The Expansion of Chinese Businesses in Ghana: Implications for Ghana's Economic Development

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Abstract: Chinese businesses in Ghana span both the formal and informal sectors of the economy. The Ghana Investment Promotion Centre (GIPC) estimates that there were about 800 Chinese companies operating in Ghana. The direction of the implications of Chinese enterprises on Ghana's development prospects is ambiguously determined. This paper examines the implications of Chinese enterprises operating in Ghana, on Ghana's economic development. Using data from the Ghana Investment Promotion Council, the economic growth, and poverty and income inequality models are employed to examine the relationship between Chinese enterprises and economic growth in Ghana. The results revealed that Chinese enterprises play a significant role in stimulating economic growth and development in Ghana. The influx of Chinese Enterprises has various benefits to Ghana's economy including the inflow of technology, promoting export and improving human resource quality.

KEYWORDS: China, economic growth, Enterprises, Ghana, Ghana Investment Promotion Council

1. INTRODUCTION

China is increasingly referred to as the world's emerging giant among emerging economies, represents the second largest economy in the world, and fastest growing economy in the world; growing at three times faster than the world's average (Korukonda, 2007). China's growth and its capacity to move in thirty years from under-development and extreme poverty to an emerging global power and one of the largest exporter of manufactured goods has attracted the attention of many developing countries. A study by Renard (2011), shows China has served as a development model for Africa and an alternative source of trade and finance from Africa's traditional development partners. The impact of China on African economies has been diverse, depending in part on the sectoral composition of each country's production. His study indicates that overall, China's increased engagement with Africa could generate important gains for African economies. However, analysis is required to quantify the advantages and disadvantages, and to design the policies necessary to maximize the development impact of China. One overriding consideration is that reaping the full benefits from Chinese trade and investment will require substantial improvements in governance in African economies (Renard, 2011).

The past decades have witnessed an increasing presence of Chinese Enterprises in countries in Sub-Saharan Africa and Ghana is not an exception. Until about 15 years ago, China's capital flow to Africa was almost all government-aid related. According to the Ministry of Commerce (MOC), China saw only a negligible amount of $56

million direct investment in the continent by 1996; this number jumped to $1.5 billion by 2005, and again multiplied 10 times to nearly $15 billion by 2011. Most noticeably, just as the world FDI outflow nosedived following the 2008 financial crisis, China's overseas investment more than doubled in 2008, with the part going to Africa actually more than tripled that year and increasing steadily thereafter (Shen, 2015). The Ghana Investment Promotion Centre (GIPC) estimated that there were about 800 Chinese companies operating in Ghana (2016). According to this data, approximately 85% were privately owned. The majority of the Chinese private firms in Ghana are SMEs.

Whilst some scholars (Tsikata, Fenny& Aryeetey, 2008; Quartey et al, 2008) believe the Chinese state and private firms' presence in Ghana potentially delivers a number of benefits to the Ghanaian economy, others (Tull, 2006; Trofimor, 2007; Bello, 2007 and Malone, 2008) believe that the presence of these Chinese enterprises and the increasing volume of Chinese trading activities which leads to the importation of cheap products like frozen chicken, textiles, electronic products unto the Ghanaian also impacted negatively on the economy. Thus, the direction of the implications of Chinese enterprises on Ghana's development prospects is ambiguously determined. It is against this background that this paper examines the implications of Chinese enterprises operating in Ghana, on Ghana's economic development.

To be able to achieve this objective, the paper is in the following form. The next section provides an overview provides an overview of Ghana-China diplomatic and economic relations, followed by Chinese businesses operating in Ghana: their characteristics and strategies, literature review, methods used, the discussion of results and conclusion.

1.1 Overview of Ghana-China diplomatic and economic relations

Relations between the two countries date back to 1960 when the countries first established diplomatic relations (*https://en.wikipedia.org/wiki/China–Ghana relation).* Since then Ghana has provided substantial diplomatic support to the Peoples Republic of China (PRC) with the PRC reciprocating with material support for Ghana's development. In the 1960s President Nkrumah lobbied for the PRC's reinstatement in the United Nations. Nkrumah also supported the PRC during the Sino-Indian War in 1962. In the early 1990s China built Ghana's National Theatre as a reward for Ghana's diplomatic support during the Tiananmen Square protests in 1989. After Kufuor was elected president of Ghana in 2001 the PRC gave Ghana a US$2.4 million grant to renovate the theatre *(*Idun-Arkhurs, 2008) The Beijing Summit and the Third Ministerial Conference of the Forum on China-Africa Cooperation (FOCAC) held from November 3 to 5, 2006 served to broadly outline the cooperation agreements that China has or aims to have with African countries, including Ghana. Cooperation agreements between China and Ghana cover a wide range of areas including diplomatic and economic.

1.1.1 Diplomatic relations

In the area of diplomatic cooperation, the two countries have agreed to support each other in issues concerning sovereignty and territorial integrity. The most important facet of this agreement is Ghana's continued adherence to the "One China Policy" which sees Taiwan as an inalienable part of People's Republic of China. This agreement forms the basis of all bilateral cooperation since China refuses to maintain diplomatic (as well as economic) ties with any country

that recognizes Taiwan as an independent nation. China and Ghana have also agreed to explore means of greater cooperation in the United Nations, World Trade Organization and other international and regional organizations.

1.1.2 Economic relations

Soon after the established diplomatic relations in 1960, bilateral relations began soon afterwards. Ghana received its first concessional loan from China in 1964 for an amount of US$12 million. Tsikata, Fenny, and Aryeetey (2008) indicate that, over the course of subsequent decades, up till the present, Ghana has received aid from China in various forms for several purposes. The overwhelming majority of these projects have been concerned with infrastructure development.

According to Tsikata et al (2008), aid from China to Ghana has been generally in three forms: loans, grants and technical assistance. The loans have taken the form of either interest-free or interest subsidized preferential loans (concessional loans) granted by the Chinese government through the Ministry of Commerce. Until recently, there was relatively not much activity with regards to the granting of loans. Nevertheless, the ceiling on concessional loans reached a value of 150 million yuan ($18 million) in 1995. In 1995, the full amount of $18 million in concessional loans was granted to be used to promote joint ventures between Ghanaian and Chinese companies.

In 2006, this ceiling on concessional loans was raised to 250 million yuan ($30 million). This entire amount was granted to the Ghana government to be used to fund the first phase of the National Communications Backbone Network Project to be implemented by the Ghana Ministry of Communications.

In 2007, the Chinese government provided Ghana with an aid package for the construction of the Bui Hydro-Electric Power Dam consisting of $270 million in concessional loans and a $332 million buyer credit facility. The buyer credit facility is from the China Exim bank and is at a semi-commercial interest rate. The concessional loans are at an even lower interest rate. This project, like most others funded by the Chinese government, is to be executed by a Chinese company, this time the Sino-Hydro Corporation.

In 2002, an agreement was reached for the Chinese government to provide Ghana with an interest-free loan of $30 million for the construction of the 16.9 kilometer Ofankor-Nsawam section of the Accra- Kumasi road which was completed and commissioned in 2006. In 2004, China gave Ghana a 20 million yuan grant and a 20 million yuan interest-free loan. In 2006, the grant amount was for 20 million yuan grant and the interest-free loan was for 30 million yuan. These and other aid packages have been put to diverse uses

Technical cooperation is another way by which China gives aid to Ghana (Tsikata et al, 2008). This has primarily taken the form of infrastructure development and has included such projects as the National Theatre, an agricultural cooperation project, the construction of a rice- grinding mill, the Afefi Irrigation Project and grain depot, the Nobewam Farmland Irrigation Project and the Ghana Vocational and Technical Training Centre. China has also provided Ghana with cotton-textile machinery and methane gas equipment. In the area of human resources development, the Chinese government has over the years granted scholarships to Ghanaians

to study in China and has also organized training courses and seminars. In 2006, more than 300 Ghanaian professionals and bureaucrats benefited from training programs and seminars. The number of Chinese scholarships also doubled from 20 to 40.

1.2 Chinese Enterprises operating in Ghana.

Chinese businesses in Ghana consist of those in the formal and informal sectors of the economy. The formal sector comprises both Chinese state-owned enterprises and privately-owned multinational corporations (Jiao and spring 2008). Estimates regarding the number of Chinese enterprises in Ghana vary considerably. In 2016 most of the Chinese state-owned enterprises were into execution Government of China sponsored projects mostly in the construction sector. Mention can be made of Bui Hydro dam constructed by Sino Hydro (Chinese state-owned hydropower engineering and Construction Company) and the Atuabo Gas Plant built by Sinopec. The Ghana Investment Promotion Centre (GIPC) estimated that there were about 800 Chinese companies operating in Ghana (2016). According to this data, approximately 85% were privately owned and the majority are SMEs. These enterprises are highly flexible and adapt quickly to local conditions. Chinese enterprises are springing up all over the country particularly the southern belt with their scope of investment spanning mining, agriculture, forestry, food processing, fishing, furniture manufacturing, footwear, textiles and garment making, and pharmaceuticals. A great deal of them is also engaged in the trading sector, dealing in manufactured goods and consumables by setting up wholesale and retail shops. Most of the Chinese firms in Ghana are strongly supported by the Chinese state, which gives them the edge over other competitors. As support to Chinese businesses, the Bank of China lunched a "Chinese Desk", a financial cooperation between the Bank of China and Ecobank to serve Chinese businesses by providing safe, convenient and efficient financial services to them (MOC, 2011).The Chinese businesses do not operate like conventional profit-maximizing firms, often willing to provide concessions in order to gain access to markets. Kamwanga and Koyi (2009), asserts that, some of the practices include bidding at very low prices, settling for low-profit margins, sourcing cheap inputs from China, and using fairly skilled Chinese workers.

2. LITERATURE REVIEW

2.1 Foreign Direct Investment

According to the World Investment Report (2007), Foreign Direct Investment (FDI) is an investment made to acquire a lasting interest in or effective control over an enterprise operating outside of the economy of the investor. The report indicates that, FDI net inflows are the value of an inward direct investment made by non-resident investors in the reporting economy, including reinvested earnings and intra-company loans, net of repatriation of capital and repayment of loans. FDI implies that the investor exerts a significant degree of influence on the management of the enterprise resident in the other economy. Such investment involves both the initial transaction between the two entities and all subsequent transactions between them and among foreign affiliates, both incorporated and unincorporated. FDI may be undertaken by

individuals as well as business entities. FDI net outflows are the value of an outward direct investment made by the residents of the reporting economy to external economies, including reinvested earnings and intra-company loans, net of receipts from the repatriation of capital and repayment of loans. These series are expressed as shares of GDP (World Investment Report, 2007).

The motivation of the direct investor is a strategic long-term relationship with the direct investment enterprise to ensure a significant degree of influence by the direct investor in the management of the direct investment enterprise. The "lasting interest" is evidenced when the direct investor owns at least 10% of the voting power of the direct investment enterprise. Direct investment may also allow the direct investor to gain access to the economy of the direct investment enterprise which it might otherwise be unable to do. The objectives of direct investment are different from those of portfolio investment whereby investors do not generally expect to influence the management of the enterprise (OECD, 2008)

2.2 Economic Development

In contrast to our understanding of economic growth, which is perhaps more dependent on the market, economic development, the product of institutions, and collective action are not as clearly defined (Feldman, 2014). Whereas economic growth is a simple increase in aggregate output, Joseph Schumpeter (1934) in the *Theory of Economic Development* cited by Feldman (2014), argues that economic development positions the economy on a higher-quality growth trajectory and is achieved through innovation and entrepreneurship.

Kindle Berger and Herrick (1958) cited by Feldman (2014) points out: "Economic development is generally defined to include improvements in material welfare especially for persons with the lowest incomes, the eradication of mass poverty with its correlates of illiteracy, disease and early death, changes in the composition of inputs and output that generally include shifts in the underlying structure of production away from agricultural towards industrial activities, the organization of the economy in such a way that productive employment is general among working age population rather than the situation of a privileged minority, and the correspondingly greater participation of broadly based groups in making decision about the direction, economic and otherwise, in which they should move their welfare".

 In the words of Meier (1964), "economic development is a process whereby an economy's real national income increases over a long period of time". This definition fails to take into account the changes in the growth of population. If a rise in real income is accompanied by faster growth in population there will be no economic development but retardation. Thus, some economists define economic development in terms of an increase in per capita income. Drewnewski (1966) defines development in terms of economic and social welfare, "In the standard of living of people economic development is supportive and it involves increased per capita income and creation of new opportunities in education, healthcare, employment sectors. Development is of limited significance if it does not lead to economic welfare. Economic development implies increased per capita income and reduced income inequalities and satisfaction of the people as a whole".

2.2.1 Measuring Economic Development

Economic development is a multivariate concept having many dimensions, there is no single measure of development that completely captures the process. Clearly, these indicators or measures of development should be valid and amenable to measurement and comparison. In this paper, per capita income or GDP, Human Development Index (HDI), poverty and inequality are discussed.

2.2.2 Per capita GDP as a Measure of Economic Development

Per capita GDP commonly referred to as per capita income has been one of the earliest and also a popular measure of economic development. It is the mean income of the people which is calculated by dividing the GDP by the total population. The per capita GDP is important because it is a direct measure of living standards and social welfare of the citizens. It is used in making a comparison between two countries. The higher GDP per capita is an indicator for a developing economy in general. In the words of Meier and Baldwin (1964), "an increase in national income may be suggested as the most relevant, as well as most convenient, a single measure of development for both poor and rich countries". In spite of the merits, there are some limitations of the measure some of which are illustrated as follows: Subjective elements are not measured by per capita income. For example, it does not tell us about the availability of happiness, justice, security, freedom, or leisure to the society and for measuring the well-being of people. GDP also excludes income inequality between the rural-urban areas. As for long-term economic development, income inequality is suggested as an important factor without reduction of which economic development would not be possible.

2.2.3 Human Development Index (HDI)

Invented by Lord Meghnad Desai and Nobel Laureate Amartya Sen and launched by Mahbubul-Haq, a leading Pakistani economist. The HDI is a composite index of three social indicators: life expectancy, adult literacy and years of schooling. It also takes into account real GDP per capita. Thus the HDI value of a country is calculated by taking three indicators Longevity, Educational attainment and a decent standard of living. HDI ignores other indicators of human development such as infant mortality, nutrition etc. and it measures relative rather than absolute human development. Human development index ranges from 0.897 in high human development countries while for low human development countries it is 0.436

2.2.4 Poverty

Nobel Prize-winning economist Amartya Sen (2000) has eloquently argued that development can be seen as a "process of expanding the real freedoms that people enjoy." Conversely, poverty is the lack of those freedoms, and is a multifaceted phenomenon. Nonetheless, Karnani (2017), asserts that income is very important, perhaps the single most important, measure of poverty. Poverty is therefore most often measured in monetary terms and defined as consumption below a certain benchmark. There is no objective benchmark, and measures of poverty necessarily entail subjective judgment Karnani (2017). This view is also held by the World Bank in a book on poverty and income distribution in

Latin America when it stated: "any poverty cut-off will reflect some degree of arbitrariness due to the subjectivity of how poverty is defined" (as cited in Boltvinik, 1998)

Poverty is a social phenomenon prevalent in society in which necessities of a large section of the population are not fulfilled. It exists all over the world. There are two concepts of poverty, relative and absolute: The concept of relative poverty can be measured in terms of distribution of income or consumption expenditure, and it is useful for developed countries only where there is no absolute poverty. The concept of absolute poverty is related to the minimum level of living and can be measured in terms of income and consumption expenditure. For the measurement of poverty, consumption is considered as more suitable than income. Absolute poverty is prevalent in less developed countries and is of significant dimensions, hence of concern to the country concerned. The absolute poverty can be indicated in terms of intake of essential food like cereals, pulses, milk, vegetables, and butter or calculated in terms of calorie intake. It is income or expenditure level that can sustain or maintain a minimum standard of living. Life expectancy, infant mortality rate, literacy, nutrition, access to primary school, health clinic and drinking water are the important factors giving appendix information of poverty.

2.3 Theoretical Review of the Nexus between FDI and Economic Development

Classical theory is of the view that foreign direct investment plays important role in economic growth of the host countries (Lensink &Morrissey, 2001, and Gorg &Strobl, 2002, Nabila, Samia, &Hafeez, 2011, Oyatoye et al., 2011). According to the theory, FDI through positive spillover, competition, and imitation enhance the transfer of capital, technology, and skills to the host countries (Mody, 2004, and Gao, 2005). Also, through backward and forward linkage FDI will lead to improved balance of payments, boost the gross national income, enhance improvement in infrastructure and increases the production for export (Gorg et al., 2001, Girma et al., 2003, Li &Liu, 2005, Chakraborty & Nunnenkamp, 2008, and Obida & Nurudeem, 2010).

Dependency theory did not believe on the assumption that FDI is vital for the economic growth of developing countries. The theory posits that FDI strangulate development by displacement of indigenous production and perpetuates dominance of the weaker countries by keeping them in a position of constant dependence on the economies of the developed countries (Alfaro, 2003; UNCTAD, 1999, Gorg &Strobl, 2002, and Girma &Wakelin, 2000; Mercinger, 2003; and Bello &Adeniyi, 2010).

New growth theory or endogenous theory sees the level of technology as a driving force for a long run economic growth in any economy. According to the theory, knowledge and technology result to increase in return which leads to increase in economic growth (Cortright, 2001). In production function, Meier and Rauch (1995) pointed out that human capital investment contributes to increase in return while De Castro (1998) put it that the level of research and development in an economy will determine the rate of innovation and economic growth of the country. By augmenting domestic capital and incorporation of diffused foreign technologies in the production function of the host countries,

foreign direct investment will be seen as responsible for the increase in economic activities in the host economy (Shanet.al, 1997).

2.4 Empirical Review of FDI and Economic Development

Previous empirical studies have divergent views on the role FDI in enhancing economic growth. Some of these studies such as Magnus and Fosu (2007) used Toda-Yamamoto and Granger causality on annual data range of 1970 to 2001 to analysis FDI as it affects pre and post SAP economic growth of Ghana. The results of the study failed to establish the evidence of causality between FDI and economic growth for the whole period and pre-SAP period. Also, the result indicated that FDI granger caused economic growth within the post-SAP period.

Adjaye (2009), examined the relationship between FDI and GDP growth in Ghana using annual time series data covering 1970 to 2007. The Johansen and Juselius (1990), multivariate maximum likelihood procedure was employed. The study established a positive and significant relationship between FDI and growth. The Granger causality tests confirmed a bidirectional causality running from foreign direct investment to growth. Frimpong et al., (2011) disagreed with Adjaye when they used the Toda and Yamamoto (1995) to explore the causal link between FDI and growth in Ghana using annual tie series data from 1970 to 2002. The results revealed that there is no directional causality between FDI and economic growth for the total sample period and the pre-SAP period. However, they discovered a unidirectional causality from FDI to growth during the post SAP period. The conflicting results could be due to the difference in estimation techniques used. Whereas Adjaye engaged the Johansen and Juselius (1990) multivariate maximum likelihood procedure, Frimpong et al., employed the Toda and Yamamoto (1995) to examine the causal linkage between FDI and growth.

In addition, Sackey et al., (2012) employed various econometric tools such as Augmented Dickey-Fuller tests, Vector Auto Regression and Johansen co-integration test to study the effect of the foreign direct investment on economic growth of Ghana using time series data from 2001 to 2010. They established a positive and significant long-run relationship between FDI and growth and a uni-directional causality running only from FDI to GDP growth in Ghana.

Furthermore, Antwi et al. (2013) used annual time series data from Ghana for the period 1980 to 2010. They employed simple ordinary least square regressions and confirmed a positive and statistically significant relationship between FDI and growth. However, the study failed to check for directional causality between the two variables.

Similarly, Edoumiekumo (2009) employed the Johansen cointegration approach to investigate the relationship between foreign direct investment and economic growth in Nigeria using annual time series data covering the period 1970 to 2007. The study established a positive and significant link between foreign direct investment and growth. The Granger causality test also confirmed a bidirectional causality running from foreign direct investment to grow. Ogiagah et al. (2010) as well used the Johansen cointegration approach and the Granger Causality test to consider the linkage between FDI and GDP growth in Nigeria using annual time series data from 1970 to 2007 of the Sub-Sahara Africa Region. The study revealed a positive and significant long-run relationship between FDI and GDP growth and a uni-directional causality running from GDP to FDI.

Nabila et. al (2011) employed heterogeneous panel techniques on annual data for the periods of 1983-2008 to examine the impact of foreign direct investment on economic output of selected Asian countries. The Larsson panel test

shows evidence that foreign direct investment and economic growth are co-integrated. FMOLS posited that FDI has a positive significant impact on economic growth. The panel homogeneous causality shows that foreign direct investment and output Granger cause each other but non-causality test affirms evidence of uni-directional causal relationship run from foreign direct investment to output of the selected economies. In the case of Malaysia, the test exhibits that foreign direct investment and growth have two-way causation. The results show that foreign direct investment Granger the economic growth of Thailand, Singapore, Nepal, and Japan while in Sri-Lanka, Pakistan and Bangladesh economic growth Granger cause foreign direct investment. Finally, the study did not show any causation in the case of Singapore, China, and the Maldives, Korea Democratic, Indonesia, Philippines, and India. In a similar study in selected African and Asian countries, Abdullahi, Aliero, and Yusuf (2012) and Gaurav and Mohd (2011) reveal that FDI positively impacts on economic growth in African and Asian countries. The study also reported a one-way relationship from FDI to economic growth only in Africa.

The literature presents mixed results on the links between FDI and growth. Most of the empirical studies are based on cross-sectional and panel data. The cross-country and panel data studies normally average the data over the samples used and across countries from different regions. As a result, they may not reveal a true nature of the relationship between Inflation FDI and growth. Such studies are not country specific.

Im and McLaren (2015) investigated the effects of inward FDI on income distribution and the poverty rate in developing countries using panel data. The study addressed the problem of endogenous FDI through time-varying instruments based on shocks to the attractiveness of investment in neighboring countries as well as oil discoveries in the host country. Without instruments, FDI appears to have no effect on income inequality and a small positive effect on poverty, but with the instruments, in contrast to previous findings, we find that FDI helps decrease both inequality and the poverty rate in the host country.

Koc (2012) study aimed at determining the effects of Foreign Direct Investment (FDI) on the level of poverty in developed and developing countries. The panel regression method, which covers 40 countries' income distribution data, is employed. The results show that the poorest segments receive a lower share of the income created by FDI than the richest segments of these countries, indicating that FDI does not have a serious contribution to poverty reduction. FDI affects the income levels of different income groups in every country, however, there is not a uniform effect in the countries examined.

3. METHODS

This section of the paper outlines the methods that were followed to achieve the objectives of the paper. It includes model specification of economic growth model as well as poverty and income inequality models. The sources of data and method of estimation of the three models are also outlined in this section

3.1 Conceptual Framework and Methodology of Chinese FDI and Economic Growth of Ghana

To examine the relationship between Chinese Enterprises (FDI) and economic growth, this paper presents the theoretical model within the framework of the neoclassical endogenous growth model (Barro and Salai Martin 1995; Romer, 1986, 1990, 1994).

Starting with the neoclassical production, the production function is specified as follows:

$$Y = AF(K, L) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(3.1)$$

where Y, A, K, and L denote the level of output, level of technical progress, the stock of domestic capital and labour respectively.

The advent of endogenous growth theory has opened the way by which policy can influence growth and for that matter FDI (De Mello 1997; Borensztein et al. 1998). De Mello (1997) has provided extensive transmission mechanisms through which FDI affects growth in an economy. Thus, the paper augments the production function by including FDI.

The augmented production function is specified below

$$Y = AF(K, L, Chfdi) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(3.2)$$

Chfdi denotes foreign direct investment flow from China to Ghana which is used as a proxy for Chinese Enterprises and the other variables (A, K, L, and F) are as previously defined.

The study assumes that production function takes Cobb-Douglas form with constant returns to scale.

$$Y = AK^{\alpha_1} (Chfdi)^{\alpha_2} L^{1-\alpha_1-\alpha_2} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots. (3.3)$$

In most of the cross-sectional and panel empirical studies on economic growth (see for instance Barro 1996; Omri and Kahouli 2014), output per capita, rather than the aggregate output is employed in order to account for differences in population across countries. Thus, equation (3.3) is transformed to obtain the per capita output function.

$$\frac{Y}{L} = AK^{\alpha_1} (Chfdi)^{\alpha_2} \frac{L^{1-\alpha_1-\alpha_2}}{L} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (3.4)$$

$$\frac{Y}{L} = AK^{\alpha_1} (Chifdi)^{\alpha_2} L^{-\alpha_1} L^{-\alpha_2} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (3.5)$$

$$\frac{Y}{L} = A\left(\frac{K}{L}\right)^{\alpha_1} \left(\frac{Chfdi}{L}\right)^{\alpha_2} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (3.6)$$

Denoting $\frac{Y}{L}$ by y, $\frac{K}{L}$ by k, and $\frac{FDI}{L}$ by fdi and inserting these variables in equation (3.6) gives equation (2.7)

$$y = Ak^{\alpha_1} Chfdi^{\alpha_2} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (3.7)$$

Taking natural logarithm and the time derivative of each variable yields growth rate of output per capita function.

$$Lny = LnA + \alpha_1 \ln k + \alpha_2 LnChfdi \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (3.8)$$

$$\frac{\dot{y}}{y} = \frac{\dot{A}}{A} + \alpha_1 \frac{\dot{k}}{k} + \alpha_2 \frac{\dot{fdi}}{fdi} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (3.9)$$

Let $g_y = \frac{\dot{y}}{y}$ $g_k = \frac{\dot{k}}{k}$ $g_{fdi} = \frac{\dot{fdi}}{fdi}$ $\mathbf{g_A} = \frac{\dot{A}}{A}$

Making the relevant substitutions, equation (3.10) is derived

$$g_y = g_A + \alpha_1 g_k + \alpha_2 g_{chfdi} \qquad (3.10)$$

Equation (3.1) simply shows that growth rate of output per capita depends on the growth of capital stock and growth rate of Chinese foreign direct investment per capita which is a proxy for Chinese Enterprises. It is expected that the presence of Chinese Enterprises in Ghana is associated with productivity spillovers which results in increasing returns in domestic production. Also, the presence of Chinese Enterprises is expected to add to existing stock of knowledge in the recipient economy through labour training and skill acquisition and diffusion, on one hand, and through the introduction of alternative management practices and organisational arrangements (De Mello 1997).

To control for other variables that affect economic growth, this paper follows the methodology employed by Omir and Kahouli (2014), who focused on the determinants of the growth rate of factor productivity. The factor productivity equation is specified below:

$$g_A = \beta_O + \beta_1 g(HC) + \beta_2 (CPI) + \beta_3 (OPEN) + \beta_4 (GOV) + \varepsilon \qquad (3.11)$$

where HC is human capital proxied by primary school enrolment, CPI represents the percentage change in consumer price index used here to measure inflation, OPEN is trading openness/GDP and GOV as government expenditure/GDP ratio

Substituting equation (3.11) into equation (3.10) gives equation (3.12)

$$g_{y_{it}} = \gamma_O + \gamma_1 gchfdi_{k\,it} + \gamma_2 gk_{it} + \gamma_3 g(HC)_{it} + \gamma_4 (CPI)_{it} + \gamma_5 (OPEN)_{it} + \gamma_6 (GOV)_{it} + g_{yit-1} + \varepsilon_{it}$$

$$(3.12)$$

Due to the time frame of the study, the study focused on four key explanatory variables for the growth model. Thus, equation (3.12) is modified to include only four explanatory variables.

$$g_{y_t} = \gamma_O + \gamma_1 gchfdi_{k\,t} + \gamma_2 gk_t + \gamma_3 g(HC)_t + \gamma_4 (CPI)_t + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.13)$$

The variables in the model including the education which refers to primary school completion as a percentage of relevant age group, GDP per capita, GDP per capita growth, capital formation defined as additions to the fixed assets of the economy plus net changes in the level of inventories and inflation which is measured as the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services were all extracted from World Bank's Development Indicators from 1990 to 2016. Data on China's foreign direct investment to Ghana were extracted from Ghana Investment Promotion Centre database.

To estimate equation (3.13) the study used Ordinary Least Squares for the estimation of the growth model.

3.2 The methodology of Poverty and Income Inequality Models.

The paper followed the methodology of Park and Mecado (2015) to develop the poverty and income inequality models. The poverty model is specified below

$Pov = f\left(ruleoflaw, education, literacy, \inf lation, financialinclusion, growth\right)$ ………… (3.14)

It is expected that the inflow of foreign investment from China to Ghana will help reduce the poverty rate in Ghana if the package of the FDI is labour-intensive which creates employment opportunities for indigenous thereby reducing poverty level Tambunan (2005). Thus, equation (3.6) is modified to account for the role of Chinese enterprises in the reduction of the poverty rate in Ghana.

$Pov = f\left(chfdi, ruleoflaw, education, literacy, \inf lation, financialinclusion, growth\right)$ …….. (3.14)

Due to the time frame of the study, the paper is constraint with degrees of freedom, thus the paper reduces the number of explanatory variables in the poverty model from seven to four key explanatory variables. These include Chinese enterprises, rule of law, education and economic growth.

$Pov = f\left(chfdi, ruleoflaw, education, growth\right)$ ……………………………………… (3.15) where pov is the poverty rate. The paper assumes the there is a linear relationship between poverty rate and its determinants, thus equation (3.15) is respecified taking into account the specific functional form.

$$Pov = \beta_0 + \beta_1 chfdi + \beta_2 ruleoflaw + \beta_3 education + \beta_4 growth + v_t$$ …………………. (3.16)

The income inequality model is specified below

$$inequality = \beta_0 + \beta_1 chfdi + \beta_2 ruleoflaw + \beta_3 education + \beta_4 growth + \beta_5 literacy + \varepsilon_t \ldots (3.9)$$

Data on Poverty rate defined as mean shortfall from the poverty lines (counting the nonpoor as having zero shortfall) as a percentage of the poverty lines, top 10 percent income and bottom 20 percent income group and literacy rate defined as the percentage of people ages 15 and above who can, with understanding, read and write a short, simple statement on their everyday life were extracted from World Bank's Development Indicators from 1990 to 2015. The study used Palma ratio defined as the ratio of top 10 percent income group to bottom 20 percent income group to measure income inequality. Data on rule of law was extracted from Mo Ibrahim Governance data from 2000 to 2015.

To estimate the poverty and income inequality models, the study employed Ordinary Least Squares to conduct the estimation of the poverty and income inequality models.
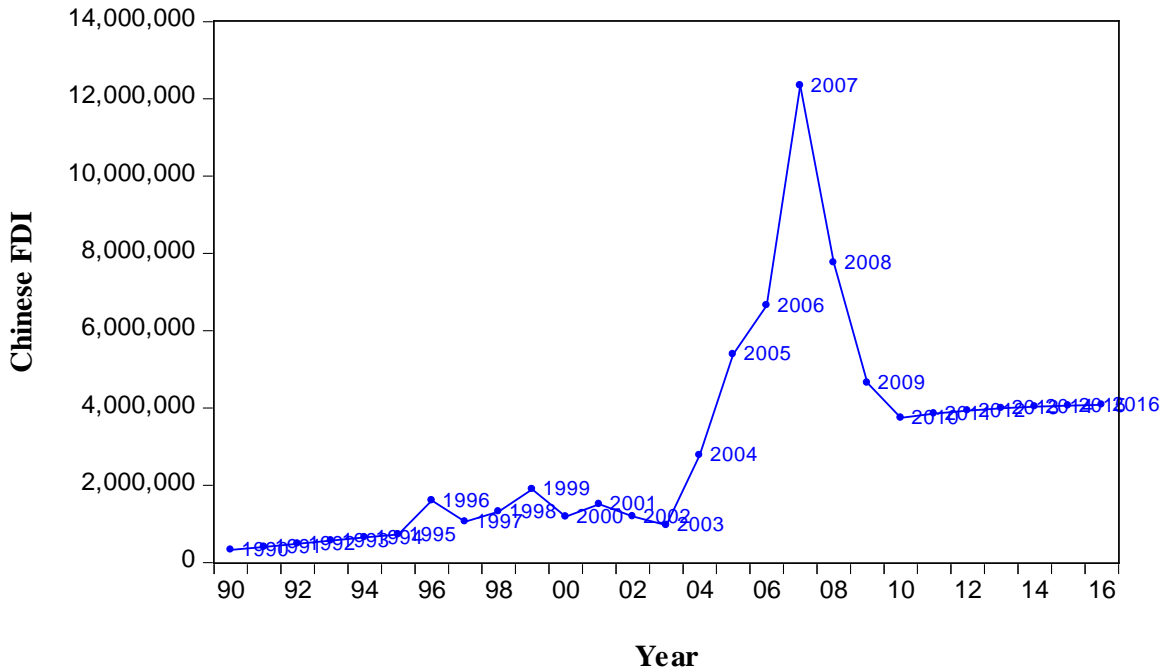
4. DISCUSSION OF RESULTS

This section discusses the empirical results that relate to the objectives of the paper. It includes the discussion of the trend of China's Foreign Direct investment inflow in Ghana, and the effects of Chinese Enterprises on economic growth, poverty and income inequality in Ghana.

4.1 The trend of the Flow of China's Foreign Direct Investment to Ghana

This sub-section discusses the time profile of foreign direct investment from China to Ghana from 1990 to 2016. Figure 4.1 shows the trend results.

Figure 4.1. Trend of Foreign Direct Investment of Chinese Enterprises in Ghana

Source: Author's compilation based on data obtained from Ghana Investment

Promotion Council

Figure 4.1 shows that there is a marginal steady increase of Chinese Investment to Ghana from 1990 to 1995. It increased from $325,006 in 1990 to $727, 014.1 in 1995. However, there was a sharp increase in the amount of foreign direct investment (FDI) from China to Ghana from 1995 to 1996. The amount increased from $727, 014.1 in 1995 to $1,602,475 in 1996. This could be due to the strengthening of democracy in Ghana in the mid-90s, therefore, making it attractive for foreign investment to flow into the country and for that matter the investment inflows from China. The investment flows from China to Ghana was unstable between 1996 and 2002. It declined between the periods 1996 and 1997 and then increased from 1997 to 1999 and declined from that year to 2000. This unstable trend continued until 2002. Ghana enjoyed a steady increase in the inflow of foreign direct investment from 2002 to 2007. The amount of FDI from China to Ghana increased from $1,192,364 in 2002 to $12,343,936 in 2007. The year 2007 recorded the highest foreign direct investment inflow from China to Ghana across the 27 year period. However, there was a sharp declined in the inflow of foreign direct investment from China to Ghana from 2007 to 2008. This could be attributable to the financial crisis that hit most countries in the world. This compelled most countries during this period to focus on internal or domestic affairs rather than transferring capital from the domestic economy to a foreign economy. This declining trend continued till 2010. It then started to increase marginally from the year 2010 to 2016.

4.2 Effect of Chinese Enterprises on Economic Growth of Ghana

This sub-section discusses the empirical results that relate to the effects of Chinese Enterprises on economic growth of Ghana. Table 4.2 shows these empirical results.

Diagnostic Test

The reliability of OLS regression is based on satisfying some key assumptions of the regression model. A failure of any of the key assumptions renders the interpretation of the OLS regression unreliable. Thus, this section present diagnosis test results on the OLS regression estimated for the economic growth model. These include heteroscedasticity, normality, and autocorrelation tests. The results are presented in Table 4.1.

Table 4. 1. Results of Diagnosis Test

Diagnosis Test	Chi-square Test	Probability value
Heteroscedasticity	2.994363	0.5588
Normality	2.22	0.3288
Autocorrelation	3.237130*	0.0864

Source: Author's computations based on data obtained from Ghana Investment Promotion
  Council, World Development Indicators and Imo Ibrahim Governance Data

The results revealed that there is no heteroscedasticity in the growth regression model and the residuals from the regression model are normality distributed. The results also indicate that the residuals from regression are autocorrelated. Thus the revelation by the diagnostic test results indicates that there are problems with least squares estimation and least squares estimate is likely to be inefficient. To resolve this problem, the paper adopted Newey-West standards errors also known as heteroscedasticity and autocorrelation-consistent standard errors (HAC) estimate to correct for the autocorrelation.

Table 4.2 shows the F-statistic from the HAC estimate is statistically significant at the 1 percent level of significance. This implies that the presence of Chinese Enterprise, physical capital, education, and inflation are jointly significant in explaining the changes in growth rate of GDP of Ghana. The R^2 value also shows that about 97 percent of the variation in economic growth of Ghana proxied by GDP per capita is jointly explained by the presence of Chinese Enterprise, Capital, Education, and inflation.

Table 4.2. HAC Estimate of the Effects of Chinese Enterprise on Economic Growth in
  Ghana

Variables	Coefficient
LnChfdi	0.041252**
	[3.489623]
Capital	0.004145**
	[2.255342]
Education	0.015382***
	[16.14458]

Inflation	-0.000771
	[-1.600385]
Constant	5.142651***
	[33.62587]

R^{2} = 0.973818 F = 204.5655 (0.00) N=27   **denotes statistically significant at the5 percent; and ***denotes statistically significant at the1. Note: lnChfdi is the natural log of Chinese foreign direct investment

Source : Author's Computation based on data obtained from Ghana Investment Promotion
Council, World Development Indicators and Imo Ibrahim Governance Data

The results also show that an increase in the amount of capital injected by Chinese Enterprises into the economy of Ghana generates a significant effect on the economic growth of Ghana at the 5 percent level of significance. The result is consistent with the one obtained by Sackey et al., (2012) who also established the positive effect of the foreign direct investment on economic growth of Ghana. A percent increase in the amount of capital injected into the economy of Ghana by the Chinese enterprises stimulates economic growth by 0.04 percent. This gives the indication that the presence of the Chinese Enterprises promotes the growth prospects of Ghana. The influx of Chinese Enterprises is not just about transfer of capital but it also comes with various benefits to Ghana including the inflow of technology, promoting export and improving human resource quality which as well augments the economic growth of Ghana (Borenzstein and Lee (1998) and Lim and Maison (2000)). Further to this, domestic firms can attain spillover efficiency only when they are able to absorb the gains that come with the presence of Chinese Enterprises in Ghana. The presence of Chinese Enterprises also has spillover effects on productivity of domestic firms as well as training of labour and management practices (Blomstrom et al 1992 and De Mello 1997). Thus, the influx of Chinese Enterprises works through these transmission mechanisms to stimulate the growth of the Ghanaian economy.

Among the control variables, capital and education which is a proxy for human capital play a significant role in determining per capita GDP of Ghana. The results show that physical capital exerts a significant positive effect on per capita GDP at the 5 percent level of significance. A percentage increase in the stock of physical capital as a percentage of GDP increases per capita income of Ghana by 0.004 percent. Both exogenous and endogenous neoclassical growth literature recognizes the role of capital in stimulating the growth of economies. High level of capital stock improves labour productivity and therefore increases economic growth. The results also show that human capital proxied by education exerts a significant positive effect on economic growth at the 1 percent level of significance. A percentage increase in primary school enrolment increases per capita income by 0.02 percent. As it is recognized in growth literature, human capital is one of the key factors for the growth of economies. Improvement in human capital implies an improvement in labour skills which stimulates productivity in the production process. Further to this, educated workers are more proficient at learning and responding to new information and technology.

Finally, inflation as a control variable in the growth model plays a negligible role in determining the economic growth of Ghana even at the 10 percent level of significance.

4.3 Effect of Chinese Enterprises on Poverty Reduction in Ghana

This sub-section discusses the empirical results that relate to the effects of Chinese Enterprises on poverty reduction in Ghana. Table 4.4 shows these empirical results.

Diagnosis Test

This section discusses the diagnostic test results on the ordinary least squares estimation. This includes heteroscedasticity, normality, and autocorrelation tests. The results are presented in Table 4.3.

Table 4.3. Results of Diagnosis Test

Diagnosis Test	Chi-square Test	Probability value
Heteroscedasticity	8.452826*	0.0763
Normality	1.94	0.3784
Autocorrelation	10.27330***	0.0013

Source: Author's computations based on data obtained from Ghana Investment Promotion

Council, World Development Indicators and Imo Ibrahim Governance Data

The results revealed that there is heteroscedasticity in the poverty regression model but the residuals from the regression model are normality distributed. The results also indicate that the residuals from regression are autocorrelated. Thus the revelation by the diagnostic test results indicates that there are problems with least squares estimation and least squares are likely to be inefficient. To resolve this problem, the study adopted HAC estimate to correct for the autocorrelation in the poverty regression model. Table 4.2 shows that the F-statistic from the HAC estimate is statistically significant at the 1 percent level of significance. This implies that the presence of Chinese Enterprise, rule of law, education and growth are jointly significant in explaining the changes in the poverty rate of Ghana. The R^2 also shows that about 97 percent of the variation in poverty in Ghana is jointly explained by the presence of Chinese Enterprise, rule of law, education, and growth of GDP.

Table 4.4. HAC Estimate of the Effects of Chinese Enterprise on Poverty Reduction in

   Ghana

Variables	Coefficient
lnChent	-2.54E-07***
	[-4.880197]
Rule of Law	-0.415378***
	[-9.423479]
Education	-0.050282***
	[-1.751510]
Growth of GDP	-0.005204

	[-0.109725]
Constant	49.88665***
	[36.50804]

R^2 = 0.978158 F = 246.3056 (0.00) N=27   **denotes statistically significant at the 5 percent; and ***denotes statistically significant at the 1 percent. Note Chent is the Chinese foreign direct investment

Source: Author's Computation based on data obtained from Ghana Investment Promotion
Council, World Development Indicators and Imo Ibrahim Governance Data

The results also show that an increasing amount of capital injected by Chinese Enterprise into the economy of Ghana exerts a significant negative effect on poverty reduction in Ghana at the 1 percent level of significance. The result is consistent with the one obtained by Im and McLaren (2015) who also found the negative influence of FDI on poverty reduction in developing countries. A dollar increase in the amount of capital injected into the economy of Ghana by the Chinese enterprises reduces poverty by 0.00000025 percent. This gives the indication that the presence of the Chinese Enterprises promotes poverty reduction in Ghana. The influx of Chinese Enterprises is not just about transfer of capital but it also comes with various benefits to Ghanaian including the employment of the masses in their firms which raises the income levels of the poor Ghanaian which makes them break away from the poverty bracket.

Among the control variables, rule of law and education play a significant role in reducing poverty in Ghana. The results show that education exerts a significant negative effect on poverty reduction at the 1 percent level of significance. A percentage increase in primary school enrolment reduces the poverty rate by 0.05 percent in Ghana. Access to education improves the productivity and academic credentials of the poor thereby providing them with the opportunity to have access to jobs that pay well which pushes them out of the poverty bracket. The results also show that rule of law exerts a significant negative effect on poverty reduction at the 1 percent level of significance. Improvement in rule of law limits the level of corruption in the society. The World Bank report also indicated that lack of access to justice is itself central dimension of poverty. Thus improvement in rule of law implies access to justice which benefits the poor.

Finally, economic growth as a control variable in the poverty model plays a negligible role in reducing poverty in Ghana even at the 10 percent level of significance. The implication of the results is that deliberate policy to reduce poverty through economic growth will be futile. Thus, the theory that posits that growth in GDP trickles down to the poor is not a reality in Ghana. The result largely is intuitively plausible. Growth is normally skewed in favour of the few rich people relative to the masses who live in abject poverty. Most of the time growth in the overall economy is driven by the growth in cities relative to the rural community where the majority of the dwellers are poor. This result is supported by the assertion made by Dahlquist (2013) who noted that a country or region with a large fraction of poor and a low growth rate shown to have problems in reducing poverty. Dahlquist (op cit.) further indicated that economic growth does not appear to be sufficient tool when the level of poverty is extreme.

4.4 Effect of Chinese Enterprise on Income Inequality in Ghana

This sub-section discusses the empirical results that relate to the effects of Chinese Enterprise on income inequality. Table 4.6 shows these empirical results.

Diagnosis Test

This section discusses the diagnostic test results on the ordinary least squares estimation. This includes heteroscedasticity, normality, and autocorrelation tests. The results are presented in Table 4.5.

Table 4.5. Results of Diagnosis Test

Diagnosis Test	Chi-square Test	Probability value
Heteroscedasticity	6.038296	0.3025
Normality	1.47	0.4788
Autocorrelation	0.188380	0.6643

Source: Author's computations based on data obtained from Ghana Investment Promotion

Centre, World Development Indicators, and Imo Ibrahim Governance Data

The results revealed that there is no heteroscedasticity in the income inequality regression model and the residuals from the regression model are normality distributed. The results also indicate that the residuals from regression are not autocorrelated. Thus the revelation by the diagnostic test results indicates that OLS estimation is reliable and therefore discussion of OLS regression estimate follows.

The F-statistic from the OLS estimate is statistically significant at the 1 percent level of significance. This implies that the presence of Chinese Enterprise, rule of law, education, literacy rate and growth are jointly significant in explaining the changes in income inequality in Ghana. The R^2 also shows that about 99 percent of the variation in income inequality in Ghana is jointly explained by the presence of Chinese Enterprise, rule of law, Education, literacy rate and growth of GDP.

Table 4.6. OLS Estimate of the Effects of Chinese Enterprise on Income Inequality in

   Ghana

Variables	Coefficient
Chfdi	-4.86E-08**
	[-2.472989]
Growth of GDP	-0.077570***
	[-4.747966]
Education	0.046426***
	[4.526744]
Rule of Law	-0.016720

	[-1.255385]
Literacy rate	0.181603***
	[7.221198]
Constant	-6.772707
	[-15.54479]

R^{2} = 0.992355 F = 545.1536 (0.00) N=27   **denotes statistically significant at the5 percent; and ***denotes statistically significant at the1. Note: Chfdi is the Chinese foreign direct investment

Source: Author's Computation based on data obtained Ghana Investment Promotion Council,

World Development Indicators and Imo Ibrahim Governance Data

The results also show that an increase in the amount of capital injected by Chinese Enterprises into the economy of Ghana exerts a significant negative effect on income inequality in Ghana at the 5 percent level of significance. A dollar increase in the amount of capital injected into the economy of Ghana by Chinese reduces income gap by 0.00000047. This gives the indication that the presence of the Chinese Enterprises promotes income inequality reduction activities of Ghana. The influx of Chinese Enterprises favours the poor more than middle and high-income individuals in Ghana. Thus, this raises the income levels of the low-income earners thereby closing the income gap between low-income earners and middle and high-income earners in Ghana.

Among the control variables, literacy rate, economic growth, and education exert a significant effect on income inequality in Ghana. The results show that education exerts a significant positive effect on income inequality at the 1 percent level of significance. A percentage increase in primary school enrolment increases income inequality by 0.05 unit in Ghana. This is counterintuitive as one would expect that education will reduce income inequality. Perhaps there is inequality in the access to education reflecting in wide income difference between the haves and have not. The results also show that literacy rate exerts significant effect positive effect income inequality at the 1 percent level of significance. This is also counterintuitive as one would expect that literacy rate will reduce the income gap between the poor and non-poor. Perhaps there are differences in literacy rate between the have and have not thereby reflected in their income levels. The results also show that economic growth exerts a significant negative effect on income inequality at the 1 percent level of significance. This implies that growth in the economy of Ghana is distributed in favour of the poor relative to the non-poor.

Finally, rule of law as a control variable in the income inequality model plays a negligible role in reducing income inequality in Ghana even at the 10 percent level of significance.

5. CONCLUSION AND POLICY IMPLICATIONS

The study examined the effects of Chinese Enterprises on the economic development of Ghana. Specifically, the study looked at the trend of Chinese Enterprises in Ghana, the effects of these enterprises on economic growth, poverty and income inequality in Ghana. The data on GDP per capita, physical capital, primary school enrolment, inflation

measured by consumer price index, economic growth and literacy rate were gathered from World Bank's World Development indicators from 1990 2016. Data on FDI from China were gathered from Ghana Investment Promotion Centre and rule of law data was extracted from Mo Ibrahim's governance data report. HAC estimate was employed to estimate the effects of Chinese Enterprise on economic growth and Poverty in Ghana. OLS was employed to estimate the effect of Chinese Enterprise on income inequality in Ghana.

The results revealed that Chinese enterprises play a significant role in stimulating economic growth of Ghana. The influx of Chinese Enterprises is not just about transfer of capital but it also comes with various benefits to Ghana including the inflow of technology, promoting export and improving human resource quality which as well augments the economic growth of Ghana. The presence of Chinese Enterprises also has spillover effects on productivity of domestic firms as well training of labour and management practices. The control variables such as capital and education also play a significant role in determining the economic growth of Ghana.

The findings also show that Chinese enterprises reduce the level of poverty and income inequality in Ghana. The influx of Chinese Enterprises is not just about transfer of capital but it also comes with various benefits to Ghanaian including the employment of the masses in their firms which raises the income levels of the poor Ghanaian which makes them break away from the poverty bracket. Access to education also reduces poverty in Ghana. Access to education improves the productivity and academic credentials of the poor thereby providing them with the opportunity to have access to jobs that pay well which pushes them out of the poverty bracket.

The results revealed that Chinese enterprises play a significant role in stimulating economic growth of Ghana, reducing poverty rate and income inequality. The paper, therefore, recommends that appropriate policies such as reduction in corporate income tax for foreign firms including Chinese enterprises, stable macroeconomic environment policies should be implemented to continually promote the inflow of Chinese enterprises to the country to continually benefit from their presence in the economic development of Ghana.

The direct relationship existing between enrolment and economic growth in Ghana implies that an increase in enrolment would induce economic growth in the country. It is recommended that policies such as school feeding and capitation grant that increase primary school enrolment should be implemented to stimulate the level of enrolment and completion at the primary school level. The free Public Senior High School education is a step in the right direction. However, the government should also progressively consider the quality side of the provision of free public Senior High School education. Teachers' motivation and logistics to create a conducive environment for studies must also be taken into consideration.

APPENDIX

Dependent Variable: LNGDP_PER_CAPITA

Method: Least Squares

Date: 12/17/17   Time: 04:09

Sample: 1990 2016

Included observations: 27

HAC standard errors & covariance (Bartlett kernel, Newey-West fixed
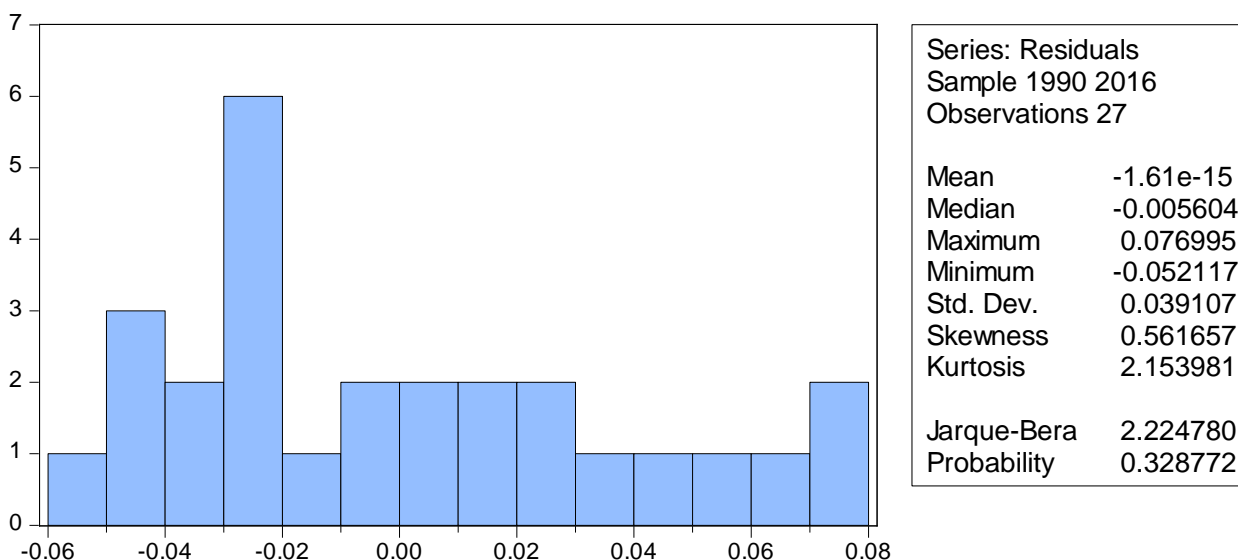
bandwidth = 3.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNCHINAFDI	0.041252	0.011821	3.489623	0.0021
CAPITAL	0.004145	0.001838	2.255342	0.0344
EDUCATION_COMPLETION				
__LO	0.015382	0.000953	16.14458	0.0000
INFLATION__LOG	-0.000771	0.000482	-1.600385	0.1238
C	5.142651	0.152937	33.62587	0.0000

R-squared	0.973818	Mean dependent var	7.013807
Adjusted R-squared	0.969057	S.D. dependent var	0.241687
S.E. of regression	0.042514	Akaike info criterion	-3.312388
Sum squared resid	0.039764	Schwarz criterion	-3.072418
Log-likelihood	49.71724	Hannan-Quinn criter.	-3.241032
F-statistic	204.5655	Durbin-Watson stat	1.277712
Prob(F-statistic)	0.000000	Wald F-statistic	208.8247
Prob(Wald F-statistic)	0.000000		

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	3.237130	Prob. F(1,21)	0.0864
Obs*R-squared	3.606141	Prob. Chi-Square(1)	0.0576

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.686047	Prob. F(4,22)	0.6092
Obs*R-squared	2.994363	Prob. Chi-Square(4)	0.5588
Scaled explained SS	1.147072	Prob. Chi-Square(4)	0.8867

Series: Residuals	
Sample 1990 2016	
Observations 27	
Mean	-1.61e-15
Median	-0.005604
Maximum	0.076995
Minimum	-0.052117
Std. Dev.	0.039107
Skewness	0.561657
Kurtosis	2.153981
Jarque-Bera	2.224780
Probability	0.328772

Dependent Variable: POVERTY

Method: Least Squares
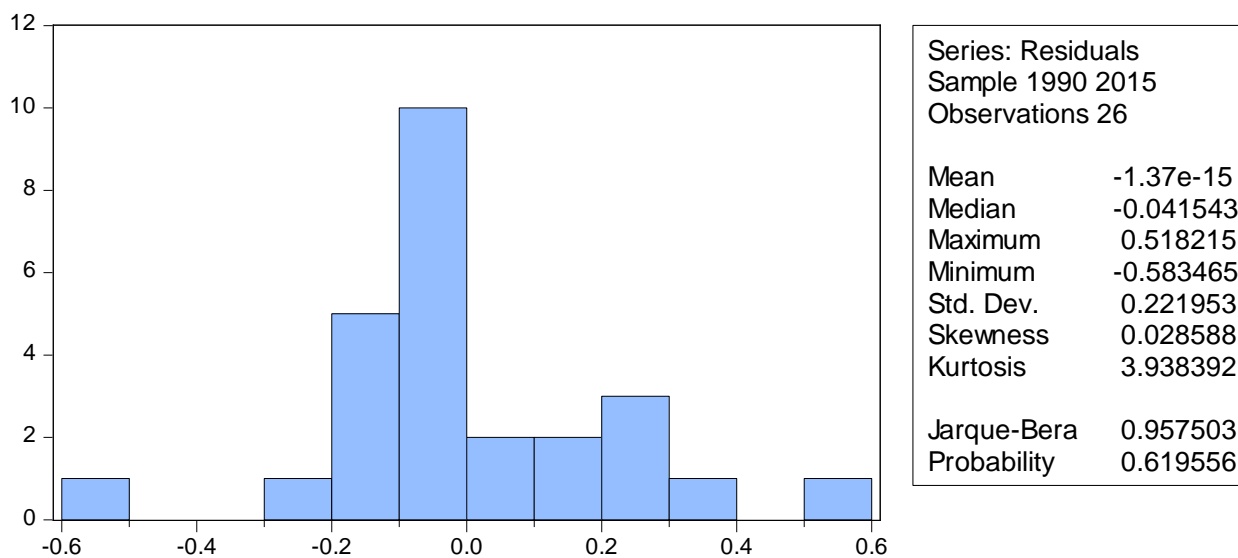
Date: 12/17/17   Time: 22:25

Sample: 1990 2016

Included observations: 27

HAC standard errors & covariance (Bartlett kernel, Newey-West fixed

bandwidth = 3.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CHINAFDI	-2.54E-07	5.19E-08	-4.880197	0.0001
EDUCATION_COMPLETION				
__LO	-0.050282	0.028708	-1.751510	0.0938
GROWTH_RATE__LOG_	-0.005204	0.047425	-0.109725	0.9136
RULE_OF_LAW	-0.415378	0.044079	-9.423479	0.0000
C	49.88665	1.366456	36.50804	0.0000

R-squared	0.978158	Mean dependent var	12.67926
Adjusted R-squared	0.974186	S.D. dependent var	4.243904
S.E. of regression	0.681851	Akaike info criterion	2.237565

Sum squared resid	10.22826	Schwarz criterion	2.477535
Log-likelihood	-25.20712	Hannan-Quinn criter.	2.308920
F-statistic	246.3056	Durbin-Watson stat	0.880806
Prob(F-statistic)	0.000000	Wald F-statistic	480.6333
Prob(Wald F-statistic)	0.000000		

Breusch-Godfrey Serial Correlation LM Test:

| F-statistic | 0.801013 | Prob. F(1,17) | 0.3833 |
| Obs*R-squared | 1.169953 | Prob. Chi-Square(1) | 0.2794 |

Heteroskedasticity Test: Breusch-Pagan-Godfrey

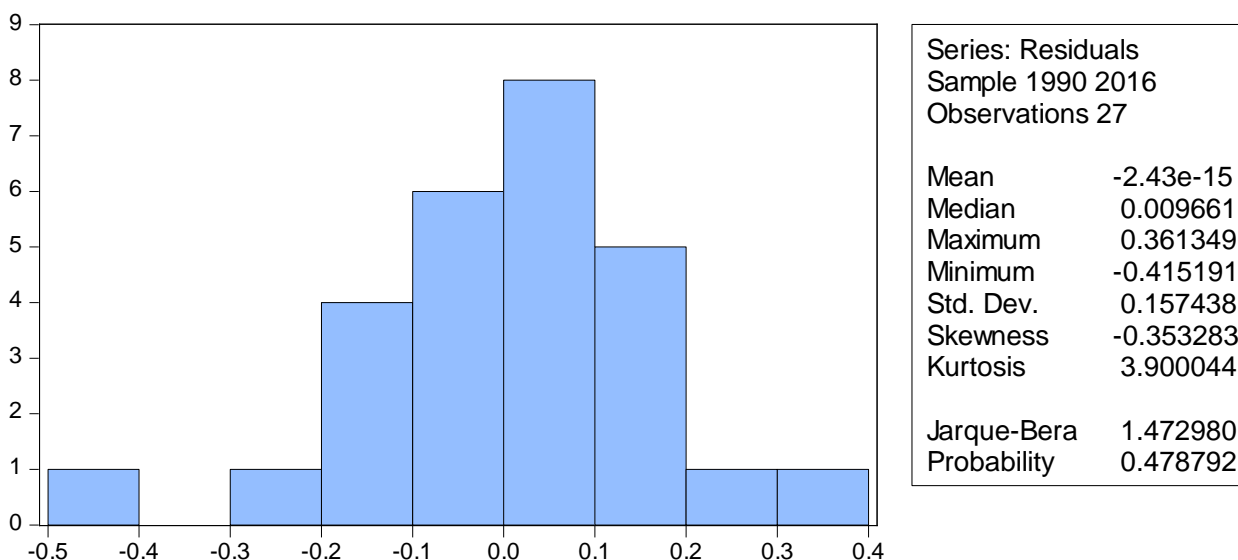| F-statistic | 0.633633 | Prob. F(7,18) | 0.7225 |
| Obs*R-squared | 5.140138 | Prob. Chi-Square(7) | 0.6429 |
| Scaled explained SS | 3.619536 | Prob. Chi-Square(7) | 0.8224 |

Dependent Variable: PALMA

Method: Least Squares

Date: 12/17/17   Time: 04:41

Sample: 1990 2016

Included observations: 27

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CHINAFDI	-4.86E-08	1.96E-08	-2.472989	0.0220
EDUCATION_COMPLETION				
__LO	0.046426	0.010256	4.526744	0.0002
GROWTH_RATE__LOG_	-0.077570	0.016338	-4.747966	0.0001
RULE_OF_LAW	-0.016720	0.013319	-1.255385	0.2231
LITERACY__LOG_	0.181603	0.025149	7.221198	0.0000
C	-6.772707	0.435690	-15.54479	0.0000

R-squared	0.992355	Mean dependent var	6.466451
Adjusted R-squared	0.990534	S.D. dependent var	1.800579
S.E. of regression	0.175181	Akaike info criterion	-0.452860
Sum squared resid	0.644458	Schwarz criterion	-0.164897
Log-likelihood	12.11362	Hannan-Quinn criter.	-0.367234
F-statistic	545.1536	Durbin-Watson stat	1.648493
Prob(F-statistic)	0.000000		

Series: Residuals	
Sample 1990 2016	
Observations 27	
Mean	-2.43e-15
Median	0.009661
Maximum	0.361349
Minimum	-0.415191
Std. Dev.	0.157438
Skewness	-0.353283
Kurtosis	3.900044
Jarque-Bera	1.472980
Probability	0.478792

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.140521	Prob. F(1,20)	0.7117
Obs*R-squared	0.188380	Prob. Chi-Square(1)	0.6643

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.209865	Prob. F(5,21)	0.3388
Obs*R-squared	6.038296	Prob. Chi-Square(5)	0.3025
Scaled explained SS	5.296635	Prob. Chi-Square(5)	0.3808

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