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AN ESTIMATION OF THE IMPACT OF ENERGY PRODUCTION ON ECONOMIC GROWTH IN GHANA

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Abstract

The main aim of this study was to determine the impact of energy production on economic growth in Ghana. The Ordinary least squares method of estimation was used to determine the values of the respective parameter estimates. The study identified that Ghana is still a developing country that needs enough energy supply to expand to become an industrialized economy. Also, the study revealed that there is a positive relationship between electricity production and economic growth despite the unstable nature of electric power supply in Ghana. The value of the impact is 0.0500175. That is, the degree of the responsiveness is 0.0500175 meaning an inelastic effect. This implies that electricity production is an input of necessity to or key to Ghana's economic expansion and sustainability development though statistically insignificant. Therefore, the policy suggestion is that the government should continue to invest massively into energy sector of the Ghanaian economy to ensure consistent and sustainable supply of energy to the industrial, commercial and residential units of the economy in order to achieve significant impact on the overall economic growth and development of Ghana.

Key Words: Estimation, Impact, Energy Production, Economic Growth, Ordinary Least Squares

INTRODUCTION

The aim of every government is to achieve economic development. However, before there can be economic development there must be economic growth. Economic growth theorists have identified some factors that have and can propel economic growth. Some of these factors identified are capital, labour, land, technology, government spending, foreign direct investment, foreign aid, interest rate, exchange rate, taxations, institutions, luck, and geographical location, good governance, political framework, sense of nationhood, natural calamities, cultural creeds and many more and recently energy (see Solow, 1956; Lucas 1988; Grossman and Helpman 1990 & 1991; Romer, 1990, 2007; Aghion and Howitt, 1992; Aryes and Warr, 2009; Acemoglu et al., 2006; Aghion et al., 2006; Holmes and Schmitz, 2001). These inputs have been categorized into primary inputs and intermediate inputs. Primary inputs of production are inputs that exist at the beginning of the production period under consideration and are not directly used up in production (though they can be degraded and can be added to) while intermediate inputs are those created during the production period under consideration and are used up entirely in production (Vlahinic-Dizdarevic and Zikovic, 2010).

The primary inputs identified by the growth theorists are capital, labour and land while energy (fuels) and other materials are identified as intermediate inputs (Vlahinic-Dizdarevic and Zikovic, 2010). Within the growth theories, more attention is paid to capital, land and labour while not much attention is paid to energy use in the economic growth process. Meanwhile, energy is considered as one of the important driving forces of economic growth in all economies (Pokharel, 2006; Romer, 2007; Augutis et al., 2011; Filiz and Omer, 2012). This has drawn the attention of economic growth theorists to consider energy as the main primary input of production. The reason is that all economic activities need energy to generate the necessary and the right quantities of outputs to meet demand, though some services activities might not require the direct usage of energy to process the raw materials (see Stern 1999, Georgescu-Roegen, 1971; Tintner et al., 1974; Wood, 1979). Also, ecological economists have argued that energy is a primary factor of production while capital and labour are considered as flows of capital consumption and provision of labour services. Furthermore, some ecological economists have concluded that energy availability drives quality of life, provide economical and social progress (see Diskiene et al. 2008) while others have the opposite view. That is from macroeconomic point of view an increase in energy prices leads to a rise in the domestic price level of goods and services and finally a fall in output due to higher costs of production (see Forex, 2009; Vlahinic-Dizdarevic and Zikovic, 2010; Guerrerio, 2011). In addition, global warming, climate change, increase in world energy demand, dependence on fossil fuels being consumed away rapidly and inadequacy of the development in new energy technologies to meet the increasing energy demand make the countries worry about energy supply security more especially in Ghana (Filiz et al., 2012; Sliogeriene et al., 2009).

According to the first law of thermodynamics (the conservation law) “in order to obtain a given material output greater or equal quantities of matter must enter the production process as inputs with the residual as a pollutant or waste product”. The second law of the thermodynamics (the efficiency law) states that “a minimum quantity of energy is required to carry out the transformation of matter”.

This implies that energy can be reused, but it will increasingly reach a less useful state and therefore additional energy is required (Vlahinic-Dizdarevic and Zikovic, 2010; Stern, 2004). This also means that there are limits to the extent to which energy can be substituted for by other inputs into the production process (Ockwell, 2008). It further implies that energy is crucial for economic expansion at the macroeconomic level. The reason is that all production involves the transformation or movement of matter in some way and all such transformation requires energy, hence energy production is of critical importance for the survival of the Ghanaian economy.

The role that energy plays in an economic growth and development of a country has attracted a lot of research attention. However, about 99% of the studies done on energy and economic growth have only concentrated on the causal relationship between energy consumption and economic growth (see Kraft and Kraft, 1978; Akarca and Long, 1980; Erol and Yu, 1987; Mozumder and Marathe, 2007; Shiu and Lam, 2004; Jumbe, 2004; Yu and Hwang, 1984; Yu and Choi, 1985; Yu and Jin, 1992; Cheng, 1995; Yang, 2000; Yoo, 2006;Chontanawat, Hunt and Pierse, 2008; Gelo, 2009; Zikovic and Vlahinic-Dizdarevic, 2009; Ghali and El-Sakka, 2004; Oh and Lee, 2004; Ghosh, 2002; Enu and Havi, 2014), while the remaining 1% attention is paid to the relationship between energy production and economic growth (see Filiz et al, 2012; Morimoto and Hope, 2001). Thus, Morimoto and Hope found that current as well as past changes in electricity supply had a significant impact on the changes in real GDP of Sri Lanka. That is, an extra economic output of 8800 to 137000 Rupees was predicted for every 1MWh increase in electricity supply. Similarly, Filiz et al. (2012) examined the causal relationship between aggregated and disaggregated levels of energy production, energy demand, energy import and economic growth for Turkey for the period 1975 – 2007. They employed the methods of Engle-Granger Cointegration, Error Correction Model and Granger Causality tests. They found that energy production had direct relationship with GDP and it had a causality effect.

According to Filiz et al. (2012) energy production leads to economic growth and economic growth can also lead to energy production. This means that as energy production increases economic growth will also increase or economic growth will increase as the energy production increases, ceteris paribus. This implies that energy production has significant impact on economic growth, more particularly within the Ghanaian economy.

With economic growth, energy production in Ghana is less than energy demand. This is due to high population growth rate, inflow of foreign investors, an increase in economic activities and an over reliance on foreign countries for sources of energy generation and so on (Enu, 2014). This has led to shortages leading to rationalization of the energy supply (load shedding) which has affected economic activities negatively. In order to arrest this situation, energy providers together with the government is doing all that they can to improve the energy situation in Ghana. The question left to be answered here is, to what extent has energy production in Ghana influence economic growth of Ghana?

It is also argued that since the cost of energy is a very small proportion of gross domestic product (GDP), it is unlikely to have a significant impact. Is there a neutral impact of energy supply on economic growth in Ghana? It is said that there is a strong link between energy production an economic growth and a further rise in the prosperity of nations will have to be sustained with increased production of energy. The question is, does energy production grow in tandem with gross domestic product (GDP) in Ghana? Morimoto and Hope (2001) has emphasized that an adequate and regular supply of power may be one of the most crucial factors which supports economic growth in developing countries. Is that the case in Ghana? More so, according to a study by Ferguson et al. (2000), there is a strong correlation between electricity use and economic development. Is energy production more sensitive to gross domestic product growth in Ghana?

For instance, the major power crisis in 2006/2007 is estimated to have cost Ghana nearly 1% in lost growth of gross domestic product during those years. Besides, for the past fifteen (15) years, Ghana has added about 1,000 megawatts (MW) of thermal generation capacity to her power generation. This has pushed Ghana's current generation capacity to 2,125 MW and it is made up of about 50% hydro and 50% thermal plants (World Bank, 2013). Has the improvement in the power sector dragged the growth of the Ghanaian economy?

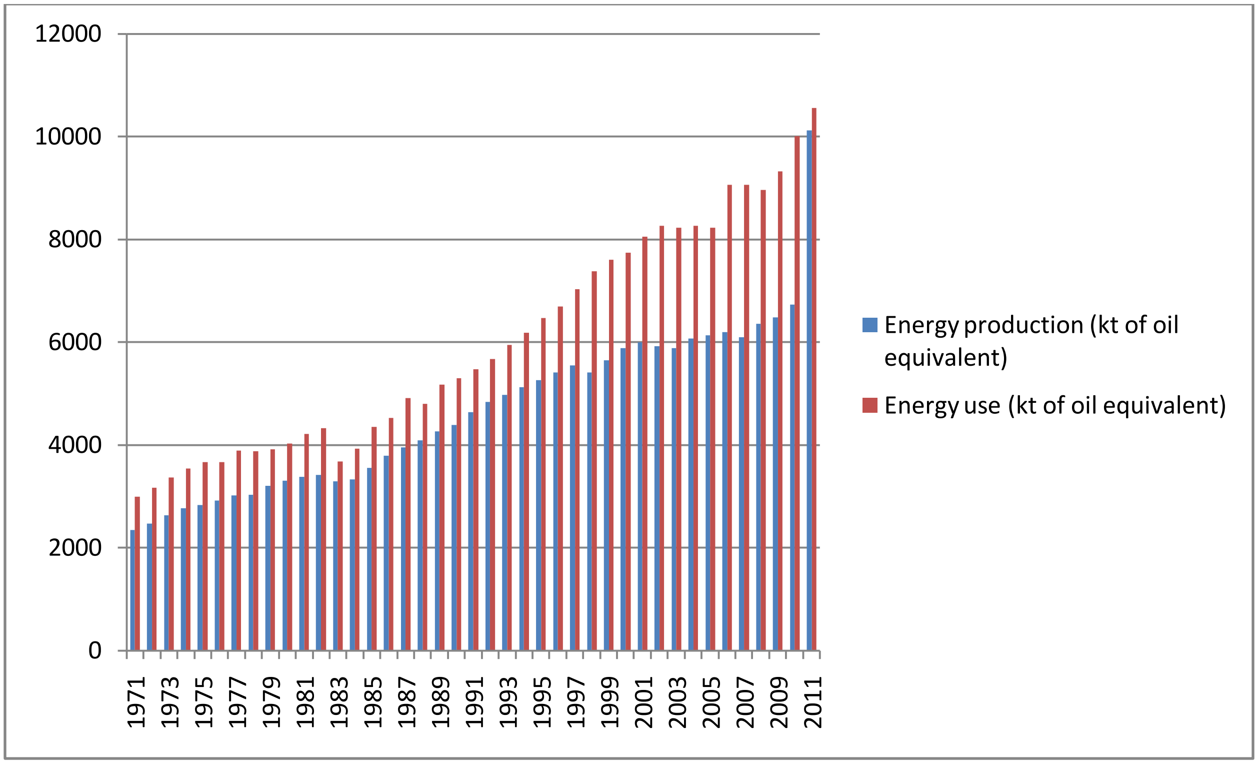
The main aim of this study is to determine the impact of energy production on economic growth in Ghana. This study is different from the earlier ones. The reasons are that:

1. Most of the research done on energy and economic growth have centered on causal relationship between energy demand and economic growth. This study will, however, examine the relationship between energy production and economic growth, more particularly in the context of Ghana.
2. It is will also provoke further research in the area of energy production and economic growth in Ghana thereby closing the literature that concerns energy and economic growth.
3. Finally, this research work is very relevant especially at this time of unstable energy supply in Ghana. This work will help all stakeholders (government, private businesses and so on) in the energy sector to derive the understanding, how and to what extent energy supply is key to the growth and economic development of Ghana, hence, it will power their conviction to invest massively/less wastage of energy in the energy sector of the Ghanaian.

In this study, Electricity production is used as a proxy for energy production. The reason is that electricity power supply is proven to be the most common form of energy usage in Ghana. In addition, electricity production has also proven to be a more reliable source of energy and very cost effective means of energy usage in Ghana.

THE INTERACTION BETWEEN ENERGY PRODUCTION AND OTHER ECONOMIC VARIABLES

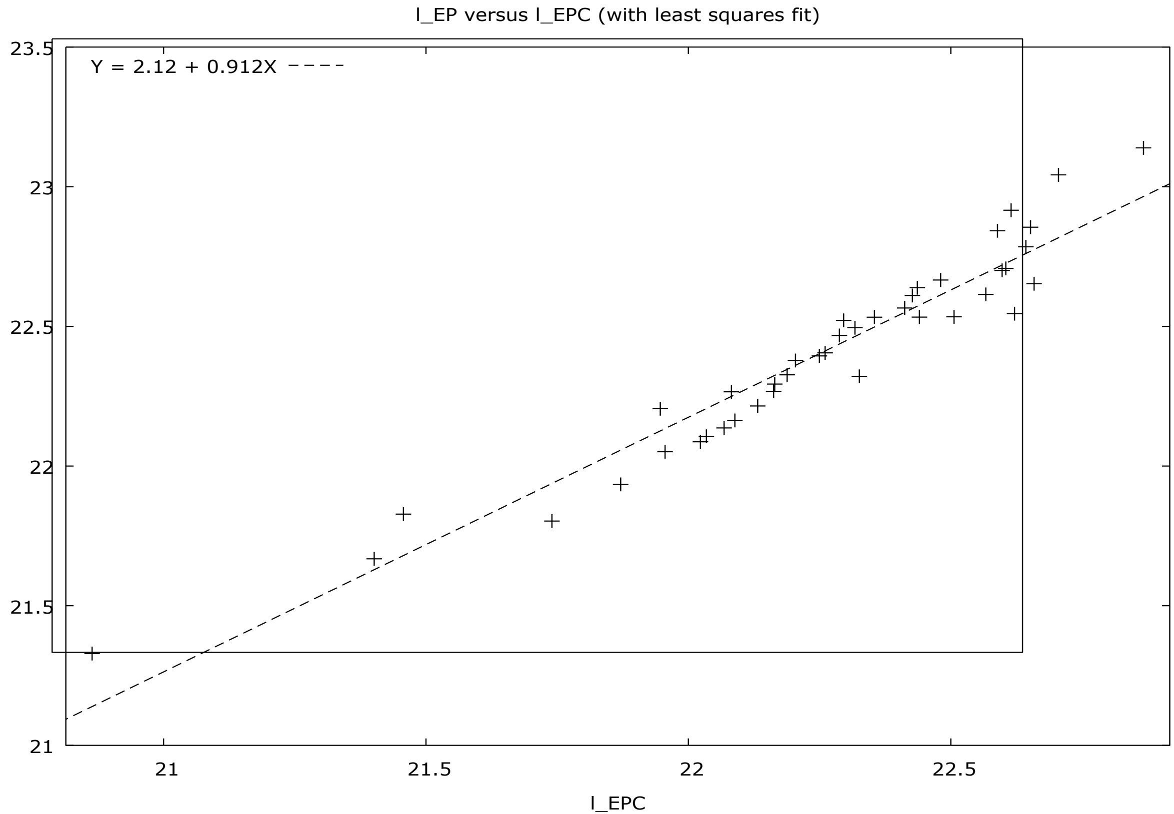
Figure 1: The Interaction between Energy Production and Energy Use in Ghana



Sources: World Development Indicators Database

Figure 1 shows that there is a positive relationship between energy production and energy usage in Ghana. As energy production increases, industrial, commercial and residential users also increase their usage. The degree of the association between the energy production and energy usage is 0.98 approximately. The relationship is a very strong one and statistically significant. 1% increase in energy usage in Ghana will cause energy production to increase by 0.904%, all things being equal. This simply means that as energy usage increases, energy production must also increase correspondingly to meet demand.

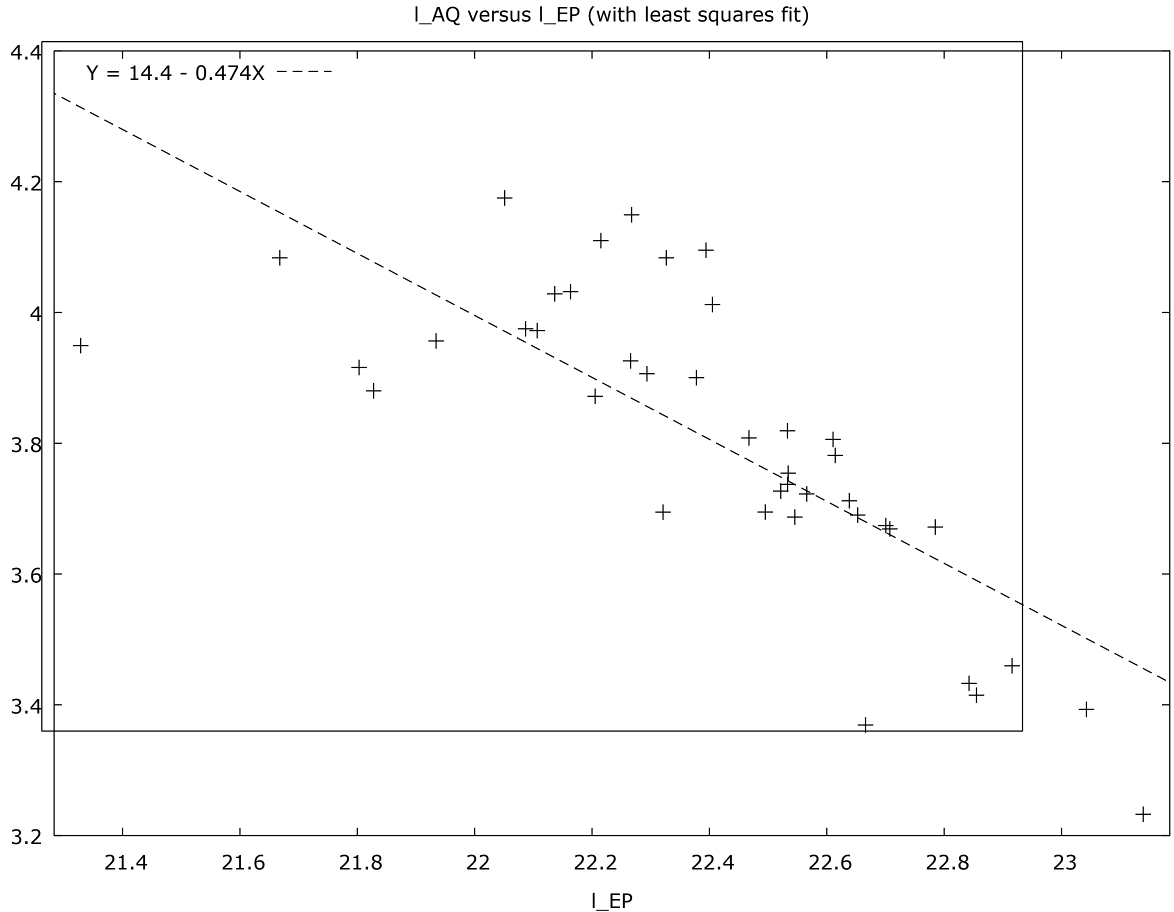
Figure 2: Interaction between Electricity Production and Electricity Consumption



Sources: World Development Indicators Database

Figure 2 shows that the association between electricity production and electricity consumption in Ghana is positive. The degree of the association between them is 0.96 approximately. This means that a very good association exists between electricity production and electricity consumption in Ghana. It is statistically significant. 1% increase in electric power consumption will cause a 0.912% increase in electricity production, all else being equal. This implies that as electricity consumption increases, electricity production must increase to meet demand.

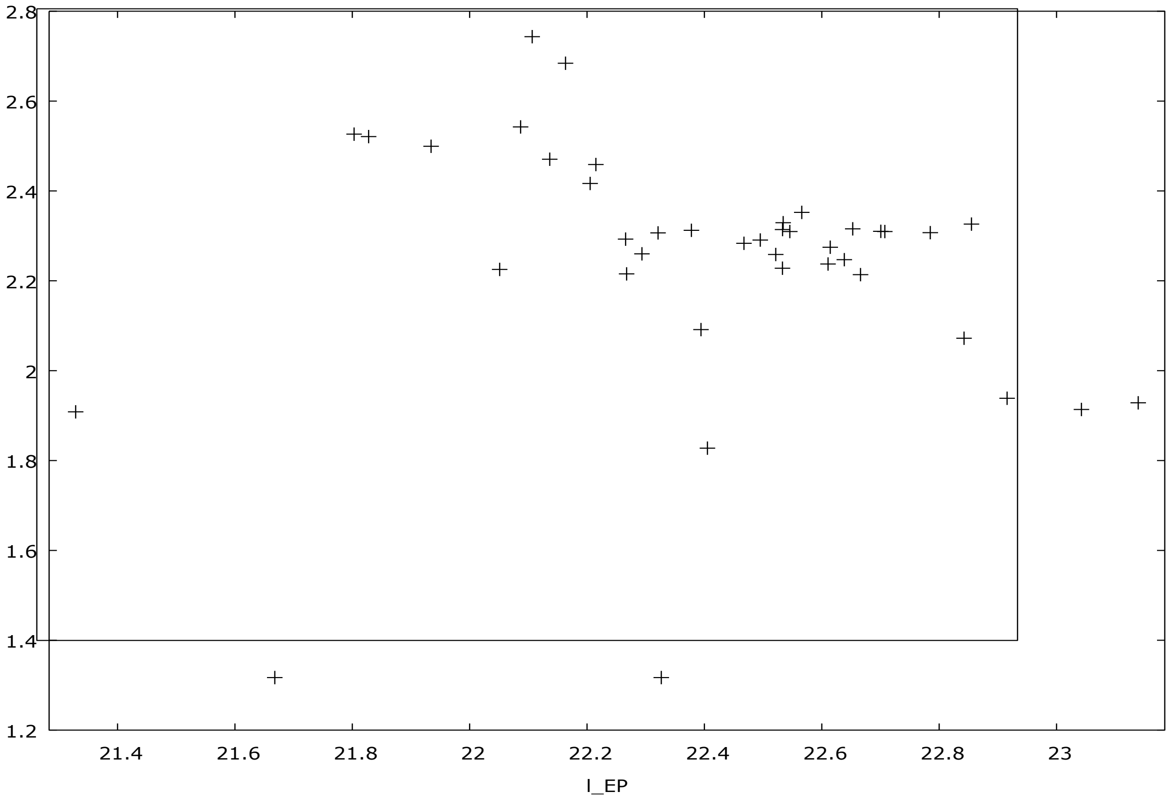
Figure 3: Interaction between Electricity Production and Agriculture Production



Sources: World Development Indicators Database

Figure 3 shows that there is a negative relationship between agriculture production and electricity production in Ghana. That is, as electricity production increases, agricultural production decreases. The reverse is also true. This means that electricity production is not an important intermediate input of agricultural activities in Ghana. The reasons might be that Ghana’s agriculture sector lacks activities such as large irrigated farms (cotton, sugar-cane, fruit farms), and agro-industrial processing plants (ginnery, sugar mills and fruit canning) which might required enough electricity power to function effectively and efficiently. The degree of the negative correlation between the two is 0.76 approximately. This value illustrates a very strong negative association and it is statistically significant. Economically, 1% increase in electricity production will cause agriculture production to decrease by 0.474% in Ghana, ceteris paribus. But, the impact is statistically insignificant. This further confirms that electricity production is not an essential intermediate input of agriculture production in Ghana.

Figure 4: Interaction between Electricity Production and Manufacturing Production

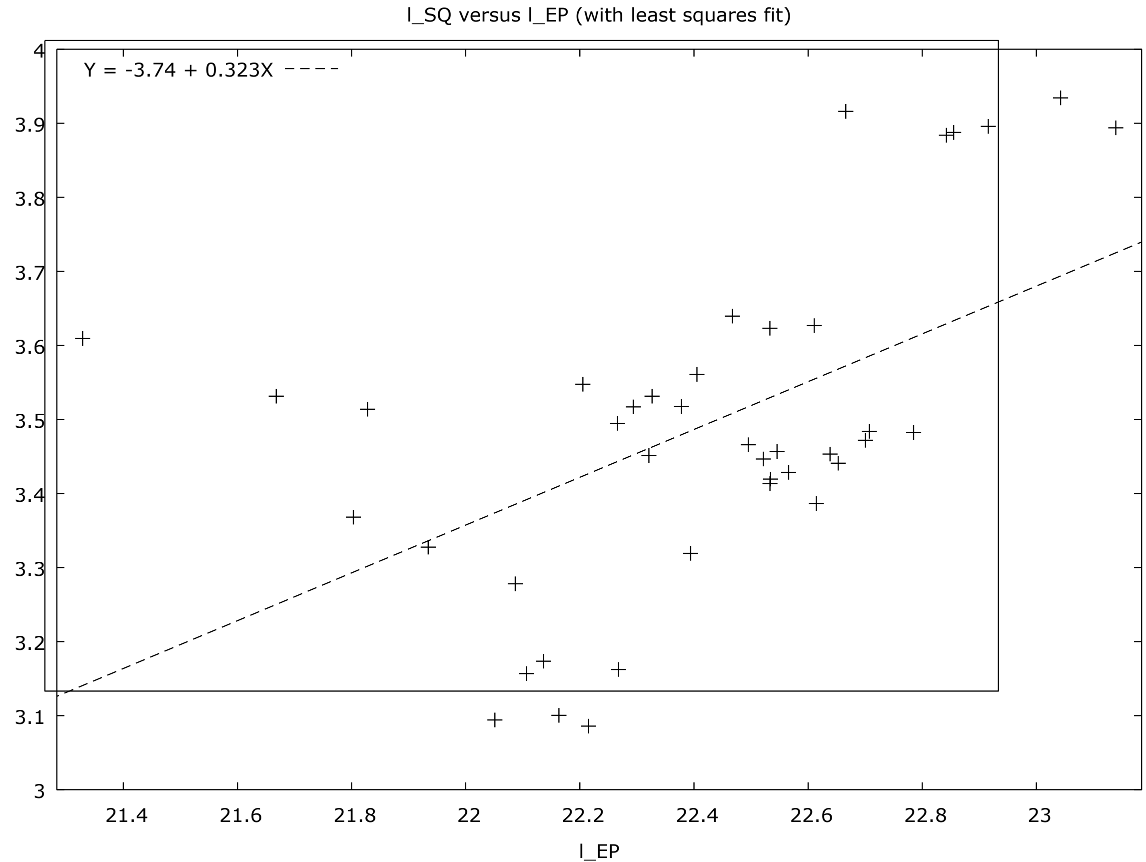


Sources: World Development Indicators Database

Figure 4 shows that there is no clear association between manufacturing output and electricity production in Ghana. That is, it cannot be said whether if electricity production increases or decreases, it will influence manufacturing output positively or negatively in Ghana. But, observationally it is expected that electricity production will have a positive effect on manufacturing output in Ghana, all things being fixed.

Or could it be that manufacturing industries in Ghana rely mostly on other forms of energy sources like diesel, petrol, solar, wind, and wood biomass and not electricity supply? This calls for further investigation.

Figure 5: Interaction between Energy Production and Services Production



Sources: World Development Indicators Database

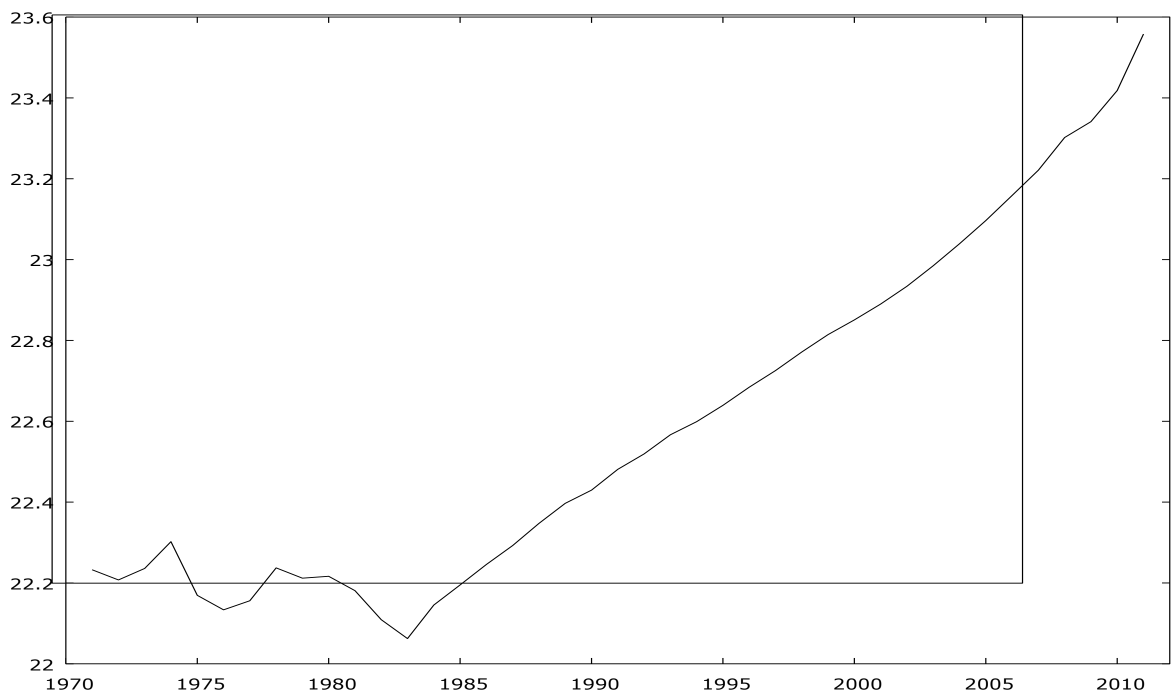
Figure 5 shows that there is a positive relationship between services production and electricity production in Ghana. This means that as electricity production increases, services production also increases accordingly. The reverse is true also. The degree of the association is 0.53 approximately. This value shows that the relationship between services output and electricity production is fair and statistically significant. Incrementally, 1% increase in electricity production will cause services production to increase by 0.323% in Ghana, all else equal. However, the effect is insignificant which indicates that electricity production is not a very major factor that influences services production in Ghana. This finding supports the argument that it is not all services activities that require the use of electricity supply. However, electricity production better explains the total variation in services production (R^2=86%).

Figure 6: Trend of Electricity Production in Ghana

Sources: World Development Indicators Database

Figure 6 shows that electricity production in Ghana has been unstable since 1970. How has this affected the overall Ghanaian economy?

Figure 7: Trend of real GDP in Ghana



Sources: World Development Indicators Database

Figure 7 shows that after 1984 Ghana has been experiencing economic expansion. Does it mean that the unstable power supply in Ghana has no significant effect on her economic growth? Or is Ghana now a developed country that is why the unstable electricity production does not affect her economic activities? Since the services sector is now the driving force of her economic growth and development process.

From the above, it has been established that there is a negative relationship between electricity production and agricultural output in Ghana. Also, there is no association between electricity production and manufacturing output in Ghana. Further, there is a positive relationship between electricity production and services production in Ghana. On the contrary electricity supply in Ghana has been unstable since the period 1970 to date. Nevertheless, Ghana's economy has been expanding since 1984. From the aforementioned the following questions are raised, which raised calls for scientific investigations.

1. Is Ghana still a developing country that requires abundant supply of energy to be transformed into a developed country?
2. Does electricity production significantly influence overall economic growth in Ghana?
3. What is the degree of the influence between economic growth and electricity production?

METHODOLOGY

Model specification

Model 1: Is Ghana A Developing Country Or Richer Country that Requires More/Less Energy Consumption

The study seeks to know whether Ghana is a higher rich country where she requires less energy consumption since if developed the services sector in which not all activities require the use of energy consumption will be the dominant sector or a developing country where she requires higher levels of energy consumption since the manufacturing sector will be the engine of growth and thus require higher levels of energy production. Therefore, the model includes:

$$EU_t = \beta_0 + \beta_1 GDPPC_t + u_t$$

Where;

EU_t = energy use at time t

$GDPPC_t$ = gross domestic product per capita at time t

u_t = error term

$\beta_0 > 0$; $\beta_1 < 0$ (developed country); $\beta_1 > 0$ (developing country)

Model 2: The Effect of Electricity Production on Economic Growth in Ghana

The study also seeks to determine the effect of electricity production on economic growth in Ghana. As a result, the study follows the specification of the Cobb-Douglas production function. The model includes:

$$RGDP_t = AL_t^{\varphi_1} K_t^{\varphi_2} EP_t^{\varphi_3} e_t^{u_t} \text{........}(2)$$

The log transformation of equation (2) gives:

$$\ln RGDP = \ln A + \varphi_1 \ln L_t + \varphi_2 \ln K_t + \varphi_3 \ln EP_t + u_t \text{......}(3)$$

Where;

$RGDP_t$ = Real Gross Domestic Product (constant 2005 US$) at time t

L_t = labour input measured as total labour force at time t

K_t = capital input measured as gross fixed capital formation as a percentage of GDP at time t

EP_t = electricity production measured in kWh at time t

U_t = stochastic disturbance term

$\varphi_1\ \varphi_2\ \varphi_3$ = partial elasticities

$\varphi_1 > 0;\ \varphi_2 > 0\ ;\varphi_3 > 0$

Method of Estimation

The Ordinary least squares method of estimation was used to determine the values of the respective parameter estimates. The method of ordinary least squares is attributed to Carl Friedrich Gauss, a German mathematician. Under certain assumptions, the method of least squares has some very attractive statistical properties that have made it one of the most powerful and popular methods of regression analysis (Damodar, Gujrati and Sangeetha, 4th ed). The statistical package used for the estimations was gretl.

Coefficient of Determination

The coefficient of determination was used to indicate how the explanatory variables included in the models best explain the total variation in the dependent variables. The closer it is to 1 be it positive or negative the better. The main weakness of the unadjusted R^2 is that it does not take the degrees of freedom into account, this weakness is corrected by using the adjusted R^2 (Mukras, 1993).

The P-Value for Each Explanatory Variable

The p-value for each explanatory variable was used to check whether each coefficient is significantly different from zero or not. Its value should be lower than 0.05. If each explanatory variable of the models has a p-value inferior to the 0.05 critical values, then it confirms that all the explanatory variables have a significant impact upon the dependent variable. To quickly judge whether the models exhibited the problem of multicollinearity, the p – values were used. If the parameter estimates prove to be statistically significant, then it will mean that the problem of multicollinearity does not exist.

The Global Significance Test

The global significance test was used to test if all the model coefficients were significantly different from zero. If the p-value for the global significance test is lower than the 0.05 critical value, then it means that all the explanatory variables included in the model have a statistically significant impact on the dependent variable or otherwise. That is, the overall multiple regression equation and the parameters estimates are statistically significant and the regression line performs well.

Durbin Watson Statistic (DW)

The DW test was used to test for the presence of autocorrelation. The traditional benchmark is 2.0. If DW value lies between 1.5 – 2.5 it means the assumption of linearity is not violated.

Durbin Watson (DW) and R—Squared (R^2)

According to Granger and Newbold, if the value of the R-squared is greater than the value of the DW (R^2> DW), then there is a good rule of thumb to suspect that the estimated regression is spurious. The R^2 and the t-statistic from such a spurious regression are misleading, and the t-statistics are not distributed as t distribution and, therefore, cannot be used for testing hypotheses about the parameters.

Source of Data and Sample Size

The data used for the estimates were taken from World Development Indicator 2014. The years considered for the data selection were from 1972 to 2011. This gives a sample size of 40 which is greater than the general acceptable size of 30.

The method of Correlation Analysis

In studying the relationships, data was collected and scatter plots were constructed. The aim of the scatter plots was to determine the nature of the relationship between the variables. The possibilities included a positive linear relationship, a negative linear relationship, a curvilinear relationship, or no relationship.

After the scatter diagrams were drawn, the next step was to compute the value of the correlation coefficient using the Pearson's product moment correlation coefficient (PPMC) given as:

$$r = \frac{n\left(\sum xy\right) - \left(\sum x\right)\left(\sum y\right)}{\sqrt{\left[n\left(\sum x^2\right) - \left(\sum x\right)^2\right]\left[n\left(\sum y^2\right) - \left(\sum y\right)^2\right]}}$$

where x = independent, y = dependent variable and n = the number of data pairs. Gretl was used to determine the value of the PPMC. In addition, we tested for the significance of the relationship r by using the p-value generated (Mendehhall and Sincich., 1989; Oakshott, 2006).

RESULTS AND DISCUSSION

Model 1: Is Ghana A Developing Country Or Richer Country that Requires More/Less Energy Consumption

Model 1: OLS estimates using the 40 observations 1972-2011

Dependent variable: **EU**

Variable	Coefficient	Std. Error	t-statistic	p-value
const	11602.3	1965.68	5.9025	<0.00001
GDPPC	4.87261	1.56489	3.1137	0.00350

Statistics based on the rho-differenced data: Sum of squared residuals = 1.98975e+006; Standard error of residuals = 228.827; Unadjusted R^2 = 0.98935; Adjusted R^2 = 0.98907; Degrees of freedom = 38; Durbin-Watson statistic = 2.25598; First-order autocorrelation coeff. = -0.130741; Akaike information criterion = 550.101; Schwarz Bayesian criterion = 553.479; Hannan-Quinn criterion = 551.322

The value of the adjusted R-square is about 0.99, which means 99% of the total variation in energy use, is explained by GDP per capita. The remaining is 1%. Also, the overall equation is statistically significant. The value of the DW is 2.25598, which indicates no presence of autocorrelation. The model is sensible, acceptable and spurious free since the value of the DW is greater than the value of the R-square (DW (2.25598) > R^2 (0.98935). Therefore, meaningful inference can be made from this model.

From the estimation, it is found that there is a positive relation between energy use and GDP per capita. If GDP per capita is increased by 1 unit, then total energy use is increased by 4.87261 on average. 100 unit increases in GDP per capita, will cause energy use to increase by 48.7261 units, ceteris paribus. This indicates that Ghana is still a developing country that needs enough energy production to industrialize. If GDP per capita is zero, then the average energy use would be 11602.3 units in Ghana, all other things being equal.

Model 2: The Effect of Electricity Production on Economic Growth in Ghana

Model 2: OLS estimates using the 40 observations 1972-2011

Dependent variable: **lnRGDP**

Variable	Coefficient	Std. Error	t-statistic	p-value
const	-15.4541	4.93145	-3.1338	0.00342
lnK	0.0199448	0.0283325	0.7040	0.48599
lnL	2.21235	0.295486	7.4871	<0.00001
lnEP	0.0500175	0.0351623	1.4225	0.16350

Statistics based on the rho-differenced data: Sum of squared residuals = 0.0620683; Standard error of residuals = 0.0415225; Unadjusted R^2 = 0.99140; Adjusted R^2 = 0.99068; F-statistic (3, 36) = 23.47 (p-value < 0.00001); Durbin-Watson statistic = 1.67488; First-order autocorrelation coeff. = 0.116043; Akaike information criterion = -137.221; Schwarz Bayesian criterion = -130.465; Hannan-Quinn criterion = -134.778

Variance Inflation Factors

Minimum possible value = 1.0

Values > 10.0 may indicate a collinearity problem

21) lnK 3.157

22) lnL 3.991

24) lnEP 2.731

VIF(j) = 1/(1 - R(j)^2), where R(j) is the multiple correlation coefficient

between variable j and the other independent variables

Properties of matrix X'X:

1-norm = 233.98326

Determinant = 0.015275645

Reciprocal condition number = 2.8555728e-007

The value of the adjusted R-square is about 0.99 approximately, which means that about 99% of the total variation in economic growth of Ghana is explained by capital, labour and energy production (electricity). The other factors not captured by the growth model constitute only 1%. The overall equation is statistically significant since the p-value on the F-statistic is less than 5%. Further, there is no multicollinearity since the value of the variance inflation factor for each of the explanatory variables is less than 10. In addition, the value of the DW is 2.25598, which indicates no presence of autocorrelation. The model is sensible, acceptable and spurious free since the value of the DW is greater than the value of the R-square (DW (2.25598) > R^2 (0.98935). The presence of heteroscedasticity should not be a worry since the logs of all the variables of interest were taken. Therefore, meaningful inference can be made from this model.

From the estimation it is realised that there is a positive relationship between economic growth and capital in Ghana. If capital is increased by 100%, then economic growth can be increased by 1.99448%, all else equal. This effect is an inelastic effect meaning that a greater increase in capital will lead to a smaller increase in economic growth, ceteris paribus. However, this impact is statistically insignificant indicating that Ghana's economy is not a capital intensive system of economy. This finding is consistent with theory that there is a positive relationship between economic growth and capital.

Next, there is a positive association between economic growth and labour force in Ghana. If labour force is increased by 100%, then economic growth can be increased by 221.235%, all other things being equal. The degree of the impact is elastic meaning that a smaller increase in labour force will cause a greater increase in economic growth. This value is statistically significant indicating that Ghana's economy can grow increasingly better by adapting to labour intensive form of production than capital intensive form of production since it does not make a significant impact on Ghana's economic growth. Also, this finding confirms to theory that says that there is a positive relationship between economic growth and labour force.

Furthermore, there is a positive relationship between economic growth and electricity production in Ghana. If electricity production is increased by 100%, then economic growth can be increased by 5%, ceteris paribus. The degree of the sensitivity between economic growth and electricity production is inelastic indicating that a greater increase in electricity production will lead to a smaller increase in economic growth, all else equal. Further, Ghana's economy is energy inelastic meaning that Ghana cannot grow without electricity production. However, the effect is statistically insignificant. This confirms the argument that since the cost of energy is a very small proportion of GDP, it is unlikely to have a significant impact; hence, there is a neutral impact of energy on economic growth in Ghana. Consequently, this implies that should Ghana's economic growth be achieved, electricity production must be combined or complement with other economic growth determinants such as political stability, macroeconomic stability, better foreign relations, sense of nationhood, good cultural practices, technological improvement and many more. The positive association between electricity production and economic growth is consistent with basic economic principles.

CONCLUSIONS AND POLICY RECOMMENDATIONS

From the aforementioned, Ghana is still a developing country that needs enough energy supply to expand to become an industrialized economy. The study revealed that there is a positive relationship between electricity production and economic growth despite the unstable nature of electric power supply in Ghana. The value of the impact is 0.0500175. Hence, the degree of the responsiveness is 0.0500175 meaning an inelastic effect. This implies that electricity production is an input of necessity to or key to Ghana's economic expansion and sustainable development though statistically insignificant. Therefore, the policy suggestion is that the government should continue to invest massively into the energy sector of the Ghanaian economy to ensure consistent/continuous/stable and sustainable supply of energy to the industrial, commercial and residential units of the economy in order to achieve significant impact on the overall economic growth and development of Ghana.

FUTURE RESEARCH

In future, study shall be done to assess:

1. How various sources of electricity generation influence the economic growth in Ghana.
2. What is the most effective source of electricity generation in Ghana and,
3. How emission of CO_2 influence the economic progress of the Ghanaian economy.

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