Effects of Foreign Direct Investment Inflows into Agriculture on Food Security in Ghana

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Abstract

This study investigated the effects of FDI on food security in a developing country, Ghana. A double logarithm functional form was employed. Daily energy consumption (hunger) was negatively related to agricultural FDI and significant in both the short run and long run. Likewise, daily protein consumption (nutrition) was negatively related to agricultural FDI and statistically significant in the short run and long run. This outcome established a detrimental effect of agricultural FDI inflow on food security in Ghana. Efforts at growing Ghana's economy and increased national income relative to population growth may not promote food security unless government directs final expenditure towards food security programmes specifically. Though further improvement in FDI inflow to agriculture should not be ignored for the sake of its positive benefits, specific interventions are required to ensure that smallholders are not side-lined in production. Government must support appropriate lower priced technologies that smallholders can adopt.

Keywords: Food security, Daily energy consumption, Daily protein consumption, Agricultural FDI, agricultural economic growth, government final expenditure, democracy, Ghana.

1. Introduction

1.1. Background

One of the basic needs of humankind is food. The need for, access to and availability of food cannot be overstressed. 'Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life'(FAO, 2012; http://www.fao.org/economic/ess/ess-fs/en/). In addition to access, Thomson and Metrz (1998) stressed the availability aspect of food security. The task of providing food for citizens is a macro level responsibility for national leaders. Investments, both local and foreign are essential in this direction. Foreign direct investment (FDI), comprise international capital flows in which a firm in one country creates or expand a subsidiary in another. FDI refers to an investment made to acquire lasting interest in an enterprise operating outside of the economy of the investor (UNCTAD, 2002). FDI can also be conceived as an investment involving a long-term relationship and reflecting a lasting interest and control of a resident entity in one economy in an enterprise resident in another economy (Rotjanapan, 2005). Essentially, FDI is an investment made to acquire lasting interest in the enterprises operating outside the economy of the investor (UNCTAD, 2002). FDI thus implies that the investor has significant degree, partial or full control or influence on the management of the enterprise resident in the other economy. According to Krugman and Obstfeld (2009), the most distinctive feature of FDI is that it encompasses transfer of resources and acquisition of control.

1.2. Problem Statement

Significant challenges confront ACP countries in the years to come as they try to step up economic growth, deal with increasingly integrated world markets and meet the Millennium Development Goals (MDGs), especially those focused on hunger and poverty (Skoet, *et al*, 2004). These efforts they noted will occur in the face of declining external assistance and many competing demands on resources. And trends in public resource mobilisation for agriculture and rural development (in terms of both domestic spending and Official Development Assistance) do not reflect that important role. However, according to UNCTAD (2009), FDI inflows into developing countries were less affected than those into developed countries in 2008. Developing countries seemed better able to weather the global financial crisis in the first half of 2008, as their financial systems were less closely interconnected with the hard-hit banking systems of the United States and Europe. Further, UNCTAD (2009) noted economic growth of developing countries remained robust, supported by rising commodity prices. FDI inflows into developing countries therefore increased in 2008, but at 17% this was a lower rate than in previous years. FDI inflows in Africa on one hand and Latin America and the Caribbean on the other grew at more than 27% and more than 13% respectively than the preceding years. In respect of agricultural FDI, USD 0.6b flowed to developing countries in

1989-1991. By 2005-2007 this rose to USD 3b constituting 0.8% of total FDI inflows across the globe. As a result, direct involvement of Transnational Corporations (TNC) in agriculture has been limited (UNCTAD, 2009). The low levels of FDI in agriculture, UNCTAD explains may be partly due to the regulated nature of the industry, restrictions on ownership of agricultural land by foreigners, and corporate strategies which favour control over the supply chain through upstream and downstream activities. The United Nations Millennium Declaration on 8th September, 2000 notes 'We [the United Nations General Assembly] resolve to halve, by the year 2015, the proportion of the world's people whose income is less than one dollar a day. We also resolve to take special measures to address the challenges of poverty eradication and sustainable development in Africa, including debt cancellation, improved market access, enhanced Official Development Assistance and increased flows of foreign direct investment, as well as transfers of technology'.

Per capita food production in Africa and the world as a whole has been increasing steadily over the past 50 years (FAOSTAT, 2008) such that there is sufficient food to feed all the people in the world. However, food is not always available, affordable, or equitably distributed to needy populations (Yang & Hanson, 2009). Indeed, in Ghana as at 2007, more than 1m persons were undernourished (UNSTATS, 2011)[1]

In the light of over a million under nourished persons, declining external assistance and many competing demands on resources, the limited involvement of TNCs in agriculture, the preference for manufacturing sector, coupled with the growing food insecurity concerns in developing countries, what is the effect of FDI inflows into agriculture on food security in Ghana?

1.3 Objectives

In response to the question posed, the study seeks to assess the effects of FDI into agricultural on food security in Ghana.

1.4 Relevance

The agricultural sector plays a distinctive role in the development of any economy. It is the only source of food, which is essential in both the developed and the developing countries; contributes to the national income, and provides employment. These roles are even more pronounced in developing economies where the largest proportion of the population lives in rural areas and depends heavily, directly or indirectly on agriculture (World Bank, 2008). Additionally, with the sector being a vital source of employment with over 65 percent of the developing countries' labour force depending on agriculture, it is not surprising that agricultural development is fundamental in any poverty alleviation policy. In the specific case of Ghana, agriculture employs more than 60% of the labour force and is predominantly rural. It also contributes significantly to gross domestic product (GDP) and foreign exchange earnings (ISSER, 2007). Though agriculture remains a mainstay in many developing countries, over time its contribution to GDP has declined in many regions of the World partly due to underinvestment in, and neglect of, the industry in favour of manufacturing (FARA, 2006; DESA, 2009).

In the light of under investment in agriculture and the MDG targets related to food; an investigation of the effects of FDI on food security is relevant. Mihalache-O'Keef & Li, (2011) investigated the role of sections of FDI on food security in least developed countries (LDCs), however, the LDCs included in the study were only nine African countries which excluded Ghana. Finally, Skoet, *et al* (2004) has shown that growth, poverty reduction and food security especially for the poorer countries in ACP region including Ghana depend on agriculture (investment) and rural economic activities.

1.5 Organisation of Study

The next section outlines the theoretical framework and presents empirical evidence. Section 3 describes the data measurements and sources, and model specification. The results are presented and discussed in the fourth section and the final section concludes with some policy recommendations.

2. Literature Review

For the greater part of humanity, basically in developing countries, agriculture remains at the centre of their existence: it provides sustenance, supports people's livelihoods and defines their traditions. Importantly, the bounty of agricultural production in many societies the world over, and throughout the ages, has created surplus value that has underpinned their material basis (UNCTAD, 2009). Thomas (1997) has noted this applies equally to urban civilisations founded in the past, the triangular trade of the colonial period which aided the industrialisation of Europe and North America. The following sub-section presents a conceptual framework which draws on the work of Mihalache-O'Keef & Li (2011) with the supporting literature.

2.1 Conceptual Framework

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[1]   http://unstats.un.org/unsd/mdg/Data.aspx

There exists an interesting interplay between FDI and food security. This interplay is vividly described by Mihalache-O'Keef & Li (2011). Figure 1 present that snap shot with the channels. The channels between FDI and food security are two; development and growth, and food access and availability. FDI in natural resources such as oil and agriculture mostly produce for export to developed countries. This vertical integration concretises the dependency and colonial link between developed and developing countries (Mihalache-O'Keef & Li, 2011).   This dependency produces some benefits to the host nation though limited (UNCTAD, 2001). Aykut and Sayek (2007) have shown that large projects in the primary sector (comprising oil and agriculture) use few intermediate inputs and export most of their output. In fact, the World Bank earlier noted that FDI flows in agriculture tend to be highly volatile (World Bank 2005).

There is evidence that, Africa gained little in terms of capital accumulation from FDI in agriculture. Samatar (1993) documents that, nearly 75 percent of the earnings from banana exports leave Somalia. The nature of agriculture FDI, largely land based, results in concentration of the benefits as well and the benefits easily gets captured by elites. Indeed, the rent seeking behaviour is re-enforced leading to weakening of institutions (Sala-i-Martin and Subramanian 2003; Isham *et al.* 2003). Aykut and Sayek (2007) did show that there is reduction in competitiveness in other economic sectors leading to preventing the benefits of primary FDI rarely trickling down to the masses or are reinvested towards sustainable development. In fact, Alfaro (2003) and Aykut and Sayek (2007) showed in cross-national empirical analyses that primary FDI (PFDI) hurts economic growth in developing countries. Through the development and growth channel, there is also reduced human capital.

The food access and availability channel has numerous effects that are detrimental to food security. Clapp (1998, 2003) have noted that Governments in developing countries often pursued agricultural policies focused on chemical-dependent technologies due to multinational involvements in agricultural projects. This leads to replacement of crop rotation and recycling of organic matter with the high-intensity use of pesticides and synthetic fertilisers (Altieri 2000; Jorgenson 2007). In some cases substances banned in developed countries with high environmental standards are used by foreign investors in developing countries (Frey 1995; Magdoff *et al.* 2000; Shiva and Bedi 2002). The resulting pollution of water sources, poisoned farmlands compel migration, frequently compelling closures and relinquishing of subsistence farms. The damages do result in threats to food security and public health. These occurrences generate negative environmental externalities, harming the livelihood of indigenous people.

There is a demographic dimension to the externalities; gender, age, low bargaining power of labour. Samatar (1993) noted that approximately one third of the operations on banana plantations in Somalia are performed by very young workers, mostly girls, aged 8-15; these children are very unlikely to obtain an education. Additionally, Echánove and Steffen (2005) stated that FDI firms have more bargaining power over the terms of employment since agriculture FDI often draws on labour that is oversupplied and poorly organised. Hence, the labourers therefore are not necessarily highly paid. FDI firms acquire existing local firms as an entry strategy. In some cases, only little labour is absorbed, creating unemployment and lowering the incomes of many villages. Davis (1978) provide evidence that large cattle ranches set up in the early 70s in the states of Para and Mato Grosso in Brazil employed few people and drove away many peasant farmers. Agriculture FDI inflows to large farms may redirect government subsidies away from small farmers and change the focus of domestic investment in agriculture (Mihalache-O'Keef, and Li, 2011). Samatar (1993) finds that foreign investment modernised banana production and increased exports but did not improve the starvation wages of plantation workers, which ranged in 1991 from USD 0.10 to USD 0.50 a day. Children usually received even lower wage rates, insufficient for buying more than a loaf of bread, or five cups of tea, or a kilogram of rice.

Agricultural FDI undermines the mechanism of improvement of rural infrastructure, accompanied by government subsidies to subsistence farms which should have resulted in encouraging the development of local markets for the products of small farmers. Such mechanism, in the view of Mihalache-O'Keef, and Li (2011), is a recommended pathway to rural development that alleviates poverty. Additionally, expansion of foreign investors operations by buying land from local small farmers prevents farmers from subsistence activities and forcing them to rely solely on wages too low for good nutrition.

Other recent studies have also shown negative effects of FDI. Gerlach and Liu (2010) and Schoneveld et al (2010) stated challenges arising from large-scale land acquisitions such as lack of transparency in land transfers, no consultation with local stakeholders, no recognition of their rights and locking of large tracts of land for up to fifty years. Land transfers involved displacement of local smallholders and loss of grazing land for pastoralists, negative impacts on livelihoods, and no compensation. Vulnerable groups, such as women and migrants, are found to be most profoundly affected because of their relative inability in recovering lost livelihood resources. They also acknowledged instances of environmental damage arising from excessive water demand for large-scale production of crops such as oil palm and sugar in monocultures. There is limitation of biodiversity arising from those

large-scale monocultures (Hallam, 2011). However, biodiversity may be sustained where the projects subscribe to environmentally sustainable procedures such as organic certificated production practices. Hallam (2011) further notes that based on historical evidence, there are concerns over highly mechanised production methods with limited employment creation; dependence on imported inputs and hence limited domestic multiplier effects; adverse environmental impacts such as chemical contamination, land degradation and depletion of water resources; and limited labour rights and poor working conditions. The effects of FDI to agriculture through the channels described results in negative or no positive effects on food security of persons in the host country.

2.2 Positive effects of FDI

Notwithstanding the negative effects of agricultural FDI outlined, studies have documented positive effects. Rotjanapan (2005) and Frimpong & Oteng-Abayie (2008) have noted diverse importance of FDI to host countries; the foreign capital inflow augment the supply of funds for investment thus promoting capital formation in the host country; stimulation of local investment by increasing domestic investment through links in the production chain when foreign firms buy locally made inputs or when foreign firms supply intermediate inputs to local firms. Furthermore, inward FDI can increase the host country's export capacity, causing the developing country to increase its foreign exchange earnings. New job opportunities and enhancement of technology transfer, and boost of overall economic growth in host countries are definitely associated with inward FDI. Borenzstein, *et al*, (1998), Blomström & Kokko, (2003) and Klein, *et al*, (2003) provided evidence that FDI has played an important role in promoting economic growth, raising a country's technological level, and creating new employment in developing countries. Indeed, the technology and know-how transfers that accompany foreign capital can be beneficial to farmers (Dries and Swinnen 2004). FDI works as a means of integrating developing countries into the global market place and increasing the capital available for investment, thus leading to increased economic growth needed to reduce poverty and raise living standards (Dollar and Kraay, 2000, Dupasquier and Osakwe, 2005 and Rutihinda, 2007). Productive employment generated from FDI is a conduit to poverty reduction (Tambunan, 2004). Arguably, the effects of FDI on economic growth, employment and productivity have positive implications for wealth creation, livelihoods and ultimately, food security of host nation inhabitants.

In the specific case of FDI into agriculture; GTZ (2009), FAO (2009 a, b, c), Gerlach and Liu, (2010) and Hallam (2011) provide pieces of evidences. Hallam (2011) noted that for FDI into agriculture benefits should arise from capital inflows, technology transfer leading to higher domestic productivity and production, quality improvement, employment creation, backward and forward linkages. Additionally, there could also be multiplier effects through local sourcing of labour and other inputs, processing of outputs, and possibly an increase in food supplies for the domestic market and for export. Gerlach and Liu (2010) documented that foreign investors in floriculture in Uganda have introduced more environmentally friendly production methods suggesting that foreign investments are not always environmentally damaging. Also, greater local availability of palm oil in Ghana, horticultural products in Senegal, and rice in Uganda as a result of foreign investments. Additionally, in Ghana, FAO (2009a) reported that FDI in Ghana are estimated to have created 180,000 jobs between 2001 and 2008. And in Mali, the Marakala sugar project is expected to generate 5,000 jobs directly and up to 20,000 indirectly against a displacement of 1,600 smallholders (GTZ, 2009). Finally, FAO (2009b, c) reports productivity enhancing technology spill overs apparent in Morocco, Egypt, and Uganda. Hallam (2011) acknowledged historical evidence suggesting longer-run benefits in terms of improved technology, upgrading of local suppliers, improved product quality and sanitary and phytosanitary standards. From the review on the positive effects of FDI the conceptual model adapted from Mihalache-O'Keef, and Li, (2011) can be augmented into Figure 2.

These positive effects are predicated on the absorptive capacity of domestic agricultural sector. Also, the desirable benefits will not accrue if investment results in the creation of an enclave of advanced agriculture in a dualistic system with traditional smallholder agriculture and which smallholders cannot emulate (Hallam, 2011). Indeed, FDI projects in banana production around the Volta River in the Eastern and Greater Accra Regions of Ghana use expensive and sophisticated irrigation and fruit handling systems for which there is a financial and technology chasm between the projects and smallholders. According to WIR (2009) technological contributions of transnational corporations have been limited as technologies developed for commercial crops are not easily transferred to smallholder production of staples. Indeed, the technology and production benefits of foreign investments to local food security would presumably be zero if crops are grown entirely for export to the investor country. A slip below the zero effect into negative zone is apparent if land, water, and other resources are taken out of production for subsistence or local markets. Thus benefits of technology transfer from FDI are often absent in developing countries. Hallam (2011) rightly notes that the necessary conditions must be created through policy interventions in order to realise the benefits of FDI for host countries in general and for food security in particular.

3. Data and Methods

3.1 Model

In order to investigate the effects of FDI on food security, the approach of selecting the determinants of food security and incorporating FDI into the factors was adopted. There are biological and socio-economic determinants of food security (UNICEF, 1990). The study specifies the economic determinants of food security with AFDI as:

$$FS = f(AFDI, P2, ED, EG, X, GC)...1$$

Where:

AFDI is agricultural FDI inflow per capita; P2 is polity 2 variable representing democracy; ED is agricultural economic development; EG is agricultural economic growth; E is exports of agricultural merchandise and government final consumption on agriculture.

Using the agricultural specifications of the variables as much as possible, equation 1 is decomposed and specified as:

$$LnDEC = b_0 + b_1 LnFDI_t + b_2 LnP2_t + b_3 LnAGPC_t + b_4 LnAGGR_t + b_5 LnFX_t + b_6 GC_t + \phi_t...2$$

$$LnDPC = b_0 + b_1 LnFDI_t + b_2 LnP2_t + b_3 LnAGPC_t + b_4 LnAGGR_t + b_5 LnFX_t + b_6 GC_t + \varphi_t...3$$

Where DEC and DPC are daily energy consumption per capita and daily protein consumption per capita respectively, FDI is foreign direct investment inflow into agriculture per capita, P2 captures democracy, AGPC agricultural GDP per capita, AGGR agricultural economic growth rate, FX exports of both manufactured and primary food exports, GC government final expenditure on agriculture. The $b_i s$ are parameters to be estimated.

3.2 Data

A number of indicators measure food security. However, daily per capita energy consumption and daily per capita protein consumption are employed in this paper. The desirable properties are: exhibition of short term variations in response to factors other than major catastrophes; series are comparable across periods; the indicators show both supply and access over time. As precedence, Jenkins and Scanlan (2001), Reenock *et al,* (2007) and Mihalache-O'Keef & Li (2011) used these two indicators. All data except foreign direct investment inflow into agriculture and polity2 variable were obtained from UN agencies. Data on daily per capita energy consumption and daily per capita protein consumption were extracted from FAOSTAT database (http://faostat.fao.org/site/368/DesktopDefault.aspx?PageID=368#ancor, 3rd February, 2012; 12:00 GMT). Agricultural economic development was measured as agricultural GDP per capita at 2005 prices. Agricultural economic growth was measured as growth of agricultural GDP. These were obtained from UNSTAT database (http://unstats.un.org/unsd/snaama/selbasicFast.asp, 3rd February, 2012; 12:30 GMT). Government consumption which captures the capacity and resources a government may directly spend to address food security concerns is measured captured as total government expenditure weighted by the share of agriculture in total GDP of Ghana. This weighting is essential as there is no data on government final expenditure in the UNSTAT database on sectoral distribution of final government expenditure. The government expenditure on agricultural sector so constructed is further divided by agricultural GDP. The division by GDP shows the portion of output spent on food security. This construct of government final expenditure on agriculture as a share of agricultural GDP is important since in Ghana, the agricultural sector supervised by the Ministry of Food and Agriculture (MOFA) is defined to include food. All data used to compute this construct were obtained from UNSTAT. In order to strip FDI of influences of trade (Jenkins and Scanlan 2001, Djokoto, 2011), agricultural and manufactured food exports were included. This was obtained from UNCTADSTAT database (http://unctadstat.unctad.org/ReportFolders/reportFolders.aspx, 3rd February, 2012; 13:00 GMT. Agricultural inward foreign direct investment was obtained from Ghana Investment Promotion Centre (GIPC) in current US dollars (USD) and divided by population data obtained from UNSTAT to generate foreign direct investment inflow into agriculture per capita (FDI). Data on FDI covered 1995 to 2010. This limited data to periods from 1995. P2 represent democracy as captured by polity2 variable in polity 4 dataset; (http://www.systemicpeace.org/inscr/p4v2010.xls). The data set which ranges from -10 to +10 captures democracy with higher values of P2 representing greater democracy. The value for 1995 is -1. Due to the need to convert the data set to natural logarithm form, 3 was added to the P2 series (Frenkel, 1976). Although all other data were available till 2010, food security data were available for up to 2007. This limited the annual data used to 2007. This posed a challenge in terms of data points for the regression analysis, specifically limitations on degrees of freedom. Following Adenutsi (2008) the annual data sets were converted to quarterly data sets in EViews 7. Prior to increasing the frequency, a natural logarithm transformation of the data was accomplished.

4. Results and Discussion

4.1 Chart Description and Summary Statistics,

The summary statistics show a minimum DEC of 2479.00kcal/person/day (1995), a maximum of

2,907kcal/capita/day (2007) with a mean of 2,648.69 kcal/person/day (Table 1). A pictorial representation of the data showed a general rising trend (Figure 3). The DEC statistics obtained for Ghana were different from the minimum of 1639 kcal/capita/day (1992, Mozambique), the maximum of 3,487 kcal/capita/day (2000, Hungary) and mean of 2558 kcal/capita/day (1999, Columbia; 1992 Paraguay and 1984 Costa Rica) for developing countries (Mihalache-O'Keef & Li, 2011). The DEC crossed the 2500kcal/capita/day in 1998 and has been rising since. At this rate, Ghana is expected to cross the FAO's recommended 3,000 kcal/capita/day adult equivalent unit mark by end of 2011. Barring any unanticipated drought Ghana should exceed the FAO recommendation by 117kcal/capita/day by 2015.

In respect of DPC, the minimum of 50.30 g/capita/day was recorded in 1995 and maximum of 59.80 g/capita/day was recorded in 2007. The mean recorded over the period 1995 to 2007 was 55.01g/capita/day (2001-2002) and a corresponding sample standard deviation of 2.69 g/capita/day. Unlike DEC, Ghana's minimum for DPC was higher than developing countries' minimum of 31.1 g/capita/day (Mozambique in 1994) according to Mihalache-O'Keef & Li (2011). The maximum of 107.4 g/capita/day (Slovenia in 1999), and average of 67 (Fiji in 1992 and Indonesia in 1995) were higher than those of Ghana. The spread of 2.69 g/capita/day for Ghana was lower than that of 15.5 g/capita/day found Mihalache-O'Keef & Li (2011). Ghana's narrow spread may be attributable to the small sample, 13 data points, unlike the 560 for developing countries. Examining the trend of the DPC (Figure 4), like DEC, there is a rising trend as well. Except a dip in 2001 and 2002, DPC has demonstrated a general rising trend. Based on an average annual growth rate of 0.015, DPC for Ghana will exceed 67.00 g/capita/day by 2015.

4.2 Tests for Unit roots and Cointegration

As time series data is often plagued with unit root problems, the data was tested for the existence of unit roots. Using Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests, agricultural GDP was stationary after second differencing. Following disagreement between ADF and PP on stationarity of LDEC and P2 the decision of PP was adopted (Table 2). Therefore all variables except AGDR are stationary after first differencing. The available methods of test for cointegration do not produce excellent results when I(2) variables are included in the set of variables to be tested for cointegration. Consequently, AGDR was excluded from the analysis. The ARDL method was adopted in Microfit 5 (Table 3). There is cointegration among the variables with both dependent variables, LDEC and LDPC. Consequently, both long run and short run estimates were obtained for LDEC and LDPC as dependent variables.

4.3 Model Estimations

Increases in agricultural economic growth did not positively correlate with food security (Table 4 and 5). Contrary to *a priori* expectations, exports of primary and manufactured food boosted food security mostly in the short run. This may be attributable to disposal of some of the export products into the local market. This may not be entirely deliberate as the produce that does not meet export standards are made available to the local market. Increases in final government consumption weighed by agricultural GDP showed a significant positive effect on nutrition in the short and long run. Whilst the short run showed an inelastic effect, in the long run an elastic effect was demonstrated. Contrary to expectations that democratic governments may be more concerned about food security for her citizens, the results do not confirm that; for nutrition, there was a negative elastic relationship between nutrition and FDI into agriculture in both the short and long run.

For daily energy consumption (hunger) only one variable, FDI was statistically significant at 5% probability level in the long run (Table 4). Since the data was expressed in natural logarithm, the coefficients are elasticities. Therefore, increase in agricultural FDI inflow of 1% will reduce daily energy consumption by 0.019%. Similarly, in the short run increase in FDI by 1% will decrease daily energy consumption by 0.001%. Despite the miniscule coefficient, the negative sign of FDI with DEC is in agreement with findings of Mihalache-O'Keef & Li (2011) who found a significant negative relationship for primary FDI inflow. The results seem to question the positive role tooted for FDI by GTZ (2009), FAO (2009 a, b, c), Gerlach and Liu, (2010) and Hallam (2011). The statistically significance negative coefficient of FDI raises concerns as to the role of (agricultural) FDI as a tool towards achieving the millennium development goals for example target 1.c which aims at halving between 2000 and 2015, the proportion of people who suffer from hunger. The documented benefits to FDI inflow to an economy in the literature may not hold in the case of Ghana. It must be noted however, that this finding relates to FDI into agriculture and not total FDI into the economy. Nevertheless, this result is significant since availability of food arises chiefly from the agricultural sector. In the short run other variables that were statistically distinguishable from zero include AGGR and FEX. The positive sign of FEX points to a non-detrimental effect of both primary and manufactured exports on hunger in Ghana. This finding is interesting as one would expect that increase in exports will reduce availability. However, in the particular case of Ghana, an important agricultural export is cocoa beans, which when processed is not a stable. However, income from sales of farm produce may be used to purchase food. Secondly, income realised from exports may be used to finance food imports. This assertion may be tested by

inclusion of food imports as an explanatory variable.

Turning to daily protein consumption (Table 5), FDI exerts a statistically significant negative effect on LDPC in both the short and long run. As in the case of LDEC, the magnitude of FDI in the long run model though small is about 16 times larger than the short run coefficient. With the statistically significant and negative relation between FDI and food security variables in both the long and short run, the model outlined in figure 1 holds sway over the positive effects. The reasons adduced in the literature may be relevant to Ghana. However, a primary level study will throw light on the specific causes of this negative effect and will be useful for better policy formulation.

Clearly, there are negative effects of foreign direct investment into agriculture on food security however measured. The evidences provided by WIR (2009), Gerlach and Liu (2010), Hallam (2011) and Mihalache-O'Keef & Li (2011) fits well into this finding.

5. Conclusions and Recommendation

The study set out to assess the effect of agricultural FDI on food security in Ghana. Daily energy consumption (hunger) was negatively related to FDI and significant both in the short run and long run. Likewise, in both the short run and long run, daily protein consumption (nutrition) was negatively related to FDI and statistically significant. This outcome establishes a detrimental effect of agricultural FDI inflow on food security in Ghana. Democratic dispensation sake has detrimental effects on food security. Increased government spending specifically directed to programmes targeted at food security would rather promote food security in Ghana. Though further improvement in FDI inflow to agriculture should not be ignored for the sake of its positive benefits, possible detrimental activities such as rent seeking behaviour of elites, reduced investment in public goods, violation of labour laws by investors and environmental degradation from chemicals as well as ceding of large tracts of land under the control of investors for long periods without use among others must be watched closely. Specific interventions are required to ensure that smallholders are not side-lined in production. Government must support appropriate lower priced technologies that smallholders can adopt. Acquisitions of large parcels of land FDI projects require regulation.

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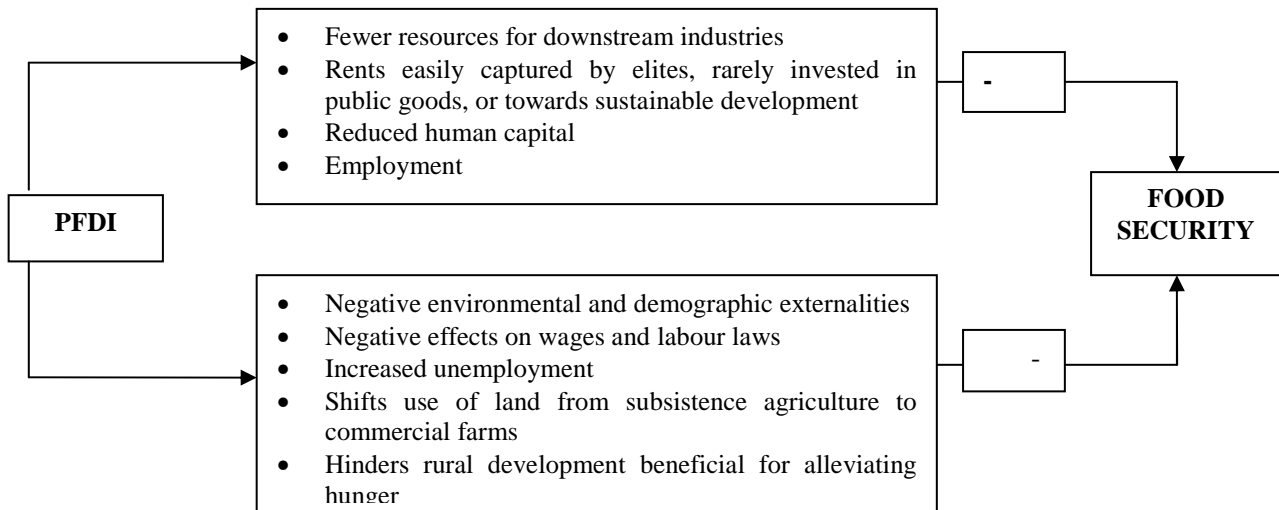
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Appendices

Fig. 1. Channels of Sectoral FDI Impact on Food Security (Negative effects)
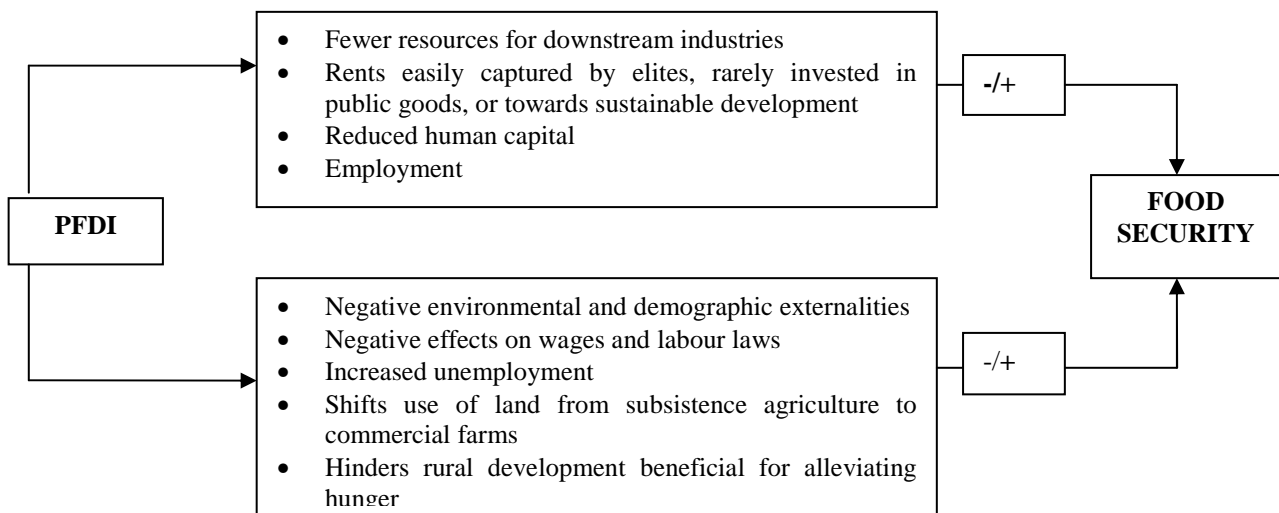
Adapted from: Mihalache-O'Keef, A., and Li, Q. (2011).

Fig. 2. Channels of Sectoral FDI Impact on Food Security (Negative and Positive effects)

Table 1. Summary Statistics

	DEC	DPC
Min	2479.00	50.30
Max	2907.00	59.80
Mean	2648.69	55.01
S. D.	140.65	2.69

Table 2. Unit Roots tests with Augmented-Dickey-Fuller and Phillips-Perron Tests

Variables	ADF		PP	
	Statistic	Lag length	Statistic	Bandwidth
AGDP	-8.084156***I(2)	0^A	-8.021106***I(2)	4^A
AGGR	-2.713464*** I(0)	0^F	-3.872259***I(1)	3^A
DEC	-9.235667***I(2)	0^F	-3.480345**I(1)	4^A
P2	-9.160921*** I(2)	0^A	-3.880268***(I(1)	3^U
DPC	-4.247054***I(1)	0^A	-4.324650*** I(1)	3^U
FDI	-3.228938**(1)	0^A	-3.648219*** I(1)	4^A
FEX	-3.873083**(1)	2^F	-3.604155*** I(1)	4^A
GC	-2.999868**I(1)	0^A	-3.831135***I(1)	3^U

^{A}-automatic lag selection; $^{U, F}$-Lag fixed by user when Eviews returned 'insufficient number of observations'

Table 3.   ARDL Test for cointegration with DEC

	F-statistic 95% Lower Bound 95% Upper Bound 90% Lower Bound 90% Upper Bound		
DEC	4.7026	2.9058	4.2337
	2.4433 3.6400		
DPC	7.2317	2.9058	4.2337
	2.4433 3.6400		

Table 4. Long Run and Short Model Estimations   for Daily Energy Consumption

	Dependent Variables	
Variables	LDEC	dLDEC
AGGR	-0.023729	-0.0065559***
P2	-4.8172	0.20770
FDI	-0.018990**	-0.0013465*
FEX	0.12366	0.061748***
GC	0.042910	-0.0018501
C (ECM)	3.3547	0.043117**
R Squared	Microfit 5 did not supply measures.	0.75421
R squared adjusted		0.69442
F Statistic		18.9222***

Table 5. Long Run and Short Model Estimations   for Daily Protein Consumption

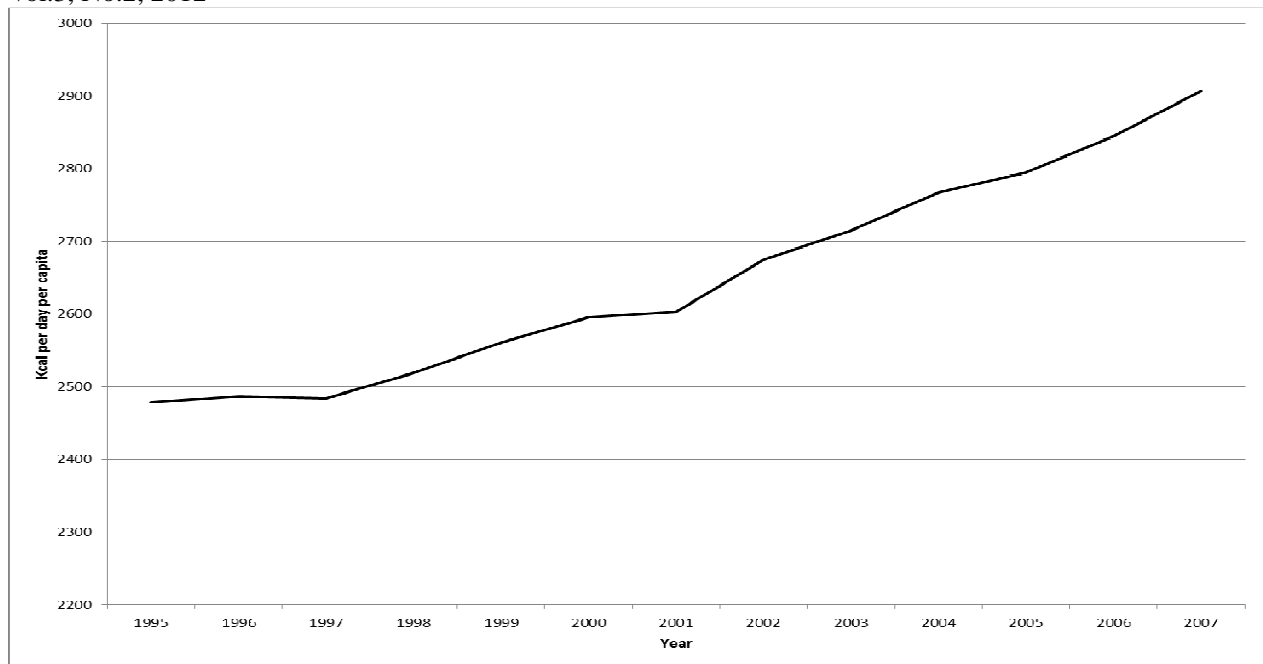|	Dependent Variables	
Variables	LDPC	dLDPC
AGGR	-0.18470**	-0.026772***
P2	-1388.4*	-117.9916***
FDI	-0.053630**	-0.0036509***
FEX	0.18622**	0.081761***
GC	5.7408*	0.39080***
C (ECM(-1))	390.1664*	-0.068075**
R Squared	Microfit 5 did not supply measures.	0.84471
R squared adjusted		0.80694
F Statistic		33.5450***

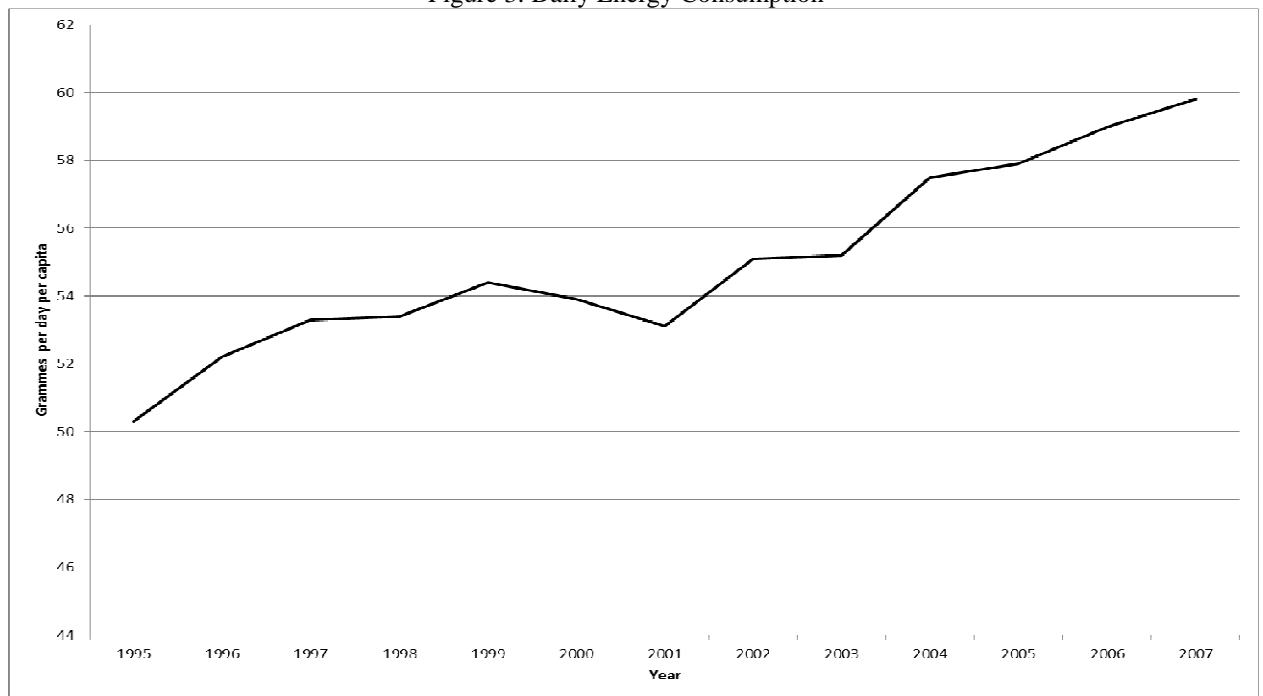Figure 3. Daily Energy Consumption

Figure 4. Daily protein consumption per capita

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