INFRASTRUCTURAL DEVELOPMENT AND ITS EFFECT ON ECONOMIC GROWTH: THE NIGERIAN PERSPECTIVE

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Abstract
    This paper has attempted infrastructural development and its effect on economic growth: The Nigerian perspective. In Nigeria under investment in infrastructural development could be a bane to her vision of becoming a top 20 economy by the year 2020. Despite her economic growth over the years, this has not translated to economic development due to lack of infrastructure, high poverty rate, unemployment etc. The methodology adopted for this paper is a simple model of an economy with foreign investment and public infrastructure with a diversified equilibrium where the model is used to examine the impact of increased labor on production of private goods, public infrastructure, foreign investment, welfare and complete specialization. The paper went on further to advice the nation on measures to take to accelerate economic development, as economic growth alone is not enough.

Keywords: Infrastructure, economic growth, social change, development, education

Introduction
    Nigeria like many other Sub-Saharan African countries has been plagued with the lack of functional infrastructure in order to grow their

economies. This poor state of infrastructure has now engaged the attention of many African governments, especially in attracting foreign investments, as the development of infrastructural facilities is one of the determinants of foreign direct investments inflow into any economy. Nigeria with her vision of becoming one of the top 20 big economies by the year 2020 needs to take seriously her infrastructural development, according to Remi Babalola (a former Minister of state finance), the country would need over $100b of her GDP in the next 5years to develop a new platform for her infrastructural development.

Most of the current infrastructural facilities in Nigeria were developed during the second national development plan between (1970-1974). According to Ekundare (1971), it is no surprise that the main emphasis of the second national plan is on social change, which is to lay the foundation for the development of public infrastructure for productive, and consumption purposes due to the oil-boom accruing to the country. Similarly successive governments involvement in the provision of infrastructure is also for social, economic and financial reasons which includes the following

— High capital expenditure of public infrastructure
— High social environment and sometimes technical risks during construction
— Direct and indirect external effects during operation e.g Land use, spatial and regional development, social cohesion and environment.
— Difficulties of cost recovery from users/beneficiaries, making potential financial profitability justifies significant public subsidies.
— Strong local monopolistic situations of infrastructural operator
— Long financial payback periods even when projects are financially viable.

However, due to the high volatility of the oil market and poor implementation of the national plan, the government then embarked on series of economic reforms, and it is the aftermath effect of these reforms that led to the neglect of all infrastructure in the country and under investment.

This neglect and underinvestment has a lot of effect on the economy and increases cost of many raw materials thereby reduces productivity and competitiveness of firms in the country. This neglect also affects poor road networks, poor power supply, poor aviation networks, poor railway services, abandoned building projects all over the country in education, health, housing and transport infrastructure etc.

Similarly, underinvestment in infrastructure has also affected the inflow of FDI into the country, as most investors will always flood to countries where there are abundant infrastructural facilities, and due to lack of infrastructure, many firms had even relocated out of the country.

Despite this, the country has been recording growth in her economy but not translated to economic development, it is against this background that the paper will attempt to bring to fore why under investment in infrastructural development can lead to economic growth without economic development.

This paper will be divided into 5 sections as follows, section 1 will be introduction, and section 2 will be on literature review, while section3 will be on research methodology, section 4 will be on policy and its implication and section 5 will be the conclusion.

Literature Review

Infrastructural development in developing countries has not been given adequate attention by successive government in Africa and Nigerian government cannot be exonerated for this. Some scholars have even acknowledged the important role of infrastructure in stimulating foreign direct investment, among them are Wheeler and Moody (1992), Loree and Guisinger (1995), Richard et al. (1999), Morisset (2000), Asiedu (2000), Sekkat et al. (2004), these scholars argued that infrastructural development is a necessary condition for foreign investors to operate successfully as poor infrastructural development increase costs for firms. Infrastructure should therefore improve the investment climate for FDI by subsidizing the costs of investment by foreign investors and increase their (ROI) return on investment. As the availability of good infrastructures like roads, railways, highways, ports, communication networks and electricity with a stable polity would increase productivity and thereby attract higher levels of FDI. Wei (2000) opined that, "location with good infrastructure is more attractive than the others". Asiedu (2002) analyzed some countries (34) concluded that with good infrastructural development the countries were rewarded with more investments.

However, for a country like Nigeria with many nearby developing countries, infrastructural development could be a comparative advantage to attract investment. According to Edun (2011), this is why it is imperative for the country to invest more on infrastructural facilities and try to bring down the escalating price of cement, with incentives for investors to enter the building material market; it is this infrastructural development that will act as the foundation for FDI attraction into the most populous nation in Africa.

In the context of either neo-classical or endogenous growth models, the effect of FDI on economic growth of the recipient country differs in the recent growth models from their conventional counterparts. The conventional economic growth theories are being augmented by discussing growth in the context of an open economy rather than a closed one and the emergence of externally based growth models, even with the inclusion of FDI to economic growth. The traditional theorists confine the possible

impact of FDI to the short run level of income, when actually recent research has increasingly uncovered an endogenous long-run role of FDI in economic growth determinants. The neo-classical model believed FDI could only affect growth in the short run because of diminishing returns of capital in the end. Barro and Sallai-martin(1995), asserted that, in contrast, with the conventional neo-classical model which postulates that long –run growth can only happen from both exogenous labor force growth and technological progress. The rise of endogenous growth models made it possible to model FDI as promoting economic growth, even in the long run through the permanent knowledge transfer that accompanied FDI. As an externality, this knowledge transfer with other externalities will account for the non-diminishing returns that result in the long run growth De-mello (1997).

Therefore, if growth determinants, including FDI are made endogenous in the model, Long run effects of FDI will follow creating a channel for technological spill over from advanced to lagging countries in the flow of FDI. Bengoa and Sanchez-Robles (2003), De-mello (1999) and Obwona (2001), Borensztein et al (1998), all supported the view that FDI is an important vehicle for the transfer of technology, contributing more to growth than domestic investment. Using a model of endogenous growth, in which the rate of technological progress is the main determinant of the long-term growth rate of income, Bengoa and Sanchez-Robles (2003), argue that for long term capital flows, benefiting countries are required to have adequate human capital, sufficient infrastructure, economic stability and liberalized markets. For Buckley et al (2002), the extent to which FDI contributes to growth depends on the economic and social conditions in the recipient country, countries with high savings, open trade regime and high technological levels would benefit more from increased FDI to their economies.

Similarly, De-gregorio (2003) in his contribution notes that FDI may allow a country to bring in technologies and knowledge that are not readily available to domestic investors and in this way increases productivity growth throughout the economy. FDI may also bring in expertise that the country does not possess and foreign investor may have access to global markets. In fact, he discovered that increasing aggregate investment by 1% point of GDP increases economic growth of Latin-American countries by 0.1% to 0.2% a year, but increasing FDI by same amount increased growth by approximately 0.6% a year during the period 1950-1985, thus indicating that FDI is 3 times more efficient than domestic investment. A lot of research interest has been shown on the relationship between FDI and economic growth, although most of such work is not situated in Africa, the focus of the research work on FDI and economic growth can be broadly classified into 2. Firstly, FDI is considered to have direct impact on trade through which the growth process

is assured, Markussen and Vernables(1998), Secondly, FDI is assumed to augment domestic capital thereby stimulating the productivity of the domestic investments, Borenzstein et al(1998), Driffield,(2001). These 2 arguments are in conformity with endogenous growth theories, says Romer (1990), and cross-country models on industrialization, according to Chenery, et al,(1986), the quality and quantity of production factors, as well as the transformation of the production processes are ingredients in developing a competitive advantage.

FDI has empirically been found to stimulate economic growth by a number of researchers, Borezstein,et al (1998), Glass and Saggi,(1998), Dees(1998) submitted that FDI has been important in explaining China's economic growth, while De-mello(1997), presents a positive correlation for selected Latin American countries, inflow of foreign capital are assumed to boost investment levels. Markussen and Vernables, (1998), posited that some economists have found FDI as having a direct impact on trade in goods and services. Trade theorists also expects FDI inflows to result in improved competitiveness of host countries exports, Bloomstrom and Kokko,(1998) . FDI also contributed to economic growth via technology transfer, Transnational corporations (TNC's) can transfer technology either directly (internal) to their subsidiaries or indirectly (externally) to domestically owned and controlled firm in the host country, Bloomstrom et al(1998) and UNCTAD(2000).

Spillovers of advanced technology from multinational enterprises (MNE's) to domestically owned enterprises can take any of 4 ways. viz, vertical linkages between affiliates and domestic suppliers and consumers, horizontal linkages between the affiliates and firms in the same industry in the host country, Lim (2001) and Smarzynska,(2002), labor turnover from affiliates to domestic firms and internationalization of R&D, Hanson(2001), Bloomstrom and Kokko(1998). Carkovic and Levine, (2002), asserted that the pace of technological change in the economy as a whole would depend on the innovative and social capabilities of the host country, together with the absorptive capacity of other enterprises in the country.

Similarly, technological transfer by multinational enterprises (MNE's) to subsidiaries or affiliates can have a negative impact on the host country, by providing them with too few or wrong type of technological capabilities or limited access to the parent company's technology. Technology transfer can also be prevented, if it is not consistent with MNE's profit maximizing objective and if the cost of preventing the transfer is low. By limiting downstream producers to low value intermediate products and in some cases "crowding out" local producers to eliminate competition and may ultimately result in a decline in the overall growth rate of the host country and worsened balance of payment situation, Bloomstrom and Kokko,(1998).

It should also be mentioned that from the 1990's competition for FDI among the developed and developing countries became intense, to attract FDI to developing countries they were told to get the "right prices"(i.e to eliminate micro-economic policies) such as energy and food subsidies which creates a cleavage between domestic and global prices. In the 1990's, the prescription proffered by IMF was to "get the policies right", however it should be added that the provision of public infrastructure is a good way of attracting FDI into most developing countries.

According to Lipsey (2003) and Hill (2005), since the end of the cold war and rapid improvement in communication technology, there has been a significant increase in foreign investment to developing countries. And China has become a major destination of foreign investment, other countries like Thailand and Malaysia have experienced rapid economic growth, due to capital inflows and the reasons for this success is because of the availability of modern production infrastructure. Though some scholars have attempted to measure the productivity of public infrastructure and these includes, Aschauer (1989),Otto and Voss (1994,1998), Holtz-Eakin and Lovely,(1996), Morrisson and Shwartz (1996), Lou and Sin (1997), Paul (2003),Cohen and Paul (2004), Delorme etal, (1999). All these scholars have found a negative relationship between public infrastructure and technical efficiency. Berndt and Hansson (1992) have attempted to measure the contribution of public infrastructure in Swedish economy, Kim (1998) examined the effect of infrastructure investment on Korean economy and concluded that infrastructure investment has resulted in economic growth and inflation, Feltenstein and Ha (1999) have attempted to measure the impact of infrastructure on Mexican GDP.

Rioja (1999) has shown that public infrastructure investment can lead to sizeable increase in GDP. Boisso et al, (2000) attempt to measure the impact of changes in public infrastructure provision on slowing down of the U.S productivity. Lin (2001) examines the impact of public infrastructure provision on economic development in some regions in China. Moreno et al,(2002) have attempted to distinguish between short and long run effects of public infrastructure, Salinas-Jimenez (2004) has considered the impact of infrastructure investment on productivity efficiency in Spanish regions, by estimating a translog cost function. Teruel and Kuronda, (2005) have attempted to measure the contribution of public infrastructure in Philippines agricultural sector; they concluded that by reducing cost of production, public infrastructure has enhanced the productivity in Philippines agricultural sector.

Krol (2001) gave an excellent summary of the existing literature, which suggests that reduction in congestion and adequate maintenance contribute to greater benefits from public infrastructure. By making use of

the Greek data, Rovolis and Spence (2002) have shown that public infrastructure and private capital are complementary. Similarly, Reinikka and Svensson (2002) have shown that poor public capital significantly reduces the complementary private investment, while Boarnet (1998) argues that due to negative spillover effects, public infrastructure investment can lead to growth in one sector at the expense of the other. Dementriades and Mamuneas (2000) have examined the impact of public infrastructure on production and input demand in 12 OECD countries, and they discovered that increased spending on infrastructure is associated with higher levels of production, and a positive relationship between the demand for inputs and the supply of infrastructure was discovered.

Kemmerding and Stephan (2003) argued that public infrastructure makes significant contribution to the private sector. While Paul, et al, (2004), have examined the impact of public infrastructure on Canadian manufacturing industries. Fumajalli (2003), in his work, considered the welfare effect of competition for foreign investment, while Hoffman (2003), empirically examines the link between the supply of public infrastructure and capital inflows, by making use of fairly disaggregated cross sectional data and concluded that there is a positive relationship between supply of public infrastructure and capital inflow. Similarly, some scholars have attributed classical factors such as good infrastructure in stimulating FDI. Among these scholars are Wheeler and Mody, (1992), Loree and Guisinger(1995), Richard et al(1999), Morrisset (2000), Asiedu (2002), Sekkat, et al (2004). They all agreed that good infrastructure is a necessary condition for foreign investors to operate successfully, as unavailable public inputs or poor infrastructure increases firms' costs (A freeway is faster than a washed out dirt road, e-mail is faster than the post office and time is money). Multinationals are profits making entities that seek to minimize the costs of doing business, by moving to a developing economy to take advantage of lower labor costs. This therefore means losing patent protection to imitators, higher transport costs due to communication problem, and then they will choose not to do business there, infrastructure or public inputs or lack of it contributes to firms cost structures.   It should therefore be included in a model that explains multinationals as well as government decisions for investment. Infrastructure should thus improve the investment climate for FDI by subsidizing the cost of total investment by foreign investors and thus raising the rate of return. The availability of crucial infrastructure such as highways, roads, ports, communication networks, electricity etc, should increase productivity and attract higher levels of FDI. Wei, (2000) posits that a location with good infrastructure is more attractive than with none.

Bende-Nabende and Ford,(1998) have taken a study of Taiwan as a relatively advanced emerging economy and discovered that FDI promotes

growth as a result of infrastructural improvements. Elmawazinir, Saadi and Ngouhouo(2005), have revealed that the impacts of FDI on productivity growth in developing countries are generally not significant and less than that in the developed countries, and this implies that technological weakness of local firms and human capital levels are key challenges for developing countries to benefit from FDI inflows.

Li and Liu (2005), in their work, carried out an investigation on whether FDI affects economic growth. Based on panel data for 84 countries over the period 1970-1999; It was discovered that significant endogenous relationship exists between FDI and economic growth from the mid-1980's onwards, it did not only promotes economic growth by itself but also indirectly does so via its interaction terms. This implies that the interaction of FDI with human capital and infrastructural development exerts a strong positive effect on economic growth in developing countries. While FDI with the technological gap has a significant negative impact, therefore human capital and infrastructural development is important for technological development.

Makki and Somwaru (2004), in analysis of the role of FDI and trade in economic growth of developing countries: cross-country framework utilizing data from 66 developing countries over 3 decades, 1971-1980, 1981-1990,1991-2000. They discovered that FDI and trade contribute towards advancing economic growth in developing countries, what this study implies is that the contribution of FDI to economic growth is enhanced by its positive interaction with human capital, macro-economic policies and institutional stability. Mencinger (2003), examines the impact of FDI on economic growth, through sampling of Eastern European, E.U, ascension candidates in post transition period and discovered that FDI has growth enhancing effects contingent on domestic firm absorptive capacity .This implies that actual size of productivity spill-over from FDI should not be overrated, as absorptive capacity is correlated to human capital development.

Xu (2000), in his study, on the investigation of US multinational enterprises as a channel of international technology diffusion in 40 countries 1966-1994, revealed that technology transfer provided by US MNE's contributes to the productivity growth in developed countries, but was less successful in LDC's. The study implies that for a developing country to benefit from technological diffusion of FDI, it must reach a minimum human capital threshold level in order to benefit from technological transfer of US and other developed countries MNE's. Zhang (2001), in his work, on the empirical assessment on the link between FDI and economic growth in LDC's, using data 11 economies in East-Asia and Latin America, brought out the extent to which FDI is growth enhancing and this appears to depend on country specific characteristics. FDI tends to be more likely to promote

economic growth when host countries adopt liberalized trade regimes, improved education. Thereby human capital conditions, encourage export oriented FDI and maintain macro-economic stability. However, this study implies that institutional and political governance factors determined the benefit, which can be accrued from FDI, therefore all government machinery, should be put in place to do the right things that encourage FDI inflow. Abu-Ghairda and Klassen (2004), in their study on the costs of missing the millennium development goal on gender equity, suggests that gender equity in education promotes economic growth, reduced fertility, child mortality and under nutrition. MDG's therefore set target is the achievement of gender equity in primary and secondary education by the year 2015 in every country of the world. The study finds out that countries that are off the track in MDG achievement are likely to suffer lower per capita growth rates, will have more children per women, higher rates of under 5 mortality and high prevalence of underweight children under 5 years. The implication of this study is that MDGs should have a wider objective with uni--dimensional interventions, promotion of equity in education also requires investment in education and at the same time other infrastructural investments like, Transportation, water, health and employment etc. World bank(1993), in her report on investing in health, discovered the existence of unskilled and incompetent bureaucracy in many LDC's, which is an obstacle to economic development and this marks a big difference between Asian tigers and other LDC's, it could be discerned from this that weak administrative and bureaucratic institutions are obstacle to FDI and economic growth. World Bank (2001), Attacking poverty, reveals that most institutional aspects of poor public service are fraught with high level of corruption and arbitrary non-transparent decision making of state bodies, the study implies therefore that the development of physical infrastructure is similarly constrained by inadequate state funding, with low organizational capabilities of the state bureaucracy.

Agenor & co(2006), achieving the millennium development goals in Sub-Saharan Africa (SSA), a macro-economic monitoring frame work assesses a macro-model which captures key linkages between foreign aid, public investment (dis-aggregated into education infrastructure and health). The supply side and poverty in Sub-Saharan Africa key MDG indicators (malnutrition, infant mortality, life expectancy) are correlated. The study went on to discuss the model outcomes (a), effects of an increase in foreign aid on the MDG's, under the assumption that public investment is relatively efficient (b) Same policy experiment in the alternative case where public investment is less efficient. This study has been able to provide a strategic implication for decision makers in terms of the level and area of foreign aid and their implication on MDG's.

Boadijkuitunen, et al (2005), in their study on urbanization without development, environmental and health implication in African cities, revealed that urbanization has eroded the subsistence base of rural agricultural communities and further ignited rural-urban migration and the failure of industry to absorb the increasing labor force, has created massive unemployment and deepening poverty crises in urban centers. The significance of this study is that poverty alleviation implies infrastructural investments, creating job opportunity, enhancing education and training, with developmental aid and democratization.

There is a large abundance of literatures demonstrating that the benefits of FDI is strongly contingent on the existence of appropriate infrastructure in the recipient countries and that in many Less developed countries (LDCs) the absence of such infrastructure detracts the potential positive effect on productivity and income growth. Over the years, several studies have been undertaken to examine the effect of globalization on economic development of recipient countries.

However, from the studies, the basic rationale was to understand how infrastructural development and FDI might improve economic growth and development in host countries. Most of the literatures reviewed, none has been able to point out that often time's economic growth does not manifest into economic development. Nigeria despite her economic growth over the years has not translated this into economic development; this paper will attempt to fill this gap in the literatures.

Research Methodology

This paper will adopt a simple model of an economy with foreign investment and public infrastructure with a diversified equilibrium where the model is used to examine the impact of increased labor on production of private goods, public infrastructure, foreign investment, welfare and complete specialization.

Consider a small open economy that produces two final goods (an exportable) and B (an importable). Both goods are produced by means of capital and labor, this is akin to a pure public input that enters private sector production functions.

This is as follows:

$$A = G^\alpha K_a^{(1-\lambda)} \cdot L_a^\lambda$$
$$B = G^{\alpha\beta} K_b^{(1-\theta)} \cdot L_b^\lambda$$

where α, λ and θ are parameters in the range (0,1); β is strictly non-negative; Ka and Kb respectively are capital used in the production of A and B; La and Lb respectively are labor used in the production of A and B.

Producers of the final goods take the supply of public infrastructure as given. This implies that there are constant returns to scale at the firm level,

but for the industry as a whole there are external economies. β greater (less) than unity implies that B-industry (A-industry) derives greater benefits from the infrastructure as compared to A-industry

(B-industry). Because of the external nature of the economies of scale, both final goods are produced under conditions of perfect competition. Labor is immobile across international boundaries and its supply is fixed. The wage rate (w) is determined by the interaction of domestic supply and demand. The supply of domestic capital is fixed, however, due to unrestricted international capital mobility; unlimited amount of capital can be acquired from the international market. In other words, foreign investment can occur in both the private and public sectors.

The domestic producers take the rate of return on capital ($\bar{r}$) in the international market as given, which also equals the rate of return on capital in the domestic market. The optimal output of A-industry is determined by the following first order condition.

$$I=\theta[\bar{r}/G^\alpha \qquad\qquad\qquad\qquad]$$
$$[w/\bar{r}]^\lambda\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(1)$$

Where $\theta=[1/〚\lambda^\lambda(1-\lambda)〛^{((1-\lambda))}]>0$

The right hand side of eq. (1) is the unit cost of production of A, which decreases as the supply of public infrastructure increases and the left-hand side is the price, which has been set equal to unity, in other words, an increase in the provision of public infrastructure leads to positive spillovers to the final goods sector.

The profit maximizing output of B-industry is determined by the following first order condition where p is the unit price.

$$P=\Omega[\bar{r}/G^{\alpha\beta} \qquad\qquad\qquad\qquad]$$
$$[w/\bar{r}]^\theta\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots....(2)$$

Where $\Omega=[1/〚\theta^\theta(1-\theta)〛^{((1-\theta))}]>0$

The right hand side of eq. (2) is the unit cost of production, which decreases as the supply of public infrastructure increases. Since the economy under consideration is small, it cannot influence p, which is determined in the international market. Unlike most existing studies, this model assumes that provision of public infrastructure involves fixed as well as variable cost as follows:

$$C=w,(r,)\bar{\ } G,\gamma,\mu,\phi=[\gamma+\mu G][w/\bar{r}]^\phi \bar{r}$$

Where γ and μ are positive and φ lies in the range (0, 1). γ=0 implies that there is no fixed cost and hence the average cost equals the marginal cost. The above cost function is consistent with real life situations where provision of infrastructure involves a significant fixed cost. Because of the presence of the fixed cost, the public infrastructure industry is characterized by internal economies of scale, this model views public infrastructure as being produced by a public firm that is not focusing on

profit maximization. The optimal supply of public infrastructure is determined by comparing the average cost of production with the marginal benefits to the producers as follows:

$$\alpha A/G + P[\alpha\beta B/G] = [(\gamma+\mu G)/G] \qquad [w/\bar{r} \qquad]^{\wedge}\phi$$

$\bar{r}$ ………………………………………………………………(3)

The right hand side of eq. (3) is average cost of public infrastructure production, whereas the first and the second terms on the left-hand side respectively are the marginal benefits to the producers of A and B. The cost of public infrastructure is financed by means of non-distortionary income taxation (see Feeben 1998, Feeben and Matsumoto 2000). The market clearing condition for labor, which is assumed to be in fixed supply, is as follows:

$$\lambda\theta[w/\bar{r}]^{\wedge}(-1-\lambda) \, [A/G^{\wedge}\alpha \,] + \theta\Omega[w/\bar{r}]^{\wedge}(-(1-\theta)) \, [B/G^{\wedge}\alpha\beta \,] + \phi[\gamma+\mu G] \, [w/\bar{r}]^{\wedge}(-(1-\phi)) = \bar{L} \,$$ ……………..(4)

The first, the second and the third terms on the left-hand side of eq. (4), respectively, are the demand for labor in industry A, B and G; whereas the right hand side is the supply of domestic labor.

The equilibrium foreign investment (Kf) in the domestic economy is determined by the following condition where $\bar{K}$ is the supply of domestic capital, which is assumed to be fixed.

$$\theta(1-\lambda) \, [w/\bar{r} \,]^{\wedge}\lambda \, [A/G^{\wedge}\alpha \,] + \Omega(1-0) \, [w/\bar{r} \,]^{\wedge}\theta \, [B/G\alpha\beta] + (1-\phi)[\gamma+\mu G] \, [w/\bar{r}]^{\wedge}\phi = \bar{K} + K\_f …(5)$$

The first, the second and the third terms on the left-hand side of eq. (5) respectively, are the demand for capital in industry A, B and G; whereas the right hand side is the aggregate supply of capital. Eq. (5) also shows that foreign investment can take place in all sectors of the economy under consideration, Bougheas et al,(2003).

This completes the description of the production side of the economy. Eqs. (1)–(5) are five equilibrium conditions in five endogenous variables (A, B, G, Kf and w) and four exogenous variables (P,$\bar{r}$,$\bar{K}$ and $\bar{L}$).

It is well known that the presence of external economies can result in multiple-equilibria involving complete specialization in one final good.

The next model presented will correspond to the case of diversified equilibrium involving incomplete specialization.

Labor supply, foreign investment, provision of public infrastructure and welfare: the case of incomplete specialization.

Eq. (1) can be used to establish the following relationship between the wage rate and provision of public infrastructure, where a circumflex is used to denote proportional changes (i.e., wˆ and Gˆ respectively are proportionate changes in the wage rate and provision of public infrastructure).

$w\hat{} = [\alpha/\lambda]$

$G\hat{}$……………………………………………………………………………(6)

Eq. (6) shows that an increase in the provision of public infrastructure increases the wage rate only if the infrastructure is productive (i.e., α>0). This follows from the fact that infrastructure provision increases the productivity of primary factors used by the private sector.

It is clear from eqs. (1) and (2) that in the case of a diversified equilibrium (i.e., an equilibrium that involves incomplete specialization), changes in labor supply do not affect the provision of public infrastructure and hence by making use of eq. (6), it can be argued that labor inflow does not affect the equilibrium wage rate (see eq.2). This follows from the fact that, owing to free international capital mobility, the rate of return on capital is determined in the international market. Variations in the provision of public infrastructure will affect the wage rate if capital was not fully mobile across international boundaries.

The impact of an exogenous increase in the supply of labor on production of the final goods can be examined by differentiating equilibrium conditions eq.(3) and eq.(4) with respect to $\bar{L}$ as follows:

$A\hat{} = [(-((w\bar{L})/pB))/(\beta((wL\_A)/A)-((wL\_B)/pB)$)]

$\bar{L}\hat{}$…………………………………………………………(7)

$B\hat{} = [\beta((w\bar{L})/A)/(\beta((wL\_A)/A)-((wL\_B)/pB)$)]

$\bar{L}\hat{}$………………………………………………………….(8)

As indicated earlier β>1 implies that A-industry derives more benefits from public infrastructure as compared to B-industry. On the other hand, β<1 implies that A-industry derives fewer benefits from public infrastructure and β=1 implies that both industries derive equal benefits from public infrastructure.

Eqs. (7) and (8) indicate that an increase in labor supply increases the production of A at the expense of B if both industries derive equal benefits from public infrastructure and the relative share of labor in A-industry is greater than the relative share of labor in Y-industry. By making use of the homogeneity properties of cost and production functions, it can be confirmed that there is a one-to-one relationship between the relative share of labor and the relative labor intensity. In other words, if the relative share of labor in A-industry is greater than the relative share of labor in B-industry, then A-industry is labor intensive as compared to B-industry. This implies that within the context of this paper, the Rybczynski theorem holds as long as both industries derive equal benefits from public infrastructure. Eq. (7) shows that, for a sufficiently large value of β, increased supply of labor can decrease the production of A even if A is labor intensive. In addition Eq. (8) shows that, for a sufficiently small value of β, increased supply of labor can decrease the production of B even if B is labor intensive. In other words,

differences in the relative size of benefits derived from public infrastructure can reverse the overall Rybczynski effect. The Rybczynski theorem holds if the labor-intensive industry derives smaller benefits from public infrastructure. One can also argue that the Rybczynski theorem holds if it is stated in terms of public infrastructure benefit augmented factor intensities.

It is interesting to note that the relative size of benefits from public infrastructure alone determines the sign of Eqs. (7) and (8) if the relative share of labor in A- and B-industries is identical — specifically, in response to increased labor supply, the industry that derives smaller benefits from public infrastructure expands at the expense of the industry that derives larger benefits. Furthermore if A-industry does not benefit from public infrastructure (i.e., β =0) then irrespective of relative factor intensities, an increase in labor supply increases the production of A-industry; whereas there is no change in the production of B. These results can be explained by making use of Eq. (3), which yields the following relationship between proportional changes in the production of the two final goods.

$$\hat{B}=-\beta[pA/B]\,\hat{A}\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots.(9)$$

Eq. (9) shows that if A-industry derives more benefits from public infrastructure (i.e., β>1) then the magnitude of the absolute value of the proportionate change in A is larger than the proportionate change in A.

The impact of variations in labor supply on foreign investment can be derived by making use of Eqs. (3)–(5) as follows:

$$\hat{K}\_f=[(w\bar{L})/(r\bar{K}\_f\qquad\qquad)][(\beta((r\bar{K}\_f)/B)-((r\bar{K}\_A)/pA))/(\beta((w\bar{L}\_B)/B)-((wL\_A)/pA))]\,\bar{L}\hat{}\ldots\ldots\ldots\ldots..\,\ldots\ldots\ldots.(10)$$

Eq. (10) shows that if the relative shares of capital and labor in B- and A- industries are identical (i.e., the two industries are equally capital intensive) then irrespective of the size of benefits derived from public infrastructure, there is a positive relationship between labor supply and foreign investment. This follows from the fact that capital labor ratios cannot remain identical unless an increase in labor supply is followed by capital inflow. On the other hand, there is a negative relationship between labor supply and foreign investment if the relative factor intensities are unequal (i.e., $K\_B/L\_B \neq K\_A/L\_A$) and both industries derive equal benefits from public infrastructure (i.e., β=1). Due to the Rybcynski effect, an increase in the supply of labor increases the output of labor intensive industry at the expense of the capital-intensive industry, which leads to a more than proportional decrease in demand for capital and hence foreign investment decreases. The sign of Eq. (10) cannot be unambiguously determined when relative factor intensities are unequal and β≠1. If A-industry does not derive any benefits from public infrastructure then changes in labor supply does not affect the production of B, but the production of A increases, which increases

the demand for capital. Since the domestic supply of capital is fixed, increased demand for capital is met through foreign investment.

In the absence of the public infrastructure, the impact of an increase in labor supply is described by the Rybczynski theorem. eqs. (7) and (8) show that in the presence of public infrastructure, the Rybczynski theorem may not hold. It is well known that in the absence of public infrastructure, private goods cannot have identical capital labor ratios and hence it is not possible to examine the impact of an increase in labor supply on production. However, once the public infrastructure is introduced, it is possible to derive the impact of an increase in the supply of labor on production and foreign investment even if the private sector capital labor ratios are identical.

However, welfare of the small open economy can also be measured by net income (I) of its residents as follows:

$$I = w\bar{L} + r\bar{K} - [\gamma + \mu G][w^{\phi} r^{\wedge}(1-\varnothing)]\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(11)$$

Where $[\gamma + \mu G] [w^{\phi} r^{\wedge}(1-\varnothing)]$ is the total cost of public infrastructure provision and foreign capital is not taxed.

The impact of an increase in the supply of labor on welfare can be examined by differentiating Eq. (11) with respect to $\bar{L}$. Since the wage rate and the supply of public infrastructure is unaffected by changes in labor supply, a small increase in the supply of labor has no effect on welfare — a result that is consistent with the existing literature.

However, it is important to also consider equilibrium that involves complete specialization in the production of B.

This implies that no resources would be used to produce A, hence the optimality condition (3) would have to be replaced with the following condition.

$$\alpha\beta/G = [(\gamma + \mu G)/G] [w/\bar{r}]^{\wedge}\phi\ \bar{r}\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots..(3')$$

The labor and capital market clearing conditions consistent with complete specialization in the production of B are as follows:

$$\lambda\Theta\ [\![w/\bar{r}\ ]\!]^{\wedge}(-(1-\lambda))\quad [B/G^{\alpha}\ ] + \phi[\gamma + \mu G]\quad [w/\bar{r}\ ]^{\wedge}(-(1-\varnothing)) = \bar{L}\ldots\ldots\ldots\ldots\ldots(4')$$

$$\Theta(1-\lambda)\ [w/\bar{r}\ ]^{\wedge}\lambda\ [B/G^{\alpha}\ ] + (1-\phi)[\gamma + \mu G]\ [w/\bar{r}\ ]^{\wedge}\varnothing = \bar{K} + K\_f\ldots\ldots\ldots(5')$$

Eqs. (1) and (3′)–(5′) are four equilibrium conditions involving four endogenous variables. These equations can be used to examine the impact of a small increase in labor supply on the wage rate, production of the final good, provision of public infrastructure and foreign investment.

Eq. (6) shows that an increase in the provision of public infrastructure increases the wage rate through its benefits to the producers of the final good B. In other words, changes in the provision of public infrastructure have no effect on the wage rate if infrastructure is unproductive (i.e., $\alpha=0$). The impact of a small increase in labor supply on the provision of public infrastructure can be discussed by means of the following equation.

$$G\hat{} = [\lambda/(\lambda(\mu G/(\gamma+\mu G)) - \alpha(1-\phi))] \, \bar{L}\hat{} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots.(12)$$

Eq. (12) shows that an increase in the supply of labor increases the provision of public infrastructure and hence the equilibrium wage rate if the following condition holds.

$$[\lambda/(1-\phi)][\mu G/(\gamma+\mu G)] > \alpha \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(13)$$

The above condition involves parameters that determine the size of benefits from public infrastructure to final good producers, the relative share of capital in public infrastructure provision and the size of the fixed cost associated with infrastructure provision. The above condition ensures the stability of the equilibrium as we considering a stable equilibrium; we assume eq. (13) holds.

An increase in the labor supply increases the production of the final good, which for a given wage rate increases, the marginal benefits of public infrastructure and hence the provision of public infrastructure increases. It is interesting to note that in the case of complete specialization, the size of the fixed cost of public infrastructure provision affects the size of all reported comparative static responses. For example, in the absence of the fixed cost (i.e., when $\gamma=0$), the denominator of Eq. (12) would be larger and hence an increase in labor supply would lead to a relatively small increase in the provision of public infrastructure and hence the equilibrium wage rate. An increase in labor supply increases the optimal provision of public infrastructure due to a relatively smaller increase in average cost as compared to its marginal benefits. The impact of an increase in labor supply on foreign investment and production of the final good, in the presence of complete specialization, can be discussed by means of the following equation.

$$K\hat{}\_f = [\alpha\phi/(\lambda(\mu G/(\gamma+\mu G)) - \alpha(1-\phi))] \, \bar{L}\hat{} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots..(14)$$

Eq. (14) shows that an increase in labor supply increases foreign investment only if public infrastructure is productive (i.e., $\alpha>0$). This result is consistent with the assertions made by Hill (2007) and Apple yard et al. (2007). An increase in the supply of labor increases the provision of public infrastructure and production of the final good, which increases the demand for capital. Since the supply of domestic capital is fixed, increase in labor supply leads to an increase in foreign investment.

Some existing literature does not explicitly include public infrastructure suggests that a small inflow of labor does not affect welfare of a small open economy. In the present case, where public infrastructure has been explicitly included in the model, the impact of an increase in labor supply on welfare of the residents of the economy can be examined by differentiating Eq. (11) as follows:

$$I\hat{} = w/I \, [\bar{L} - L\_g - (\mu G/(\gamma+\mu G))\hat{}(L\_B)] \, w\hat{} \ldots\ldots\ldots\ldots\ldots\ldots\ldots.(15)$$

As indicated earlier, in the presence of complete specialization, an increase in labor supply increases the provision of public infrastructure, which increases the equilibrium wage rate. Eq. (15) shows that an increase in the wage rate increases welfare of the small open economy only if the infrastructure provision involves non-zero fixed cost (i.e., $\gamma \neq 0$).

Discussion And Policy Implication

The model presents a unified framework where both foreign investment and public infrastructure are endogenous which allow the impact of labor inflows on foreign investment, provision of public infrastructure and welfare. However, a number of empirical studies have demonstrated the importance of the provision of public infrastructure in real economies and in real life, foreign investment is endogenous.

This stylized model of a small open economy that produces two final goods by means of capital, labor and public infrastructure. The infrastructure is produced by means of capital and labor and its cost is financed by non-distortionary taxation. With existing studies explicitly include public infrastructure, this model assumes that provision of public infrastructure involves fixed as well as variable cost and the presence of public infrastructure gives rise to external economies of scale, which gives rise to multiple-equilibria and both complete and incomplete specialization was considered. International capital mobility has made foreign investment in both private and public sectors possible.

Within the context of this model, an increase in labor supply is attributed to exogenous labor inflows.
For a case of a diversified equilibrium, an increase in labor supply does not have any effect on the provision of public infrastructure and hence the wage rate. Consequently, a small increase in labor supply does not affect welfare, Rybczynski theorem holds only if both industries derive equal benefits from the provision of public infrastructure, an increase in the labor supply increases foreign investment as long as both private goods are equally capital intensive, otherwise foreign investment decreases.

For a complete specialization, an increase in labor supply increases the provision of public infrastructure arising due to an increased labor supply, which increases production of the final good, which in turn increase demand for capital, which results in increased foreign investment.

From the above, it could be gleaned that an increase in labor supply increases welfare as long as the public infrastructure is productive and its provision involves some fixed cost. This linkage, between foreign investment and public infrastructure with labor mobility and welfare, has shown that theoretically and empirically there is a close relationship between FDI, infrastructural development and the welfare of the people.

However, in the Nigerian context, despite her vision of becoming a top 20 economy by the year 2020, the country's infrastructural facilities have been in a decay condition and needs to be developed in order to attain her vision and meet some of the objectives of the millennium development goals of reducing poverty by half before year 2015. The availability of a functional infrastructural facility will fast track economic growth and development. Though some scholars may argue that despite the under investment in infrastructural provision the country has been recording success in her economic growth over the years, but this has not translated into economic development. As agriculture and service sectors have accounted for the economic expansion, because agriculture is still practiced at the subsistence level while the service sector (banking, telecommunication, etc) do not generate enough jobs that can make meaningful impact on unemployment in order to reduce poverty. Similarly, most investors are not re-investing their profits into the economy; rather they repatriated it back to their various home countries. If they had re-invested this profit, they could hire more people due to production expansion.

For Nigeria's economic growth to make an impact, the country is therefore, advised to, accelerate the development of her infrastructure especially in the area of power, telecommunications, and transportation (rail, aviation, marine and roads) .In order to encourage more investments into the country.

The government should also create an enabling environment for investors, through stability of policies and required legal and regulatory act, through the strengthening of all the regulatory institutions (NAFDAC, EFCC, ICPC, SERVICOM, CBN, NCC, etc) to protect the citizens from unnecessary exploitation by service providers.

The government in Nigeria needs to ensure that her capital market is managed in conformity with international best practices, to encourage domestic savings and allow foreign in flow of investments into the economy; to provide long-term funds for investments both for productive purposes and for infrastructural development financing. The market should discourage in house trading and other forms of corruption in the market.

Education, which is investment in human capital, is also very important for a nation's economic success, for when investments are trickling into the country, certain professional skills will be required and for the country to benefit fully from FDI inflow, it is necessary to develop her human capital. Similarly, investment in education can enhance the standard of living, especially where human capital is scarce, the gap between the wages of educated and uneducated populace is even larger, and therefore people should take advantage of education.

Protection of property rights: Policy makers should also foster economic development through the protection of property rights and political stability. Property right is the ability of people to exercise authority over the resources they own, e.g. a scientist who made a discovery and receives patent for its usage , will be discouraged to engage in more research and development, if his discovery is stolen. Though the criminal justice system discourages theft, the civil justice system should ensure that all investors and the people live up to their contracts. Contracts should be enforced and fraud cases punished.

Property rights is protected when there is political stability, but when there are coups and revolution, there is doubt about property rights protection, and this will discourage foreign investment and domestic savings, which can depress a nations standard of living.

Corruption, this is another area where Nigeria needs to discourage as no investor will like to go into a country where there is massive corruption, Nigeria needs to improve her ranking on transparency international rankings on corrupt nations by moving out of the current 3 digits of corrupt nations perception to at least top 50 less corrupt nations. By ensuring that corrupt officials are punished and their ill gotten wealth confiscated.

Research and development: The current high standard of living recorded today were outcome of technological development and investments in research and development. Although most technological advances comes from private research by firms and individual inventors, government should encourage the development of new technologies with research and development through the granting of tax holiday to firms engaging in research and development and the protection of patent system.

Conclusion

Many countries in Africa have come to realize that there is a robust relationship between foreign direct investment and infrastructural development for their economies to grow. Both theoretical and empirical analysis of the literatures has shown this relationship, between foreign investments and infrastructural development. However, none has been able to look at why economic growth may not correspond to economic development and this paper has attempted to fill this gap. Therefore, economic growth is related to a quantitative and sustained increase in the country's per capita output or income, accompanied by expansion in its labor force, consumption, capital and volume of trade. However, economic development is a wider concept than economic growth; it means growth plus change, which includes quantitative changes in economic wants, goods incentives, institutions, productivity and knowledge or upward movements of the entire social system. It describes the underlying determinants of growth

such as technology/structural changes; therefore economic is a combination of both growth and decline. Nevertheless, for Nigeria, her economy has been growing but no development due to high poverty, unemployment and inequality, due to the absence of productive infrastructure, technology and other factors highlighted above.

However, there is a need for further research into infrastructural financing, through PPP (Public Private Partnership), as government alone cannot finance infrastructural development in an emerging market economy like Nigeria that needs to be pragmatic in her infrastructural development, in order to create employment and reduce poverty.

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