agriculture has been observed in Asia and Latin American countries as important factor that help them to successfully transform their economies. However, capital accumulation was complemented with public provision of irrigation, technology and infrastructure. As observed by Schultz (1964), capital accumulation is only a necessary condition for agricultural transformation.

Capital accumulation is important because technology led change involves the use of modern inputs purchase from the markets. Availability of seasonal financing, more developed marketing systems, and supply chains built around small holder farmers are equally important in agricultural transformation. The draw backs here especially in developing economies like Nigeria include coordination problems, rent-seeking and poor support infrastructure all inhibit the importance of capital accumulation. Lack of capital to invest in infrastructure, information and enabling institutions results in high transportation and transaction costs; forcing farmers to produce with traditional, subsistence mode of production.

THE MODEL, DATA AND METHODOLOGY

The Model

The model developed in this paper is anchored on the endogenous growth theory. The endogenous growth theory is preferred in this paper because of its inherent advantages, for instance, the endogenous growth model provides a framework to understand how technology change occur from economic activities. Technological change evolves from the interaction of factors of production (material and human), one reinforces the other. The major sources of technological change identified in the literature include accumulation of human and physical capital, and infrastructure. A firm that increases its physical capital learns at the same time how to produce efficiently due to technical knowledge embodied in new capital goods, but this efficiency could be constraint by poor quality of labour emanating from human capital, and lack of complimentary factors such roads, electricity, deliberate government expenditure on domestic manufactured goods and services. This deliberate expenditure on domestic manufactured goods assist domestic firms to accumulate capital which could be used in further research on new products and inputs. Eliminating the constraints lead to increase productivity, output and returns on investment. This makes possible for per capita growth to occur in the industrial sector. The non-diminishing marginal rate of capital gives rise to the production function of the form;

$Y_t = AtK_t$ ---------- (1)

Where Y_t is industrial output; A is level of technology; Kt is physical and human capital.

Presenting equation one in intensive output per worker form yields equation 2 thus;

$Y_t = Ak_t$ ---------- (2)

Increasing returns brought about by human capital prevents the marginal product of capital from diminishing. The growth rate of investment in human and physical capital per unit of effective labour becomes

$K^*/K_t = sf(kt)/k_t – (n + g + \beta)$ ---------- (3)

Since the marginal product is non-diminishing the production function becomes

$Y_t = f(K_t, Ai, Li)$ ---------- (4)

An increase in per capita stock increases the productivity of labour through learning-by-doing. As the factor-labour-accumulates knowledge and skills, other firms benefit from it, resulting in knowledge spill-over. Technical change is a reflection of the level of aggregate capital stock. Knowledge spill-over allows us to replace A with k in the production function, therefore equation 4 becomes

$Y_t = f(Ki, k, Li)$ ---------- (5)

As firms expand their capital stock in the process of production, spill-over benefit raises marginal productivity of factors, thereby generating endogenous growth.

Government engagement in economic activities in terms of consumption and supply of support infrastructure has important implications for technological advancement and growth in output especially in developing economy like Nigeria. Government consumption on domestic manufactured goods and services, expenditure on roads, electricity and education reduces cost of production and stimulate capital accumulation, economic growth and development. Incorporating the activities of government into the production function yields equation 6

$Y_t = Alt^{1-\alpha} K_t Xt^{1-\alpha}$ ---------- (6)

Where X_t = government final consumption, expenditure on education, credit to the private sector as percentage of GDP, and transport and communication infrastructure.

The argument of equation six is that if government increases consumption expenditure on domestic manufactured goods and services capital accumulation is raised in those sectors. Skilled human capital, transport infrastructure reduces distribution and production costs. This indicates that government expenditure on support infrastructure complement private inputs in the sense that an increase in X_t raises the marginal product of labour and capital. The exponent of X_t $(1-\alpha)$ determines the extent to which X_t impacts on technological change to drive economic growth and development.

The sign of coefficient of public investment in infrastructure is expected to be positive. This is because public investments in infrastructure support agriculture, manufacturing and services. It facilitates the adoption of modern technology in agriculture and enhances efficient utilization of inputs and distribution of output. As noted by Breisinger and Diao (2008), and Restruccia, Yang and Zhu (2008), public investment in infrastructure changes farmer's savings and investment behaviour, good road network lowers the distribution costs of firms in terms of inputs, goods and services. Murphy, Schleiter and Vishny (1989) agrees with these submissions but added that private investors needs the guarantee that public investment will provide such support infrastructure or are already provided to invest in an economy.

A priori human capital is expected to enter with a positive sign. Increased human capital leads to improved productivity in the industrial sector. A highly skilled human capital can easily operate complicated task and produce a given output at increasing returns. A country can only domesticate foreign direct investment (FDI) only if the country has the right quality of human capital. As observed by Lucas (1988), and Basu and Weil (1998) a country whose human capital cannot learn, adopt and adapt new techniques and technology cannot expand the value chain.

Corruption plays a significant adverse role in the economic transformation process. This is because it distorts the efficient workings of the productive processes in the economy. Jones (2008) argued that corruption leads to poor infrastructure and poor infrastructure reduces output in all sectors including construction. Transport infrastructure smoothen the production process in terms of acquisition of inputs and distribution of final output.

DATA AND METHODOLOGY

The data for this paper were obtained from various sources. These include Central Bank of Nigeria statistical bulletin, transparent international, World Development Indicators CD Rom 2009 and 2010. All the variables are in their natural logarithm to examine growth elasticity. The growth elasticity essentially measures the sensitivity of output to explanatory variables, showing the effect of a percentage change in explanatory variables on industrial output.

The paper explored the co-integration/error correction paradigms. Given data instability in Nigeria occasioned by policy instability, political cum economic disruptions etc, it becomes increasingly useful to test the time series property of the variables for meaningful economic results. It is clear that OLS regression estimates with non-stationary time series data often produce unacceptable results, even though the overall results may indicate a high degree of fit (as measured by coefficient of multiple correlation, R^2 or adjusted coefficient of R^2, high auto correlated residuals and statistical significance as measured by the usual t-statistics (Gujarati, 2004).

Moreover, many economic variables have a strong tendency to trend over time, such that the levels of these variables can be characterize as non-stationary, since they do not have a constant mean over time. Difficulties may arise while performing regression with clearly non stationary series, thus leading to the so called 'spurious' regression (Granger and Newbold, 1974). Given two completely unrelated but integrated series, regression of one on the other will tend to produce an apparently significant relationship when, in fact, they are not related.

This study therefore, adopts the co-integration/error correction methodology to estimate three equations. This selection is based on the premise that if the variables are non-stationary, the desirable properties of consistency, efficiency, and unbiased estimator will be lost if Ordinary Least Squares (OLS) technique is used to estimate the equation, which could lead to spurious results and inference, hence, inaccurate predictions. Co-integration and error correction is used because it adds richness, flexibility and versatility to the econometric modelling and integrates short-run dynamics with long equilibrium. Hence accurate predictions can be more confidently made on the economic relationship between the variables.

RESULTS AND DISCUSSIONS

Table V.1 Unit Root Test

Augmented Dickey Fuller Test | Phillip Perron Test

Variable	Intercept	Trend and intercept	Decision	Intercept	Trend and Intercept	decision
Idustrt	-6.113684	-6.033881	I(1)	-6.113601	-6.033644	I(1)
Cspgdpt	-4.911256	-4.926424	I(1)	-4.815615	-4.819144	I(1)
Labt	-4.627628	-5.869692	I(1)	-4.689632	-5.858745	I(1)
gexptranspt	-7.915399	-8.195363	I(1)	-7.8938808	-8.468814	I(1)
Gexpedut	-6.994986	-7.196239	I(1)	-7.069660	-9.109963	I(1)
Hcapitat	-5.805819	-6.534833	I(1)	-5.799449	-6.562758	I(1)
gconsumptr	-4.458872	-4.377857	I(1)	-4.283304	-4.180759	I(1)

Critical Values with Trend

1% = -3.615588

5% = -2.941145

10% = -2.609066

Critical Values Trend and Intercept

1% = -4.219128

5% = -3.533083

10% = -3.19831

To test for the level of integration used in the model, we employ the well-known augmented Dickey-Fuller and Philip Peron tests. The purpose is to determine whether the variables follow a non-stationary trend and in fact of the order of 1 denoted by 1(1) or whether the series are stationary, that is of the order 1(0). If the series are not stationary the use of classical method of estimation such as OLS could lead to unwittingly accepting meaningless result. Moreover, in cases where the series are non-stationary around their mean, the traditional practice was to differentiate the series. In most cases this usually leads to stationarity, allowing the researcher to apply conventional econometrics (Granger and Newbold, 1974). The major disadvantage

of first differencing is that it prevents the detection of long-run relationship that may be present in the data. In other words the vital long-run information is lost, which is the major question being addressed.

The result of the unit root tests based on the Augmented Dickey Fuller and Phillip Peron unit root tests is presented in table V.1. The purpose is to determine whether the variables follow a non-stationary trend and in fact of the order of 1 denoted by 1(1) or whether the series are stationary at levels, that is, of the order 1(0). All the variables under scrutiny namely industrial output, banking system credit to the private sector as a percentage of GDP, government consumption on consumer goods and services, government expenditure on education and transport, human capital, labour force and technology are I(I) process, which means that they are stationary at first difference. Since all the variables are integrated at an order of 1, That is, I(1), it suggests that they have a stochastic trend. In addition, the fact that their first difference appear to be stationary further shows that they all candidates for inclusion in long run relationship concerning the interdependence between dependent and explanatory variables included in the model.

Our next task is to investigate whether the series under consideration are co-integrated using the Engle and Granger (EG) two step procedure, so that a well-defined relationship exists between them in the long-run. The contribution of Engle and Granger (1987) was to demonstrate that albeit individual series could be non-stationary a linear combination of them might produce stationary series. The EG provides information about the short term dynamics responses of variables included in the model. The method is straightforward and requires running regression using stationary series I(0), which in our case is obtained by using the first differences of the variables and including in the regression as an explanatory variable the lagged residuals from the levels regression. This lagged residual is intended to capture the error correction term and then tested to see whether or not it is a stationary process. The result shows that the residual denoted as ECM1 is stationary at levels. This strongly suggests the existence of a co-integrating relationship among variables in the model.

The presence of co-integration makes it possible to estimate the error-correction model (ECM), which is a solution to the problem of spurious result associated with estimating equations involving time series variables, and to capture dynamic adjustment to the long run (Patterson, 1990). Adopting the general to specific framework, we proceeded to estimate over-parametised error correction model of the economic development equation from where a parsimonious (preferred) error correction model was obtained.

The novelty of ECM is that it provides a framework for establishing the links between the long run and short run approaches to economic modelling. Thus with ECM no information associated with the variable first differencing is lost because the modelling technique incorporates both the short run dynamics and long run information through the error correction term. The summary of the parsimonious (preferred) model is presented in table V.II. A careful examination of the parsimonious results show that the error correction term is well specified as it has the expected a priori sign and is statistically significant.

The existence of a well specified error correction model indicates how agents adjust their anticipated changes in output, and in this case, about 28 per cent on the average. The nature of the distribution of the error term indicates that it is stationary. This means that the combinations of dependent and the explanatory variables are co-integrated. The existence of co-integration provides further validity of the regression results (Nyong, 1995; Engle and Granger, 1987; Domowitze and Elbadawi, 1987; Nyong and Udah, 2012).

Table V.II: Parsimonious Result of Industrial output equation

Variable	Coefficient	T-Statistics	Probability
C	75.06355	5.039056	0.000
CSPGDPT	0.88566	2.090889	0.045
Log(GEXPEDUT(-2))	0.772309	3.886316	0.005
Log(GEXPTRANST)	0.186419	1.628669	0.023
Log(Hcapitat)	4.488527	3.846445	0.006
Log(Lbfrt)	5.713757	5.931325	0.000
Log(tech)	1.415943	1.165681	0.253
Gconsumptr	o.865321	1.903245	0.041
ECM1(-1)	-0.275258	-2.829357	0.052

R^2= 0.96; D.W. = 1.65 and F-Statistics = 93.80

The diagnostic statistics are good. R^2 of 0.96 shows that the regression line explains about 96 per cent of the dependent around its mean, indicating a good fit. The value of Durbin Watson statistics suggests the absence of first order serial correlation. With the exception of technology, all other variables of interest entered with the correct a priori signs and were statistically significant. Albeit the technology variable entered with correct a priori sign but was not statistically significant. Theoretically technology is important for industrial development. Economic experiences of both advance capitalist and emerging societies lends credence to the importance of technology in propelling industrial growth. Technology enhances the ability of human capital to produce goods and services at least cost. This in turn enhances total factor productivity which is the catalyst for industrial development.

The results indicate that transformation is fostered by public investment in education and transportation infrastructure. This is because government investment in education and transport infrastructure was not only statistically significant but entered the regression line with correct a priori signs. The result indicates that a 10 per cent increase in government expenditure on education will lead to an average annual increase in industrial output by 7.7 percentage points. Investment in education creates positive externalities which increases the productivity of both human and physical capital (Easterly and Rebelo 1992, Bose, Haque and Osborn 2007).

CONCLUSION

The major objective of this paper had been to investigate the role government could play within the transformation agenda in order to promote industrialization to the desired threshold. To achieve this objective the paper based on endogenous growth theory developed a model that attempted to explain the critical areas government needs to channel its capital expenditure to

accelerate the pace of industrial development. The study also used the co-integration and error correction paradigms to smoothen the data.

The results showed that government expenditure on education, transport and communication infrastructure has long lasting effect on industrial development. Investment in education and transport infrastructure accounts for much of the accelerated industrialization experienced in most Asian and North American countries. For instance, in Malaysia per capita expenditure in education increased from 16.4 per cent in the 1970s to 226.4 per cent by 2009, whereas in Thailand it was 11.0 per cent in the 1970s and 88.1 per cent in 2009. This concludes that to achieve economic development that is sustainable, there is need to invest in education and infrastructure.

REFERENCES

Aayami, Y. and Ruttan V. (1985). *Agricultural Development*: An International Perspective, Baltimore, MD: John Hopkins University Press

Breisinger C. and Xinshen Diao (2008). Economic transformation in theory and practice: What are the messages for Africa? *IFPRI discussion papers,* 00797 September

Dixon C. (1999). *The Thai Economy: Uneven Development and Internationalization*, New York: Rout ledge

Domowitze, I and I. Elbadawi (1987). An error correction approach to money demand: The case of Sudan', *Journal of Economic Development*, 26, 257-275

Engle, R. F. and Granger, C. W. J 1987. Co-integration and error correction: representation, estimation and testing", *Econometrica*, 55, 2, 251-76.

Easterly, W. and Sergio Rebelo (1993). Fiscal policy and economic growth: An empirical investigation, *Journal of Monetary Economics*, XXXII, 417-58

Gujarati, D. N. 2004. *Basic Econometric*, Tata McGraw-Hill publishing Company, India.

Kuznets, S. (1973), Modern economic growth: Findings and reflection. Nobel memorial lecture, *American Economic Review* 63(3): 143-165

Lucas, R. E. 1988. On the mechanics of economic development', *Journal of Monetary Economics*, 22, 3-42.

Lewis, W. A. (1979). The dual economy revisited. *The Manchester School*, 47(3): 211-229

Muscat, R. J. (1994), The Fifth Tiger: A Study of Thai Development Policy. New York, United Nation's University Press

Patterson, K 1990. *An Introduction to Applied Econometrics: a time series approach.*

Palgrave publishers, United Kingdom.

Schultz, T. W. (1968). Economic Growth and Agriculture, New York, St. Louis, San Francisco

Schultz, T. W. (1964). Transforming Traditional Agriculture, New Haven

Siamwallq, A. (1987). Thailand's agricultural future, what are the questions? *The World Bank Washington*

Tambunlertchai, S. (1993). Manufacturing. In War P. G (ed): The Thai Economy in Transition, Cambridge University, press, UK, 118-150.

Toffin, R. and X. Irz (2006), Is Agriculture the Engine of Growth? *Agricultural Economics*, 35: 79-89

Volden, M. (1995) Contract Farmining Maize in North Thailand, in Hesselberg J. (ed) Development in the South: Issues and Debates, Department of Human Geography, University of Oslo, 123-135.

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