A General Equilibrium Analysis of the impact of inward FDI on Ghana: The Role of Complementary Policies

Lawrence Arbenser

HUMBOLDT UNIVERSITY OF BERLIN

DEPT. OF AGRICULTURAL ECONOMICS AND SOCIAL SCIENCES

INTERNATIONAL AGRICULTURAL TRADE AND DEVELOPMENT

ABSTRACT:

The need for external capital (FDI) inflow to finance the current account deficit of developing countries cannot be over-emphasized. Foreign direct investment takes predominance over other types of capital inflow into developing countries. How would an increase in FDI and a reduction in import tariff levels in isolation affect household welfare and other macroeconomic indicators? How would the concurrent application of the two enhance the expected impact? This paper explores the above questions by using a Computable General Equilibrium (CGE) model for Ghana, implemented in the General Algebraic Modeling System (GAMS) to carry out specific counterfactual simulations. This paper concludes that the primary benefit of an increase in FDI inflow for a developing economy is the increase in current consumption. It also establishes that policies which ensure increase in FDI inflow and reduce tariff levels are complementary policies that enhance household welfare. It also emphasizes that the two policies will have different impact on macroeconomic indicators, inter alia exchange rate, export, import and trade deficit.

1.   Introduction

The need for external capital inflow to finance the current account deficit of developing countries cannot be over-emphasized. Acute poverty level and poor institutions may be cited as some of the reasons accounting for the very low national savings in developing countries. Divergence in marginal productivity of capital between the developed and developing countries also account for capital inflow into developing countries. That is in capital-rich countries, most productive investment opportunities have been exploited already with saving levels still being relatively high. To earn higher rate of return on their savings, savers in developed countries lend to finance investment in developing countries. Total capital flow into developing countries has slowed down while the share of it that takes the form of Foreign Direct Investment (FDI) has increased tremendously over the years (Hausmann *et al.*, 2000). Ghana, for example has witnessed enormous upsurge of FDI inflow. The share of Ghana's capital stock owned by foreigners increased more than fivefold from \$229 million in 1980 to \$1347 million in 2001.

This surge in FDI together with the spate of financial crisis that hit the emerging economies in the 1990s has been the underlying factor behind the rise in empirical work on the impact of FDI on host's country economy. The popular discussion has been in two directions; the first is whether to adjust for the assumed spillovers that are associated with FDI inflow when analyzing FDI. The conventional wisdom has been that FDI brings with it technology, managerial skills and market access and thus accelerates growth and development (Blomstrom and Kokko, 1997; Borensztein, De Gregorio, and Lee, 1998).

The validity of the conventional wisdom has been questioned by some economists. Hausmann *et al.* (2000) argue that the benefits that are attributed to FDI are generated by a firm using FDI as one of its sources of finance. Germidis (1977) in a study of 65 subsidiaries in 12 developing countries found no evidence for technology transfer. They attributed the lack of spillovers to domestic firms, to limited labor mobility between domestic and foreign firms, limited R&D, and few incentives for technology transfer. In another study (World Bank, 2002), Brian Aitken and Ann Harrison highlight mixed role of foreign investment in technology transfer. There is the need, therefore, to examine the impact of FDI on the host country without simultaneously adjusting for the above-mentioned spillovers.

The second popular discussion theme has been the role of macroeconomic and trade policies in enhancing the impact of FDI on the host country. With the increasing integration of international capital markets in recent years, trade policy changes can be expected to affect

direct foreign investment. This implies that an evaluation of the effects of international capital mobility needs to consider the effect of trade and macroeconomic policies. Policy makers in developing countries may have genuine reasons though misguided, for implementing various trade and macroeconomic policies - a deliberate redistribution of income and wealth from agricultural to the industrial sector. Capital inflow in the presence of these misguided policies may have "immiserising" impact on the economy.

This paper focuses its analysis on the impact of upsurge in FDI inflow and commercial trade policy simulations on the welfare of households and selected macroeconomic indicators in Ghana

Prior to 1980, economic theory has not been delving extensively and systematically into the strictly related phenomena of Foreign Direct Investment (FDI) and Multinational Enterprise (MNE). However, according to Caves (1996), the stock of literature appearing since 1982 on FDI and MNE has been enormous. Two distinct circumstances have been favoring this recent interest: a big surge in the FDI and a new space for MNE in the mainstream of economic theory. FDI - the main way through which MNEs act - has been growing at an impressive rate (more than that of world trade), and this growth has had puzzling effect on both developing and industrialized countries. Available data (UNCTAD, 1997) has shown that several African economies have demonstrated increasing capacity to attract FDI over the years. The increase in FDI flows going to Morocco, Tunisia, Ghana, Tanzania, Mozambique and Zimbabwe between the mid-1980s and the mid-1990s was greater than the global average (Afriyie, 1998). Ghana, for example, has become a popular destination for FDI in West Africa, besides Nigeria.[1] Ghana has been and remains a "guinea-pig" to most international organizations notably the World Bank and IMF in the implementation of various economic policy programs.

After years of economic decline that began in the 1970s, Ghana embarked on an economic recovery program (ERP) in 1983 that led to the full adoption of the World Bank/ IMF prototype Structural Adjustment Program (SAP). Reduction in government deficit spending, a floating exchange rate, reduction in and eventual elimination of import tariffs and other trade barriers, and elimination of barriers to FDI inflow were three of six main key objectives of the ERP-SAP.

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[1] Nigeria is home to about half the population of West Africa and has led the region in inward FDI

This paper therefore attempts to produce quantitative results with much emphasis on the orders of magnitude and comparative findings and less significance on the numerical results, which should be perceived for its illustrative nature. Though there are numerous papers on FDI, it suffices to say that, there are relatively few that use computable general equilibrium to investigate the role of FDI inflow on household welfare and the economic development of a developing country. The method of analysis is a counterfactual simulation[2], implemented in GAMS[3]. Against the disadvantage of not yielding confidence interval estimates, is the advantage that counterfactual simulation analysis based on a clearly defined structural model simplifies the task of identifying the role of assumptions in determining the outcome of simulations.

The fact that FDI inflow and the policies mentioned above have economic-wide implications, this paper assesses their impact using a computable general equilibrium (CGE) model for the Ghanaian economy. Partial equilibrium estimates may yield accurate estimates in particular sectors, but estimates of aggregate benefit of FDI inflow requires a general equilibrium model to account for the economy-wide budget and resource constraints. CGE models are not just multi-sectoral models that capture interdependence between sectors, but also capture the interdependence between other agents in the economic system such as households and other domestic institutions, as well as the external sector. Consequently, this paper uses counterfactual simulations, based on a CGE model of the Ghanaian economy - (ghanacge), which is a blue print of the "Standmod" developed under IFPRI's ongoing project on macroeconomic reforms and regional integration in Southern Africa (MERRISA).

The paper is structured as follows: Section 2 presents recent inward FDI trend with emphasis on Ghana while section 3 gives a brief literature review on FDI. The fourth section gives an overview of the ghanacge model whose underlying accounting framework and benchmark data is derived from the consolidated SAM of Ghana for 1993. Section 5 demonstrates the introduction of capital mobility into the model. A range of simulation experiments conducted to examine the possible effects on household income, its distribution and some macroeconomic indicators of Ghana is presented in Section 6. This is followed by section 7

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[2] This means that the validity of the underlying assumptions is not tested for, however, the sensitivity of the results to changes in behavioral rules indirectly tests for most major behavioral assumptions.

[3] General Algebraic Modeling System (GAMS) is a high-level modeling system for mathematical programming problems. It consists of a language compiler and a stable of integrated high-performance solvers.

which presents and discusses simulation results. It ends with a concluding remarks in section 8.

Firstly, with this work we hope to complement recent strands of analysis of FDI's impact on recipient countries and provide insights gained from CGE approach to modeling FDI and macroeconomic policies. Secondly, our work tends to complement the literature on the inflow of capital to developing countries in general and Ghana in particular. Moreover, the model can be used by decision makers as laboratory in Ghana in analyzing policies. FDI is important in light of the conscious efforts by developing and emerging countries alike to adapt policies that discourage short-term capital and promote longer-term equity holding.

2.   Recent Inward FDI trend

Figure 1: INWARD FDI STOCKS (MILLIONS OF DOLLARS)
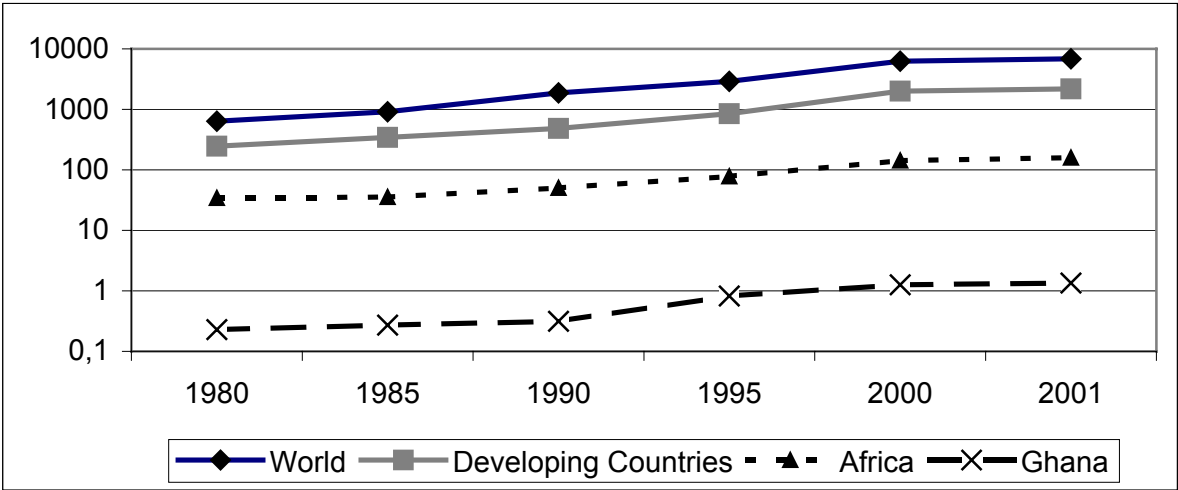
Source: (UNCTAD, 2000)

The world's inward FDI stocks has skyrocketed over the past two decades from $ 635,534 million in 1980 to $6845.723 million in 2001 (see figure 1). Though the world's stock of FDI is very unevenly distributed, all regions showed increasing inward FDI stock (see figure 1). This trend was probably sparked off by the ever increasing rapid tendency towards globalization in the world economy. It must, however, be said that FDI inflow has not been steady but has exhibited a cyclical pattern which could be attributed to the cyclical downturns in the international economy. Recent downward trend of FDI inflow could also be attributed to the September 11 terrorist bombing of the World Trade Center, given the fact that U.S.A. together with France, Germany, Japan and U.K. have been responsible for nearly 60% of all FDI outflow that came from the developed countries.

Figure 2: INWARD FDI FLOWS TO GHANA (MILLIONS OF DOLLARS)
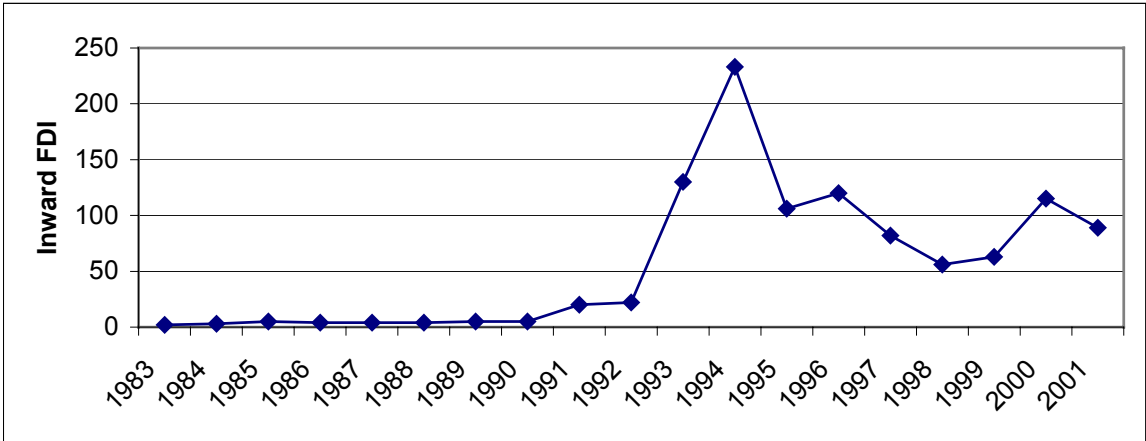
Source: (UNCTAD, 2000)

Looking specifically at Ghana, historical records (UNCTAD, 2000) show that inward FDI stock trend is very similar to other regions (see figure 1). On the other hand, FDI inflow has witnessed some interesting trend over the past 2 decades which is worth noting (see figure 2). Prior to the introduction of the economic reform Program (ERP) in 1983, Ghana witnessed decreasing FDI inflow which even slipped to negative numbers in the late 1970s, while it was around $5 million in mid-1980. Through the ERP, the government of Ghana implemented policies which in the short term reverted the economic decline and also affected the flow of inward FDI into Ghana. Gross Domestic Product (GDP) grew at an average annual rate of 5.4 percent between 1984 and 1990 and Gross Fixed Capital Formation (GFCF) doubled as a percentage of GDP. FDI remained sluggish in the years immediately following the start of the reforms, accounting for less than 1 percent of GDP. It picked up, however, during the period 1991-1995 with Ghana been considered as front runner, ranking among the top 10 investment locations in Africa.

This was sparked off by the adoption of policies in 1986 to attract investment in natural resources. This period saw the enactment of the new mining law which received positive response from investors. One key direction of the ERP was the privatization of state-owned enterprises(SOEs), which was implemented in 1988. This began with the privatization of 55 SOEs and the liquidation of another 31 firms. As illustrated in Fig.2, 1994 witnessed the highest peak of FDI inflow of $233 million, mainly precipitated by the partial sale of AGC to the South African mining company, Lonmin. According to UNCTAD (2003)[4], this deal is one

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4   See the investment Policy Review of Ghana by the United Nations, 2003

of Africa's largest privatization to date[5] which consequently put Ghana in the spotlight for international investment.

Within the frame work of a comprehensive development strategy- the vision 2020, the government in 1994 enacted a new investment code to further attract investment into Ghana. With the investment code, investors were provided incentives and guarantees, they would not need prior project approval and the process of establishing a company was simplified. FDI inflow however declined in 1996 but recovered slightly in 1998, declining further between 1997 and 1999.

The decline in FDI between 1997 and 1999, reflected the poor economic condition that prevailed within this period. There was a slash in prices of major exports such as cocoa and gold while the price of oil- a major import, went up. This resulted in acute trade imbalances with the currency depreciating rapidly. In addition, high interest rates and expansionary fiscal policy pushed the budget deficit to unbelievable level. Severe droughts within this period made the supply of electricity[6] very unstable, thus contributed to the decline in FDI inflow. The decline was, however, reversed in 1999, increased steadily from 63m in 1999 to recent record heights of 115m in 2000. This was, however, short lived, FDI inflow, started moving down again purely reflecting the worldwide decreasing trend. So external forces as against internal forces were responsible for this change in FDI inflow. Typical examples were the weak economic situations within the European Union and that of the U.S.A

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[5]   As at the time of writing this paper, the government of Ghana has accepted the Ashanti Board recommendation of the 1.4 billion dollar merger offer from Anglogold. Ashanti's major shareholder Lonmin, which owns a 27.6 per cent stake in the company had earlier given ist blessings to AngloGold's bid. The new company Anglogold Ashanti is expected to be the number one gold mining company in the world with a production of 7.6 million ounces annually. (Reuters, 18 August, 2003)

[6]Ghana's main source of power is from the Akosombo hydroelectric Dam

2.1   Sectoral Distribution of FDI

Figure 3: Sector Distribution of FDI
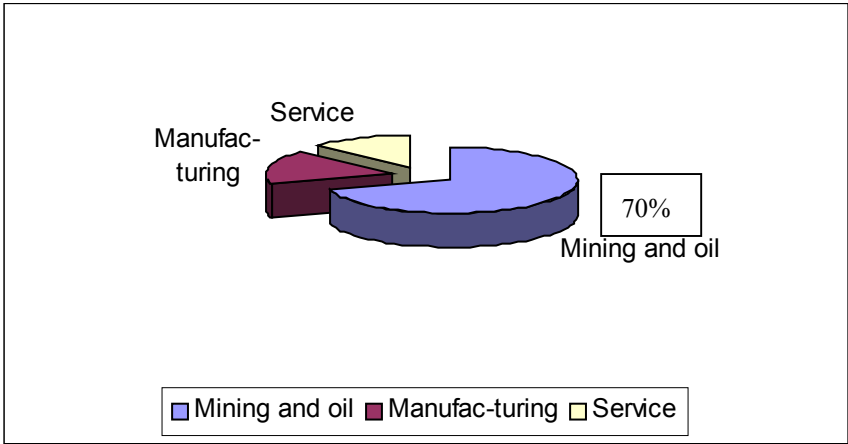
Source: (UNCTAD, 2000)

As illustrated in figure 3 above, 70 percent of FDI is in the natural resources, this is no surprise given the fact that Ghana is blessed with natural assets hence has a form of comparative advantage in the natural resources. Ghana therefore attracts more resource seeking investors, seeking to benefit from Ghana's wealth of Gold, aluminum, bauxite, timber, diamond, manganese, and oil and natural gas exploration.

The next sector destination of FDI in Ghana is manufacturing, specifically, FDI is in food, aluminum and plastic products. Leading examples of FDI include the following: the Pioneer Food Cannery in Tema (partially owned by United States-based Heinz and the cocoa processor), West Africa Mills in Takoradi (bought by a German company), Ireland's Guiness Ghana Ltd., Germany's Ghana Agro Food Company, Coca-Cola Bottling Company, Accra Brewery Ltd., Cadburys (United Kingdom) and Nestlé Ghana Ltd.

Though the service sector accounts for the largest share of FDI in registered projects, it attracts lesser volumes of FDI by comparison with the above mentioned sectors. As at December 2002, the Ghana Investment Center (GIPC) had registered 1393 projects[7], – excluding energy and mining. 966 of which were joint ventures with Ghanaian interest while 427 were wholly-foreign-owned projects. It attracts lesser volumes of FDI by comparison with the above mentioned sectors. Foreign companies have been playing a major role in construction and tourism. A good example is Taysac-United Kingdom construction

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[7]   These include 410 projects in the services sector, 387 in manufacturing, 165 in tourism, 111 in building and construction, 116 in agriculture and 204 in trade

company, which has operated in Ghana since 1947, has been involved in constructing hotels, roads, and major infrastructure projects .With Telekom Malaysia taking over the management of Ghana telecom, FDI in telecommunications accounted for the largest share of FDI in services. Banking also attracted foreign investors, pushing up significantly the number of foreign banks in Ghana to 17 in addition to a number of leasing companies, two savings and loan companies, a venture capital company, a finance house and a mortgage company

2.2   Sources of FDI

Figure 4: Distribution of FDI in registered projects in Ghana by region, 1994-2002
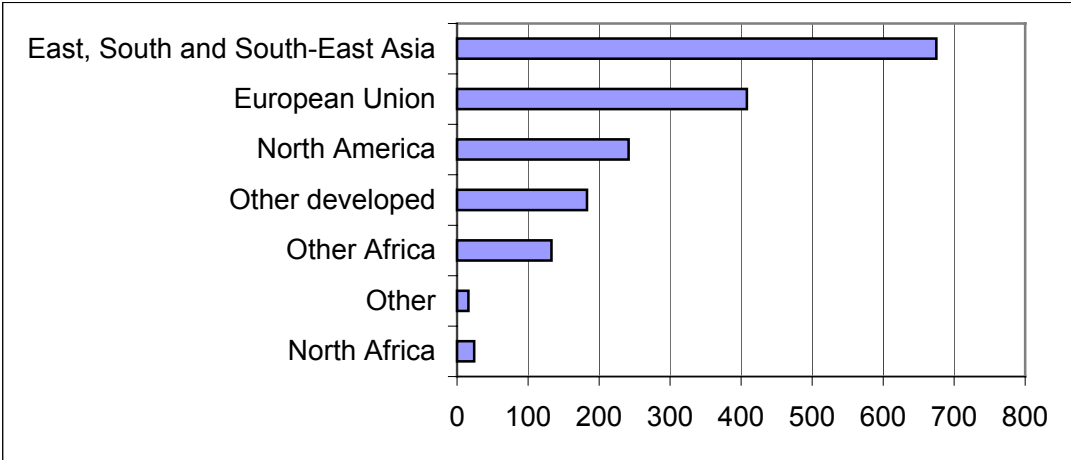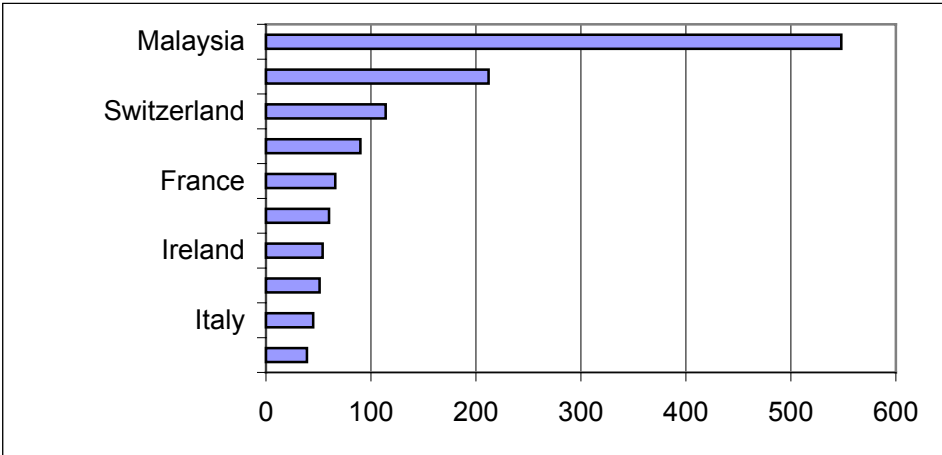

Source: GIPC, Ghana.

The economic recovery program and the peaceful political climate prevailing in Ghana, make Ghana a competitive environment for potential investors. Europe, especially United Kingdom (colonial masters) and USA were the traditional sources of FDI flow to Ghana. This has however, changed over the years, as shown in figure 4 , Asian investors account for the largest investment in registered projects because countries like China, India and Malaysia took advantage of the recent bout of privatization and either bought shares in Ghanaian companies or undertook green field investment in Ghana. Malaysian companies for example invested substantially in the telecommunications and telephone sector[8]. The New government of Ghana (NPP government) has, however, appointed Telenor of Norway to replace the Telekom Malaysia as the manager of Ghana Telekom.

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[8]   The television station TV3, and the film group, GAMA, are both Malaysian controlled.

Figure 5: Distribution of FDI in registered projects by country of origin: the top 10 investors in Ghana, 1994-2002*

Source: GIPC, Ghana

On the other hand , United Kingdom, in terms of projects was the single biggest investor and accounted for 10% of the total(figure 5). Its position relative to that of Malaysia, United States and Switzerland is only fourth. Investors from India , Lebanon and Syria have been playing a major role in Ghana of late, they serve the domestic and tourist markets through general trading, import-export and the hospitality sector.

3.   Literature Review

The literature on FDI and for that matter on multinational enterprises began with Dunning in the late seventies when he came up with the famous "OLI paradigm"(FN: see Dunning1981, 1986, 1988). Simply put, for a firm to be considered as multinational enterprise, it must fulfill the following three conditions: Firstly, it must have ownership advantage which will make it profitable for the firm to relocate abroad its own production. Secondly, there must be location (L) advantage and thirdly, it must have the opportunity to conveniently manage the advantages of the firm internally. The "OLI paradigm" was a very useful tool for economists (especially for development economist) in putting together different features of firms' opportunities to become multinational and also assessing the phenomenon. The investment development path (IDP) was also later developed by Dunning. The underlying principle of the IDP is that, the economic development of a country in terms of its net outward investment[9] (NOI) position is in five stages. The propensity for each country to be inward or outward investor, in turn, depends on the relative competitive strengths of the domestic firms vis-a-vis

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[9]   NOI is defined as the gross outward investment stock minus the gross inward investment stock.

MNEs in ownership- and location-specific advantages and their abilities to internalize cross-border market transactions [Dunning (1992), p 240]. However, [Graham (1996), p. 186-191] as well as many development economists raised some critique to the "OLI paradigm", stressing that it is consistent with more than one behavioral model hence the need for a solid theoretical assessment.

The literature on FDI later shifted from discussing the ability of firms to become MNEs to discussing the benefits of FDI to the recipient countries. Some of the earlier contributors to the literature on FDI have been; Markusen and Melvin (1979), Bhagwati (1973), Batra (1986) and Lotze (1996).

Markusen et al (1979) and Bhagwati (1973) stressed that capital flow into tariff protected capital intensive sector has a negative welfare impact unless foreign profits are taxed. Batra (1986) on the other hand, showed that multinational corporations can cause a decline in total employment and real income of underdeveloped host countries when technology transfer is not accompanied by substantial capital investment. On his part, Lotze (1998) concluded that a transfer of technology without equivalent capital flows leads to an overall welfare improvement, but resources are driven out of the primary, non-recipient sectors into the advanced sectors of the economy.

The financial crisis that hit most emerging economies in the 1990s precipitated another major shift in the literature on FDI. The discourse on FDI emphasized more the correlation between the composition of international capital flows and crises. The conventional wisdom has been that crises are largely due to swings in short term capital. Hence, economies that finance their current account deficits mainly via foreign direct investment (FDI) are less susceptible to crises. This motivated economist like Granham et. al. (2001), Hausmann et. al. (2000) and Sharg- Jin (2000) to investigate the correlation between FDI inflow and crises.

Hausmann et al. (2000) reviews the conventional wisdom that the share of FDI in total liabilities tend to be higher in countries that are safer, more promising and with better institutions and policies. They establish the contrary, that FDI in total flows tend to be larger in countries that are riskier, more distant, resource rich, financially underdeveloped, institutionally weak and suffering from original sin[10]. They however caution that this does not

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[10] A currency is said to suffer from original sin when it can not be used to borrow abroad, or even domestically to borrow for a long term. Firms will therefore be faced with the problem referred to as the Devil's Choice by Pedro Pou, that is borrow in dollars and face a currency mismatch or borrow short term and face a maturity mismatch.

mean that the rise in FDI is bad in itself, because the movements in the size and composition of the capital account may reflect behavior that is optional given the constraints faced by agents.

Graham et. al.(2001) making similar argument as Hausmann et. al.(2000), examine the conventional wisdom that a country can reduce its vulnerability to crisis by increasing the share of FDI in capital inflows. They conclude that increasing the share of FDI may itself be associated with and causally connected to increased instability of FDI and may be of spurious importance. The danger here is that increasing FDI may generate negative externalities in the form of distortionary cost rather than benefit of enhancing financial stability.

Shang-Jim Wie (2000) similarly, using data on bilateral foreign direct investment (FDI) and bilateral bank loans, conclude that corrupt countries tend to have a particular composition of capital inflows that is relatively light in foreign direct investment. Earlier studies including that of Graham et. al. and Hausmann et. al., show that a country with such a capital inflow structure is more likely to run into a subsequent currency crises.

This paper tries to contribute to the literature on FDI by not only looking at the impact of FDI on the recipient countries but, concurrently synthesizing the role a traditional macro policy like import tariff reduction plays in enhancing or otherwise, the observed FDI impact.

4. Model Structure and Data Base

Under this section, an overview of the model is presented. It is a multi sector general equilibrium model, calibrated to the 1993 Social Accounting Matrix of Ghana. It is distinguished by explicit separation of activities, factors, and households into rural and urban. It has detailed treatment of agricultural and other rural production, the labor market, and households. The analysis is implemented in GAMS - Generalized Algebraic Modeling Systems.

Overview of the model

The ghanacge model is a real-side model of a small open economy, and a blue print of the standard CGE model of Lofgren *et al*. (2002)[11]. It explains all payments recorded in the SAM hence follows closely the SAM disaggregation of factors, activities, commodities, and institutions.

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[11] For further information on the model, refer to the paper
   A standard computable general equilibrium (CGE) model in GAMS Microcomputers in Policy Research
   5: A standard computable general equilibrium (CGE) model in GAMS
   http://www.ifpri.org/pubs/microcom/micro5.htm

It also follows closely the standard neoclassical specification of general equilibrium models (Dervis *et al.*, 1982; Robinson, 1989). It is written as a set of simultaneous equations, many of which are nonlinear. It has no objective function and the equations define the behavior of the different actors. Consequently, this behavior follows simple rules captured by fixed coefficients. For consumption and production decisions, behavior is captured by nonlinear, first-order optimality conditions - consumption and production decisions are driven by the maximization of utility and profit respectively. Final domestic demand for output of a sector is treated as private consumption demand. The domestic demand for the output of a sector is the sum of the domestic intermediate demand plus domestic consumption demand. It is assumed that all consumers have identical preferences so that behavior is modeled by a 'representative' consumer. The equations also include a set of constraints that has to be satisfied by the system as a whole but is not necessarily considered by any individual actor. The constraints include markets (for factor and commodities) and macroeconomic aggregates (balances for Savings-Investment, the government, and current account of the rest of the world). Figure 1 shows the basic structure of the general equilibrium model.

Figure 6 : The basic structure of the CGE model
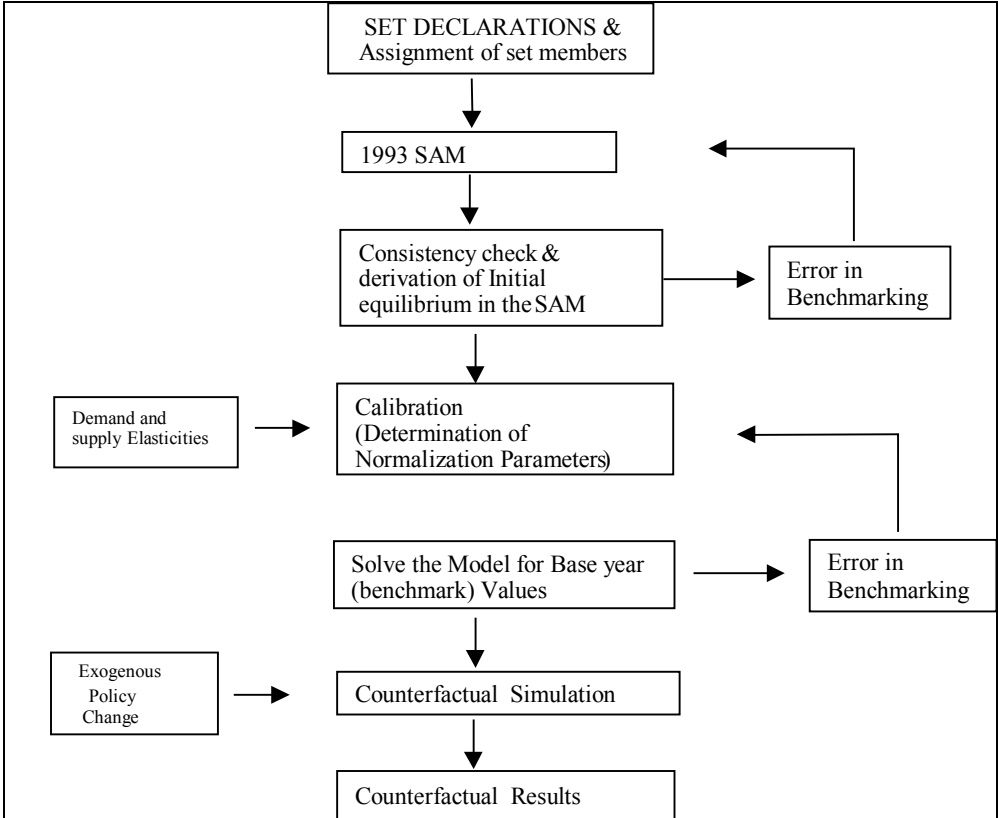
Source: Adapted and extended from de Melo et al (1992)

Producers maximize profits subject to a constant-return-to-scale (CRTS) technology (Arrow and Debreu (1954). Given technology, output and input prices, the representative firm in each industry purchases primary factors, domestic and foreign intermediate inputs, so as to minimize the cost of producing any level of output. The single representative consumer purchases domestic and foreign goods and maximizes utility, given income and prices. The consumer's income is determined endogenously. Consumer demand functions are continuous, non-negative, and homogenous of degree zero (Dinwiddy *et al.*, 1988). The latter property means that the model is Walrasian because it determines only relative prices and other endogenous variables in the real sphere of the economy. Sectoral product prices, factor prices, and the foreign exchange rate are defined relative to an aggregate producer price index, which serves as numeraire. The real exchange rate - the relative price of traded goods to the domestic good - is determined by the model.

5.   Introduction of International Capital Mobility into the model

The set of equations describing the basic ghanacge model is a blue print of the set of equations that is used to describe the IFPRI standard model. This work is however different in that it allows the economy-wide capital stock to be flexible and introduces foreign direct investment inflow into the model. We therefore find it prudent to expound on the salient equations that introduce the exogenous capital inflow into the model. For details on the set of equations, default macroeconomic balances and assumptions refer to the Standard Computable General Equilibrium (CGE) Model in GAMS by Lofgren et. al.(2002).

Allowing for international capital mobility implies the introduction of an exogenous variable FK (the amount of foreign-owned capital stock) into the balance of payment equation and allow the economy-wide capital stock to be flexible. YF the share of factor income that is transferred to the rest of the world (they are denoted in foreign currency). The exogenous capital inflow manifests itself in two ways:

It redefines the balance of payments constraint, i.e. the value of import no longer has to be exactly equal to the value of exports but exceed it by an amount which is equivalent to the net capital inflow ($\bar{B}$).This is exhibited in equation 2 below.

Secondly , as shown in equation 3, the net capital inflow constitutes an addition to the income generated within the economy and is therefore incorporated in this analysis in the disposable income equations.

This is consistent with the argument made by de Melo and Tarr (1992) and that of Dinwiddy and Teal (1988).

$$\sum_{c \in CM} \left(pwm_c * QM_c + pwi_c * QI_c \right) + \sum_{f \in F} \left(\frac{\psi * YF_f}{EXR} \right) = \sum_{c \in CE} \left(pwe_c * QE_c \right) + \frac{RFK}{EXR} \qquad (1)$$

$$TY = W * \overline{L} + R * DK + GR + \overline{B} * EXR \qquad (2)$$

Table 1: Definition of variables

VARIABLE	DEFINITION
Pwm	border price for imports
Pwi	border price for intermediate imports
Pwe	border price for exports
R	rental on capital
W	wage rate
EXR	exchange rate
FK	the amount of foreign-owned capital stock
DK	the amount of domestic owned capital stock
TK	total capital stock
QM	quantity of imports
QI	quantity of intermediate import
QE	quantity of export
TY	Total Income
GR	government revenue
YF	factor income
$\overline{B}$	net foreign capital inflow
ψ	share of factor income that accrue to foreign investors

6.   Policy experiment

Based on the CGE model presented in the preceding sections, the impact of the increase in the inflow of FDI is investigated with emphasis on the disaggregated household welfare, domestic non-governmental income and trade. The role of complementary policies - trade liberalization and currency devaluation are also investigated. More specifically;

Simulation I (Increase in FDI inflow-FDIINCR)

Introduction of 50% increase in FDI inflows with endogenous foreign exchange rate and fix current account balance.

Simulation II (Tariff cut-TARCUT1)

50% cut in tariffs with flexible government savings and mobile factors

Simulation III (Combination of simulation I and II - COMBO1)

In addition to simulation I, 50% cut in import tariff with flexible government savings and mobile factor is introduced.

7.   Results and Discussions

7.1   Welfare Benefit

We use the Hicksian equivalent variation (EV) as a measure of the change in the welfare induced by policy change. That is we measure utility with reference to initial prices (P^0). The functional forms for consumer behavior used in the model are sufficient to allow two-stage budgeting. Hence we base our welfare measure on the expenditure function associated with top-level utility function, that is a Stone-Geary function[12]. Our goal here therefore is to measure how much better or worse off the representative consumer is in the initial equilibrium, facing prices P^0 and income Y^0, than in the equilibrium after the policy shift, facing prices P^1 and income Y^1 A positive EV indicates that the consumer is better off as a result of the policy shift.

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[12] The top level Stone-Geary utility function is represented by $U \prod_{i=1}^{n} (C_i - \lambda_i)^{\beta_i}$ where C_i, λ_i, β_i are composite consumption and parameters of linear expenditure system for sector i respectively.

**Figure 7: Effect of simulation I to III on aggregate household welfare**
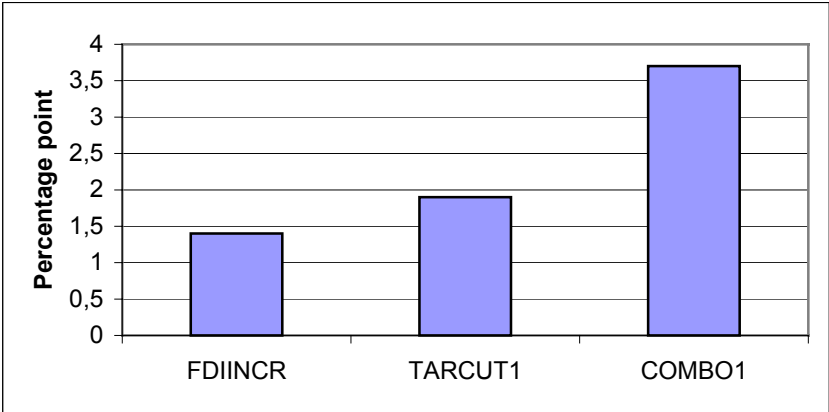
Fig. 7 presents the results of the aggregate household welfare changes in response to simulation I to III. All the three simulations generally show positive impact on consumer's welfare but the degree of impact varies. The key initial effect of the upsurge of inward FDI(simulation I) is that it stimulates income growth there by making it possible for aggregate household to consume more, hence becoming better off as compared to the pre increase in FDI situation. This is indicated in fig 7 by a 1.4 percentage point change in aggregate household welfare .

Cutting tariffs by 50% (simulation II) generally reduces consumer price hence the significant positive aggregate household welfare effect of simulation II (1.9 percentage point change). Concurrently implementing simulation I and II significantly almost doubles household welfare (3.7 percentage point change). Consumers rightly, will favor such policy, but how does the economy as a whole benefit? We will analyze this later under section 7.2.

Figure 8 : Welfare effect of simulation I to III on different household groups
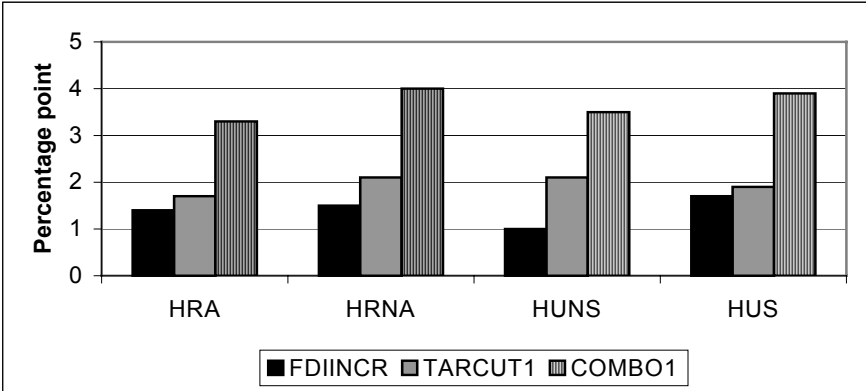
The four household groups presented in fig. 8 are ,namely, Household Urban Skilled (HUS), Household Urban non-skilled (HUNS) , Household Rural Agriculture (HRA), Household Rural Non Agriculture (HRNA).Under simulation I, the highest proportional welfare gain accrue to HUS, which is not different from what is observed under the income effect. HRNA also show a significant welfare gain (but to a lesser extent) of 1.5 percentage point increase. HUNS registers the lowest positive change of 1 percentage point. With the exception of HUNS, the difference in welfare change among the three others are not that significant with either 1 or 2 percentage point difference.

Jointly implementing tariff cut and increase in FDI flow shows that household-welfare remain positive relative to the increase in FDI (figure 8). Its effect on various households is also consistent with that of FDIINCR. However the magnitude of change is significantly larger than that of FDIINCR, that is almost double the percentage change registered under FDIINCR.

The welfare effects mentioned above are mainly due to the income effects[13] precipitated by the policy changes. Increase in FDI inflow (Simulation I) raises the aggregate household income by more than 1.3%. Generally, simulations I to III show positive income changes for all households varying from 1% to 4.2%.The induced income effect enables the respective households to consume more hence becoming better off ceteris paribus. Secondly it can be conjectured that capital is imported into respective sectors until, at the margin, when the value of the social marginal product equals the rental rate of capital. Thus the social marginal product of capital imported into the economy is more than the private marginal product. Since social marginal product equals the rental rate on capital, household welfare is increased because of the imported capital. The indicated welfare impact is consistent with the assertion made by de Melo et al. (1992), that allowing international capital mobility in the presence of tariff cut results in welfare gain.

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[13]   Refer to Appendix A for further discussion on the income changes.

7.2   Macroeconomic effect

Table 2[14] : Impact of simulation I to III on selected macroeconomic indicators

INDICATOR	FDIINCR	TARCUT1	COMBO1
Data	Percentage change compared to base		
Aggregate Household Income	1.39	2.12	3.90
Real absorption	2.50	0.20	4.60
Real Domestic Investment	5.60	-3.10	7.90
Total real Export	-6.00	2.00	-7.90
Total real import	4.60	1.20	9.70
Real exchange rate	-2.90	1.30	-3.60
Government Revenue	8.24	-7.23	0.47
Government Expenditure	-0.28	1.44	0.97
Nominal Macro. Data	Percentage point change		
Investment	1.60	-1.6	1.70
Private Savings	0.10	0.30	0.30
Foreign Savings	-0.30	0.20	1.80
Trade deficit	2.20	-1.50	2.40
Government Savings	1.90	-1.90	-0.10

Source: Own calculation

Column 1 in table 2 shows that increasing FDI raises the real absorption level- total value of domestic final demand, by 2.5% and pushes real household consumption up by 1.4%. In addition, real domestic investment increases significantly by 5.6%. The real exchange rate, on the other hand decreases by 2.9%, indicating appreciation of the Ghanaian currency thus making export more expensive but gives value and confidence to the local currency. Total real export consequently is slashed down by 6% while import increases by 4,6%.

On the other hand, investment as a percentage of nominal GDP deviates positively from the base value by 1,6 percentage points, while private (household + enterprise) savings, import tax revenue, direct tax revenue all show modest deviation of 0.1 percentage point from the base percentage level. Trade deficit and government savings as a percentage of GDP increase by 2,2 and 1,9 percentage points respectively. Foreign savings on the contrary, albeit very small, deviate negatively from the base year percentage. Government Income surges by 8,238% while Government expenditure minimally declines by 0.28%.

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[14]   The first part of the table shows percentage changes from base-year values whilst the second part of the table shows percentage point changes from base which are expressed as % of nominal GDP.

The analysis of the effects observed above is analogous to the analysis of Ghana's central bank balance sheet. That is, FDI inflow is like the sales of domestic assets to foreigners. If the payment is made with domestic currency, the currency goes into vault and out of circulation. Consequently, currency in circulation is reduced accounting for the currency appreciation indicated above. This has a profound impact on exports, i.e. makes exports very expensive resulting in the sharp decrease in export, which worsens the already benign trade deficit.

With decrease in government consumption and increase in government income, it is not surprising that government savings here expressed as percentage of GDP increases indicating net government surplus. This, however, cannot offset the high trade deficit because savings are channeled to domestic investment, hence the recorded sharp increase in domestic investment.

Column 2 in table 2 demonstrates the macroeconomic effects of a 50% cut in tariff . The real exchange rate depreciates pushing exports up by 2 %. This leads to improvement in the trade deficit causing it to decline by 1.5 percentage points. This is consistent with the conventional wisdom that import substitution policies such as tariff reduction cause a long-term improvement in a country's balance of payments. Initially, reducing tariff levels increases domestic demand for import raising domestic import by 1.2%, this then in currency terms shoots up the quantity of domestic currency causing the currency to depreciate by 1.3%. There is a multiplier effect on exports, with the depreciated currency, the demand for exports goes up causing a 2% rise in export levels and subsequently a 1.5% reduction in trade deficit. The increase in private savings is too small to offset the significant decrease in government savings. Total domestic savings therefore decline, which we conjecture leads to the sharp cut in domestic investment. Given the fact that tariff policy is a revenue generating policy undertaken by the Government of Ghana, its cut drastically reduces government revenue.

Under COMBO1 (column 3), real disposable HH income show larger income benefit for the various household groups relative to FDINCR and TARCUT1.Concurrently applying FDIINCR and TARCUT1 induce significant upsurge in household income (3.9 %). This upsurge pushes domestic final demand up by 4.60%. The currency also gain value tremendously, appreciating by 3.6%, demand for exports therefore goes down by 7.9%, consequently, trade deficit worsens going up by 2.40 %. The depreciation of the cedi under TARCUT1 could not offset the FDIINCR effect on exchange rate. This is because higher tariff rates prevented the full realization of the impact of FDIINCER.

Foreign savings under COMBO1 rises significantly by 1.8% despite the -0.30% and 0.20% changes under FDIINCER and TARCUT1 respectively, how do we explain this magnifying increase? This can be attributed to a direct and indirect tariff impact; allowing reduction in tariff implies the removal of distortionary trade policy which then stimulate accumulation of more capital hence the rise in foreign savings. Indirectly, the decreasing impact of FDI inflow on foreign savings generated under FDIINCER is nullified in that tariff cut ensures efficient use of capital which in turns stimulates more capital accumulation. Unlike TARCUT1 where national savings are used to finance the trade deficit, under COMBO1 it is channeled into domestic investment hence trade deficit worsens. This also has a counter effect on the impact of tariff cut on real domestic investment.

8.   Concluding Remarks

The share of Ghana's capital stock owned by foreigners increased from $229 million in 1990 to $1347 million in 2001. What is the effect of this upsurge on household welfare? How does this affect the welfare of aggregate household as well as that of the different household groups? How would a government policy that ensures 50% cut in tariff levels affect the proposed impact? What would be some of the impacts on selected macroeconomic indicators?

To answer the above questions, a counterfactual simulations based on a CGE model of Ghana is carried out. This paper revealed that a policy that ensures increase in FDI inflow and that which reduces tariff levels are complementary policies that enhance household welfare in Ghana[15]. It also established that positive welfare impact is induced by the income effect. That is both policies stimulates income growth, thereby making money available to households, implying, ceteris paribus, that consumption goes up which makes households better off compared to the pre policy period. The model could not however explain the different degree of impact on the different household groups. This is because the disaggregation of the households in the model is not based purely on income categories. A typical Ghanaian household consists of more than one income categories, that is, it is common for urban civil servant to generate additional income else where (e.g. income from rent) than relying only on income from employment. Even if income is only generated from employment, it is worth noting that in a typical Ghanaian household there may be more than one individual who is an active member of the labor force. Such individual may even undertake more than one

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[15]   Refer to Appendix B for similar conclusions generated from a theoretical partial equilibrium analysis of the benefit of the concurrent application of FDI and tariff cut.

economic activity during any year, any week, or indeed at any period in time (FN GLSS3, 2000). We therefore wouldn't like to speculate on the reasons for the observed welfare differences. At the very least the analysis in this paper concludes that the above policies will make households better off.

Any decision on the impact of the 3 simulations on the selected macroeconomic indicators will depend on the policy objective and to a larger extent the prevailing state of the economy. If the objective is to reduce trade deficit then simulation I and II will be out of place. Simulation II will surely reduce the trade deficit but will on the other hand worsen the near valueless cedi. On the contrary, albeit simulation I and II will aggravate the trade deficit problem, it will improve the exchange rate and direct savings into investment. Directing savings into investment is a prerequisite for higher growth in any economy.

This paper advances our information empirically on how FDI and tariff cut in isolation and concurrently applying the two policies affect household welfare as well as selected macroeconomic indicators. It is worth noting, however, that given the limitations of a static CGE analysis, the numerical results are necessarily illustrative and should be given less significance than the orders of magnitude and comparative findings.

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APPENDIX A: Income Effect

Figure 9: Household income effects of simulation I to II
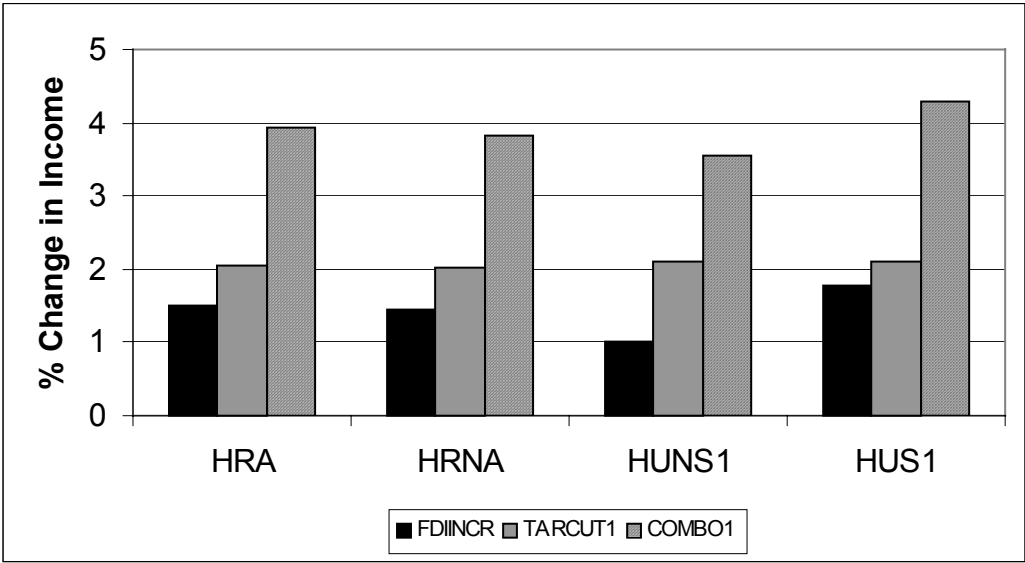
Source: Own calculation

The question whether the increase in FDI in isolation promotes income growth, is examined here by analyzing the impact of simulation I on income of various household groups.

The over all income measure, representing aggregate disposable income in real terms is the sum of gross incomes of the four household groups net of direct taxes deflated by the general consumer price index (CPI). The four household groups are ,namely, Household Urban Skilled (HUS), Household Urban non-skilled (HUNS) , Household Rural Agriculture (HRA), Household Rural Non Agriculture (HRNA). Increase in FDI inflow (Simulation I) raises the aggregate household income by more than 1.3%, this then gives consumers the ability to consume more, ceteris paribus. Comparing the four household groups (see Figure 2), household urban skilled (HUS) registers the highest percentage increase in income (more than 1.5%) followed closely by household rural agriculture (HRA). The difference in percentage change between HRA and household rural non agriculture (HRNA) however, is very minimal (a 1 percentage point). The least income gain accrues to household urban non-skilled. That HUS registers the highest income gain is not surprising, given the fact that FDI- induced investment requires skilled labor to ensure the maximization of its productivity. It must be emphasized here that albeit the conventional belief has been that developing countries are abundant in labor, skilled labor on the other hand is limited. The results above support the hypothesis that FDI inflow improves the income levels of recipient's country household groups but its equity impact is unclear.

It is worth noting here that HRNA is made up of skilled non-urban dwellers (teachers, government staff, etc.) hence it will not be out of place in conjecturing the same reasons for the positive income change as in the case of HUS.

Referring to figure 2, which presents the comparative policy effect of the first three simulations, the experimental results of the income changes under simulation II and III may be interpreted in exactly the same way as in simulation I. The income changes are generally positive across all households for all simulations. Although, simulation I and II all show

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positive income change, the income that accrues to the various households under simulation II is relatively higher by averagely five-tenths of one percent. Consequently, a policy that pushes up inward FDI flow and that which liberalizes trade (tariff cut), are complementary policies that advance the objectives of household income growth. Jointly implementing FDIICER and TARCUT (Simulation III) lead, not to a substantial percentage increase in income across all households.

APPENDIX A: *Partial Equilibrium analysis of the benefit of simultaneous application of fdi and tariff removal*

Figure 10: Benefit of simultaneous application of FDI and tariff cut
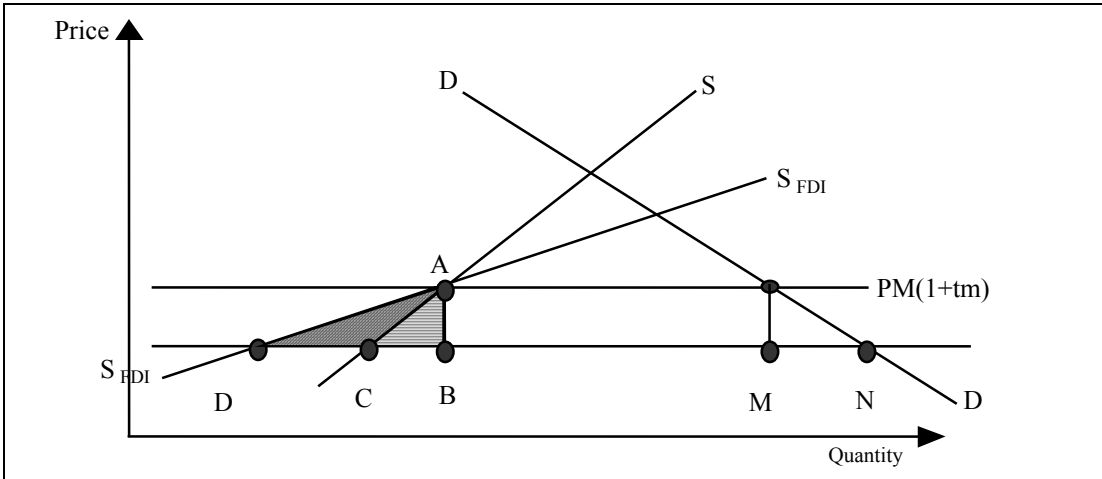
Source: Own extension based on de Melo *et al.* (1992)

Let us now try and give a straightforward partial equilibrium interpretation of the welfare impact registered above. Here we agree with the assertion made by de Melo *et al.* (1992), that the impact of international capital mobility on welfare is another application of the impact of different elasticities on welfare effect of a protection policy. When capital inflow into a country increases the elasticity of supply increases. Secondly, the domestic supply curve with FDI inflow is relatively elastic as compared to the one without. The effect of increase in international capital inflow vis-a-vis tariff reduction is illustrated in Fig. 7.

To begin with, let D be the demand curve, S be the relatively inelastic supply curve and S_{FDI} the relatively elastic supply curve, PM be the border price of imports, and tm be the tariff rate. Initial imports are BM, increasing to either CN or DN after tariff removal depending on FDI inflow. With tariff removal the production deadweight loss ABD is regain in the high FDI case, and ABC is regain in the low FDI case. In addition, the increase in import is more in the case of higher FDI as against that of lower FDI. This implies the benefits of removing tariffs are greater in the higher FDI inflow case. These deductions explain the results presented above. They are also consistent with the conclusion made by Neary(1988), Neary and Raune (1988) and de Melo (1992). In their recent general equilibrium theoretical work, Neary (1988) and Neary and Ruane (1988) establish that international capital mobility increase the costs of imposing a tariff.