

**The Effect of Foreign Direct Investment on Trade Balance:
The Case of Sub Saharan Africa**

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**By
Mengistu Bessir**

Advisor: Dr. J. Manohar Rao

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Addis Ababa University
School of Graduate Studies

The Effect of Foreign Direct Investment on Trade Balance:
The Case of Sub-Saharan Africa

By


Mengistu Bessir Achew

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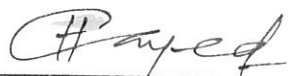
DR. J. MANOHAR RAO
Advisor


Signature

DR. TAVIS BARR
Examiner


Signature

DR. SYED HASAN
Examiner


Signature

17/06



ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES

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of Sub Saharan Africa

By:
Mengistu Bessir
Faculty of Business and Economics

Approval by Board of Examiners:

Advisor

Signature

Examiner

Signature

Examiner

Signature



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Abstract

Economists usually consider that FDI affects import share and export share positively. But the nature of FDI flow varies across regions there by having different impacts on the region under study.

This paper examined the impact of FDI on trade balance and its components (export and import) for Sub Saharan Africa region. This paper empirically proved that FDI affects import share and export share positively and at a statistically significant level. The results from cross sectional and panel data regression reveal that the impact of FDI up on trade share, import share and export share is strong. Almost all the regression results indicate that FDI affects these variables at a 1% significance level. However the magnitude of FDI in import share is consistently higher than that of export share; indicating that the net impact of FDI on trade balance is negative.

Moreover this paper proved that import tax does not affect import share at a statistically significant level in the case of Sub Saharan Africa. This may be due to the fact that most of sub Saharan Africa imports are structural and do not respond sensitively to price increment.

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1. Introduction

1.1 Statement of the problem

Since the late 1980s the inflow of foreign direct investment (FDI) is increasing rapidly in almost every region of the world revitalizing the long and contentious debate about the costs and benefits of FDI inflows. On the one hand many would argue that given appropriate policies and a basic level of development, FDI can play a key role in the process of creating a better economic environment. On the other hand potential drawbacks do exist including a deterioration of balance of payment as profits are repatriated and increment in imports.

Nowadays policy makers of developing countries are giving new attention to the potential that FDI could play in the economic growth of their nations. This is partly because FDI has some advantages over other forms of foreign resources: One, from the stand point of the balance of payments adjustment, equity investment requires payments only when it earns a profit unlike debt which requires payments irrespective of the state of the economy. Two, in contrast to the need to service debt, earnings from private foreign investment are frequently reinvested and only a part of it is repatriated. Three, with FDI both commercial and foreign exchange rate risk are passed onto the investor rather than having to be borne by the host governments. Lastly, its stability compared to other forms of foreign resources attracted attention of most policy makers in the developing world.

In addition to these comparative advantages over other forms of foreign resources, FDI, though still debatable, is viewed as a major stimulus to economic growth in developing countries. Those who argue for FDI point out that its ability to fill the four gaps, namely, the resource gap, the foreign exchange gap, the technology gap and revenue gap, has made it the center of attention for policy-makers in low-income countries.

The role of FDI as a source of capital has become increasingly important to Sub-Saharan Africa (SSA). The reason is that in order for the continent to achieve the Millennium Development Goal (MDG) of reducing poverty rates by half, the region needs to fill an annual resource gap of \$64 billion, about 12% of GDP. Since income levels and domestic savings in the region are low, a bulk of the finance will have to come from abroad official finance (such as aid from the World Bank) or from private foreign investment. (asiedu,2003).

However, official assistance to the region has been declining. For example, net official development assistance to SSA declined from \$17 billion in 1990 to \$10 billion in 2001, a decrease of about 41 percent (World Bank 2002). Moreover most of the countries in the region cannot raise funds from international capital markets. As a consequence, a bulk of the external resources needed for poverty alleviation has to come from FDI.

Nowadays a consensus view seems to be that there is a positive association between FDI inflows and growth provided that receiving countries have reached a minimum

level of educational, technological and infrastructure development. However, these pro-FDI views are not taken for granted. The debate over the impact of FDI on growth is not yet over. Those who argue against FDI point out, among other things, its negative consequences in terms of deterioration in the balance of payments due to repatriation of profits and high import requirements of multi national corporations. This paper aims at finding empirical relationship between FDI and trade balance.

1.2 Objectives of the study

The general objective of this paper is to see whether there exist a statistically significant relationship between FDI and trade balance, and if so to determine the direction of association. With this, the paper comments on the policy recommendation in a bid to optimize the benefits of FDI.

Specific Objectives:

1. To see the impact of FDI on trade balance of SSA region
2. To assess the impact of FDI on trade share, import share and export share of SSA region.
3. To examine FDI's potential and performance of SSA; to see its diversification across various countries.
4. To provide policy recommendations which will maximize the benefits of FDI and/or minimize its drawbacks.

1.3 Significance of the study

Economists tend to favor the free flow of capital across national borders because it allows capital to seek out the highest rate of return. Despite this notion, the realities on the ground show that developing countries should be cautious about taking uncritical attitude toward the benefits of FDI.

The purpose of this paper is to examine empirical relationship between FDI and trade balance. To the researcher knowledge no empirical study has so far been made to investigate the relationship between FDI and trade balance in SSA region. Thus this study is supposed have a significant importance.

1.4 Research Questions and Hypothesis

The African continent is characterized by low level of income and hence low savings and investment. In addition to this, investment in the region is constrained by lack of technological and entrepreneurial know how. These coupled with the inability of the region to raise the necessary foreign currencies to finance its import requirements, forced the continent to remain backward. Nowadays, FDI is considered, by some, as a way to get out of such a dismal situation and speed up economic growth. Though the rate of increase was meager, compared to other parts of the developing world, the continent has been receiving increasing amounts of FDI over the last two to three decades. Then the question is what has been the impact of such an inflow? Does it improve or deteriorate the trade balance?

In line with the above questions, the following hypothesis is forwarded.

- Increases in FDI do have a significant impact on trade share of SSA region.
- FDI affects the import share of SSA region positively and significantly.
- FDI affects the export share of SSA region positively and significantly.
- The direction of association between the inflow of FDI and trade balance is negative.

1.5 Data source and Method of Analysis

The paper uses data from the World development Indicators CD room (WDI, 2004) for the panel data analysis part; and data from UNCTAD investment report (2005) for descriptive analysis part. The analysis in this paper covers a panel of thirty nine Sub Saharan Africa countries for the years ranging from 1970 to 2002. To see the long run effect of FDI on trade balance cross sectional data analysis is used. Besides the results from the cross sectional data regression is complemented by panel data regression.

Use of panel data is required here as it enables us: one, to focus on changes within different units over time. Two, the estimates remain unbiased even when data is missing for some time periods for some cross-sectional units and this will solve the fundamental problem of incomplete data in the case of Africa (Asiedu, 2003). Beside these Gujarati (2003) pointed out the main arguments against using cross-section data analysis, and in favor of time series analysis saying that cross country studies

implicitly impose or assume a common economic structure and similar production technology across different countries which is most likely not true, and further, economic growth of a country is influenced not only by FDI and other inputs, but also by a host of domestic policies such as monetary, fiscal and external policies (Shan *et al*, 1997). As is also agreed by Shan *et al*, panel data analysis has some features to account for these country specific effects.

There are several estimation techniques to estimate panel data regressions. The two most prominent are the fixed effect model (FEM) and the random effect model (REM). In FEM the intercept in the regression model is allowed to vary among individuals in recognition of the fact that each cross sectional unit may have some special characteristics of its own. To take in to account the differing intercepts, one can use dummy variables. FEM is appropriate in situations where the individual specific intercept may be correlated with one or more regressors (Gujarati, 2003). A disadvantage of FEM is that it consumes a lot of degrees of freedom when the number of cross sectional unit is very large.

An alternative to FEM is REM. In REM it is assumed that the intercept of an individual unit is a random drawing from a much larger population with a constant mean value. The individual intercept is then expressed as a deviation from the constant mean value. One advantage of REM over FEM is that it is economical in degrees of freedom, as we don't have to estimate N cross sectional intercepts (*Ibid*). We need only to estimate the mean value of the intercept and its variance.

The kind of panel data analysis employed in this paper is the random effect model. The very reason for the choice of this model is not to consume a lot of degrees of freedom. This paper examines 39 SSA countries and if we use a dummy variable for each cross sectional unit, which is the case in FEM, we will insert 38 dummy variables in the model; which is too costly in terms of degrees of freedom. More over as Gujarati wrote “if the dummy variables do in fact represent lack of knowledge about the (true) model, why not express this ignorance through the disturbance term u_{it} ?” (Gujarati, 2003)

The basic idea for REM is to start with:

$$Y_{it}=B_{1i}+B_2X_{2i}+B_3X_{3i}+\dots\dots B_nX_{ni}+u_{it} \quad (\text{equation 2.1})$$

Instead of treating B_{1i} as fixed, we assume that it is a random variable with a mean value of B_1 . And the intercept value for an individual country can be expressed as:

$$B_{1i}=B_1+e_i \quad i=1,2,\dots,N \quad (\text{equation 2.2})$$

Where e_i is the random error term with the mean value of zero and homosedastic variance.

Substituting 2.2 in to 2.1, we get:

$$Y_{it}=B_1+B_2X_{2i}+B_3X_{3i}+\dots\dots B_nX_{ni}+e_i+u_{it} \quad (\text{equation 2.3})$$

$$Y_{it}=B_1+B_2X_{2i}+B_3X_{3i}+\dots\dots B_nX_{ni}+w_{it} \quad (\text{equation 2.4})$$

Where $w_{it} = e_i+u_{it}$

The composite error term w_{it} consists of two components e_i , which is individual-specific error term and u_{it} which is the combined time series and cross section error component. (For elaborate discussion see Gujarati, 2003 or Maddala ,1992 .)

2. Literature Review

2.1 Review of Theoretical Literature

2.1.1 Definition of Foreign Direct Investment

Foreign direct investment may be defined as those financial flows invested by transnational corporations (TNCs) with regard to their international production operations. These consist of funds for financing establishment, acquisition or expansion of foreign based affiliates of TNCs. Foreign direct investment can take different forms. It may be in the form of a new enterprise or the expansion of an existing enterprise; it may also come through a merger or an acquisition.

According to Krugman and Obstfeld, foreign direct investment is international capital flows in which a firm in one country creates or expands a subsidiary in another. It involves not only a transfer of resources but also the acquisition of control. That is, the subsidiary does not simply have a financial obligation to the parent company; it is part of the same organizational structure (Krugman and Obstfeld, 1998).

According to the International Monetary Fund 1993, "FDI refers to Investment made to acquire lasting interest in enterprises operating outside of the economy of the investor." The IMF suggests a threshold of 10 per cent of equity ownership to quantify an investor as a foreign direct investor. The most important characteristic of FDI, which distinguishes it from foreign Portfolio investment is that it is undertaken with the intention of exercising control over an enterprise (IMF, 1993). Only capital that is

provided by the direct investor-either directly, or through other enterprises related to the investor,-should be classified as FDI. The forms of investment by the direct investor which are classified as FDI are (1) equity capital, (2) the reinvestment of earnings and (3) the provision of long- and short-term intra-company loans (between parent and affiliate enterprises).

The above ideas, even though not identical, show the clear conventional definition that foreign direct investment is putting money or other resources with the intention to produce goods or services in a foreign country and to control that business to a certain degree. Foreign portfolio investment is not foreign direct investment because there is no intention of producing goods or services but the desire to speculate with the shares they have bought.

2.1.2 The pros and cons of FDI as a source of development

Attraction of FDI is becoming increasingly important for developing countries. However this is often based on the implicit assumption that greater inflows of FDI will bring certain benefits to the country's economy. FDI, like ODA or any other flow of capital, is simply a source of capital. However the impact of FDI is dependant on what form it takes. This includes the type of FDI, sector, scale, duration and location of business and secondary effects.

A. Stimulation of national economy

FDI is thought to bring certain benefits to national economies. It can contribute to Gross Domestic Product (GDP) and Gross Fixed Capital Formation (total investment in a host economy). There have been empirical studies indicating a positive link between higher GDP and FDI inflows, however the link does not hold for all regions, e.g. over the last ten years FDI has increased in Central Europe whilst GDP has dropped. (asiedu ,2003)

Therefore the impact of FDI will largely depend on the conditions of the host economy, e.g. the level of domestic investment/savings, the mode of entry (merger & acquisitions or Greenfield investments) and the sector involved, as well as a country's ability to regulate foreign investment (UNCTAD ,1999).

B. Improvement or Deterioration of the Balance of Payments

FDI can also contribute toward debt servicing repayments, stimulate export markets and produce foreign exchange revenue. Subsidiaries of Trans-National Corporations (TNCs), which bring the vast portion of FDI, are estimated to produce around a third of total global exports. However, levels of FDI do not necessarily give any indication of the domestic gain (UNCTAD, 1999). Corporate strategies e.g. protective tariffs and transfer pricing can reduce the level of corporate tax received by host governments. Also, importation of intermediate goods, management fees, royalties, profit

repatriation, capital flight and interest repayments on loans can limit the economic gain to host economy.

Moreover many economists who argue against FDI point out its negative consequences in terms of deterioration in the balance of payments due to repatriation of profits and high import requirements of TNCs.

C. Stability of FDI

FDI inflows can be less affected by change in national exchange rates as compared to other private sources (portfolio investments or loans). This is partly because currency devaluation means a drop in the relative cost of production and assets for foreign companies and thereby increases the relative attraction of a “host” country. FDI can stimulate product diversification through investments into new businesses, so reducing market reliance on a limited number of sectors/products (UNCTAD 1999). However, if international flows of trade and investment fall globally and for lengthy periods, then stability is less certain. New inflows of FDI are especially affected by these global trends, because it is harder for a foreign company to de-invest or reverse from foreign affiliates as compared to portfolio investment. Companies are therefore more likely to be careful to ensure they will accrue benefits before making any new investments. Examples of regional stability are mixed, whilst FDI growth continued in some Asian countries e.g. Korea and Thailand, during the 1996/97 crisis, it fell in others e.g. Indonesia. During Latin America’s financial crisis in the 80’s many Latin

American countries experienced a sharp fall in FDI (UNGA 1999), suggesting that investment sensitivity varies according to a country's particular circumstances.

D. Social development

FDI, where it generates and expands businesses, can help stimulate employment, raise wages and replace declining market sectors. However, the benefits may only be felt by small portion of the population, e.g. where employment and training is given to more educated, typically wealthy elites or there is an urban emphasis, wage differentials (or dual economies) between income groups will be exacerbated (OECD ,1998).

Cultural and social impacts may occur with investment directed at non-traditional goods. For example, if financial resources are diverted away from food and subsistence production towards more sophisticated products and encouraging a culture of consumerism can also have negative environmental impacts. With in small scale and rural businesses of host countries, there is less capacity to attract foreign investment and bank credit/loans, and as a result certain domestic businesses may either be forced out of business or to use more informal sources of finance (ibid).

E. Infrastructure development and technology transfer

Parent companies can support their foreign subsidiaries by ensuring adequate human resources and infrastructure in place. In particular "Greenfield" investments into new

business sectors can stimulate new infrastructure development and technologies to host economies. These developments can also result in social and environmental benefits, but only where they “spill over” into host communities and businesses.

Investment in research & development (R&D) from parent companies can stimulate innovation in production and processing techniques in the host country. However, this assumes that in-house investment (in R&D, production, management, personnel training) will result in improvements. Foreign technology/organizational techniques may actually be inappropriate to local needs, capital intensive and have a negative effect on local competitors. Similarly external changes in suppliers, customers and other competing firms are not necessarily an improvement on the original domestic-based approaches (UNCTAD, 1999).

F. “Crowding in” or “Crowding out”?

“Crowding in” occurs where FDI companies can stimulate growth in up/down stream domestic businesses within the national economies. Whilst “Crowding out” is a scenario where parent companies dominate local markets, stifling local competition and entrepreneurship. One reason for crowding out is “policy chilling” or “regulatory arbitrage” where government regulations, such as labor and environmental standards, are kept artificially low to attract foreign investors, this is because lower standards can reduce the short term operative costs for businesses in that country. Exclusive production concessions and preferential treatment to TNCs by host governments can

both restrict other foreign investors and encourage oligopolistic (quasi-monopoly) market structure (OECD, 1998).

Empirical data for these scenarios is variable, but crowding out is thought to be more common in specific sectors. For example, in industries where demand or supply for a product or service is highly price elastic (market sensitive) and capital intensive. Hence regulation brings additional costs of compliance and is therefore much more likely to influence a company's decision to invest in that country (OECD b).

G. Scale and pace of investment

It may be difficult for some governments, particularly low income countries, to regulate and absorb rapid and large FDI inflows, with regard to regulating the negative impacts of large-scale production growth on social and environmental factors (UNCTAD, 1999). Also a high proportion of FDI inflows in developing economies are commonly aimed at primary sectors, such as petroleum, mining, agriculture, paper-production, chemicals and utilities. Primary sectors are typically capital and resource intensive, with a greater threshold in economies of scale and therefore slower to produce positive economic "spill over" effects (OECD a). Thus, in the short term, low income economies will have less capacity to mitigate environmental damages or take protective measures, imposing greater remediation costs in the long term, as well as potentially irreversible environmental losses (OECD, 1998)

2.1.3 Determinants of FDI flows

The existing uneven distribution of FDI among countries, regions and different income groups has generated a substantial research effort to identify their major determinants. In the late 1990s, FDI became the largest single source of external finance for many developing countries, however, the percentage share obtained by African countries has been declining from year to year.

There have been several theoretical explanations given to the determinants of FDI flows. [T]he pure capital movement, the product cycle, industrial organization, the stagnation thesis as well as other political considerations (Alemayehu, 1999). According to the pure capital movements theory, capital flows across countries are governed by differential rate of return. Followers of this theory assumed the existence of risk, which in present times, by and large explain the flows of FDI. If it were all about the returns to capital, the developing world (and Africa in particular) where the returns to capital is very high, would have benefited a lot. Alas, risk matters and FDI to Africa remained relatively low despite its profitability. "The least known fact about FDI in Africa is that the profitability of foreign affiliates of TNCs in Africa has been high and that in recent years it has been consistently higher than in most other host regions of the world." (UNCTAD, 1999).

Some people use Veron's product cycle theory to explain movements in FDI. According to this theory, when firms in the developed countries come up with new products they will first serve the home market, but after the product gets standardized, they think about producing it in a low cost country and re-export it if the costs of transportation can be justified. As per this theory, countries that can provide low cost of production in terms of labor, infrastructure etc... can attract more FDI.

The third theory focuses on the determinants of FDI based on the theory of "industrial firm" and "industrial organization". Followers of this theory argues that foreign firms have an advantage over local and their desire to exploit economies of scale, increased their market power, tackle risk and uncertainty etc... will give rise to FDI. (Alemayehu, 1999). The last one also called the Marxist version of FDI determination argues that FDI is an outlet for investment seeking surplus caused by stagnation in centers of capitalism. This thesis mainly explains the sources of FDI and may not fully explain the destinations (Ibid).

Frey 1984, in Alemayehu 1999, classified empirical studies about the determinants of FDI into three categories. Approach A – much politics and little economics, Approach B – much economics and little politics, Approach C – unstructured amalgamation of economics and politics. The last approach employ economic variables such as GNP, labor cost, human capital, R&D expenditures etc.... According to Frey this politico-economics model with sound theoretical explanations is a good model to explain the determinants of FDI (ibid)

A. Size of the Local Market and its Growth

For most multinationals, a large market means a greater demand for their products. Hence, countries with larger GDP, other things held constant, are likely to get more FDI compared to countries with smaller GDP. As a result, it is common to see econometric studies to use size of GDP as well as and its characteristics (average income levels and GDP growth rates) as proxy to size of the local market. Rapid GDP growth could induce the inflow of FDI because: rapid GDP growth will usually create a high level of capital requirement in the host country and hence the host country will demand more FDI by offering concessional terms. Further, rapid economic growth will build the confidence for overseas investors to come and invest in the host country. More importantly, rapid economic growth, accompanied by an increase in per capita income, will create huge opportunities for FDI to in the industrial sectors, consumer durable goods and infrastructure sectors in the host country (Shan and *et al*, 1997). In general, GDP growth rate can be considered the best explanatory variable in our case as small market size need not be a constraint in the case of resource endowed, export oriented economies.

B. Availability of Natural Resources

It is a well-known fact that FDI inflows to Africa to a larger extent are determined by the availability of natural resources. This can be easily discerned by looking into the sectoral allocation of FDI in the region. By citing UNCTAD, 1999 Morisset show us that about 60% of FDI inflows to Africa concentrated in the oil and natural resource

sector (Morisset, 2001). Thus, other things held constant, countries with abundant resources are likely to get more FDI than those with little or no natural resources. We can therefore expect FDI to respond positively to the share of minerals and oil in total exports.

C. Macroeconomic Instability and Indebtedness

Stable macroeconomic environment includes a wide array of policies which, sustained over a period of time, should lead to verifiable results. The result of good macroeconomic policies will result in increased growth, low inflation, reduction of external account deficit, reduction of fiscal deficit, and less exchange rate volatility. Thus, while a stable and sustainable macroeconomic environment boosts the confidence for foreign investors and hence impact on inflows of FDI positively, macroeconomic instability affects FDI negatively. Various writers, including Obwona, Asiedu use inflation rate as a proxy to measure macroeconomic instability.

D. Openness

Several writers (including Marino, Asiedu, Morisset) have found a positive relationship between FDI and openness of the host country. Relatively open economies, other things held constant, will be able to attract more FDI than those which are relatively closed. This is because: One, openness is a good attraction to export-oriented foreign firms and two; relatively open economies usually encourage FDI. The share of foreign

trade in GDP¹ is the only available proxy we have to this variable and we expect FDI to respond to it positively.

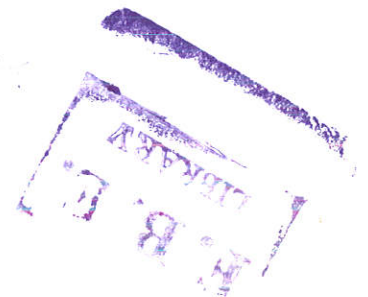
E. Labor cost and Productivity

It is much sensible to assume foreign investors investing in labor-intensive industries and export oriented subsidiaries to respond to relative labor costs significantly. However, when the cost of labor is relatively insignificant or when wage differences between countries is little, the skills of labor force are expected to have an impact on decision about FDI location. “ [L]ow direct labor costs are not as much importance as is commonly believed. In fact, the importance of low-cost unskilled labor force in location decision has declined in recent years and greater attention is now placed on skills and “trainability” of workers (Obwona,ND).

F. Infrastructure

Infrastructure covers many dimensions, ranging from roads, ports, railways, and telecommunication systems, to institutional developments. In developing countries, especially in Africa, bad roads, delays in shipments of goods at port and unreliable communication systems can be considered as the major obstacles hindering FDI inflows. Thus countries that do a better job in making these things better, other things held constant, have a better chance of attracting FDI. In general, “good infrastructure

¹ Though it is debatable which proxy to use for openness, the share of foreign trade to GDP is the most commonly used one.



facilitates production, reduces operating cost and there by promotes FDI” (Asiedu, 2003). Many writers including (Asiedu, Morisset, and others) use numbers of telephone mainlines per 1000 people as a proxy to the condition of infrastructure developments.

G. Institutional Quality and Political Risk

Especially in Africa, corruption and weak enforcement of law are viewed as the major deterrents to FDI as they have their own contribution to increasing cost of operating business and also in terms of dissatisfactions to the investors. We will use indexes of these two measures of institutional quality based on the data obtained from PRS's website. Political instability is also a very serious obstacle in securing significant amounts of FDI. That is, political instability, whether real or perceived, curb inflows of FDI.

H. Incentives given to Foreign Investors

Most empirical studies, supports the notion that specific incentives such as tax exemptions have no major impact on FDI, especially when they are seen as compensation for continuing comparative disadvantages (Obwona,ND). Besides, these incentives are almost uniformly given by all African countries and hence will not significantly affect the location of FDI. Because of these and also because of the difficulty of measurement, we deliberately excluded this variable from the model.

2.1.4 Conceptual Aspects on the Interactions between FDI and Trade

A. Standard trade theory and factor mobility: FDI flows and trade flows

The standard trade theory and factor mobility examines the links between FDI flows and trade flows is by considering FDI as simply a factor movement between two countries and to see how this affects trade volumes between these economies.

In the standard Heckscher-Ohlin model of trade with 2 countries, 2 factors and 2 goods, the traditional view is that factor mobility (and in particular capital mobility or FDI) is a perfect substitute to goods mobility. In other words factors movements are a substitute to international trade in commodities. The first formal exposition of this idea is credited to Mundell (1957) who noted that in the presence of tariffs, the relatively low priced factor in each country will be that country's abundant factor. Factor mobility in response to these international factor prices differences would thus lead to the elimination of trade via the elimination of the factor proportion basis for trade. Perfect factor mobility would produce an international equilibrium in which factor prices and commodity prices are identical to those characterizing free trade equilibrium with factor immobility. According to this view factor movements and commodity trade are substitutes in both a welfare sense and a volume of trade sense and in particular more FDI flows should be associated to less trade flows.

In an important contribution Markusen (1983), extends the analysis of Mundell to show a number of situations in which factor movements (and FDI in particular) and

trade in commodities are in fact complements in the sense that an increase in factor movements between two economies leads to an increase in commodity trade flows.

The basic idea is to consider the following set of assumptions:

- a) Countries have identical relative factor endowments
- b) Countries have identical technologies
- c) Countries have identical homothetic preferences
- d) Production is characterized by constant returns to scale
- e) Production is characterized by perfect competition
- f) There are no domestic distortions in either country.

Under these assumptions, two countries have no reason to trade with each other. Relaxing only assumption (a) provides the standard Heckscher-Ohlin motive for trade in commodities. Markusen (1983) showed that retaining (a) but relaxing any of the other assumptions (b), (d), (e) or (f) provides a reason for a complementarity between factor movement and trade in commodities. The basic intuition is that in all of these cases, at the initial trading equilibrium with no factor mobility, there is no factor price equalization with a country having the relatively high factor price for the factor used intensively in the production of its export sector. Thus factor mobility must lead to an inflow of the factor used intensively in the production of the export good. This in turn adds a factor proportion basis for trade and an increase in the volume of trade between the two economies.

Taken together, these different models suggest the general idea that trade flows in goods and FDI flows are substitute in only a restricted set of circumstances and most likely to be complements when technologies differ across countries, when there are

external or agglomeration economies of scale, when firms compete in oligopolistic fashion and when there are local product or factor market distortions.

B. Standard Trade theory: interactions between FDI and trade policies

While the previous contributions discuss the question of the correlations between trade in commodity and factor movements, they do not directly address the question of the interactions between FDI and trade policy instruments and their welfare impacts on the host country. An early contribution which could provide some direction to this question is Johnson (1967) who showed that an exogenous increase in the stock of a domestic resource, as for instance capital may bring a welfare loss in a tariff ridden small open economy if it exacerbates the overproduction of the tariff protected import competing industry. Clearly if additionally, there is a discrepancy between domestic product and national income because the increase in the capital stock is due to foreign owned capital (FDI), then it is even more likely that national welfare may decrease due to an inflow of FDI in a small tariff ridden open economy.

The relationship between trade policy and FDI flows is further investigated in Brecher and Diaz-Alejandro (1977) who note that a tariff-generated FDI may reduce the real income of the host country or even reduce the real income of the world as a whole. The intuition is simple. Tariffs imply that a reduction of imports at constant terms of trade reduces national income by a reduction of the volume of trade that the country has. If tariff-generated FDI has the Mundell effect of reducing trade, this tends to reduce income in the absence of a favorable terms-of-trade change. This result

shows therefore situations where a tariff reduction in the host economy, tends to increase the welfare gain associated to FDI flows. Looking at instruments, this suggests that trade liberalization policy may complement a FDI policy promoting capital movements between countries.

Bhagwati and Brecher (1980) show that free trade may be inferior to subsidized trade or no trade for a large country when this economy has a domestic factor of production which is foreign-owned (like FDI capital). This comes because of the discrepancy between a differential volume of trade or a differential pattern of trade phenomenon between the economy as perceived in aggregate (domestic and foreign owned factors) and the economy as perceived from the national point of view (domestic factors only).

All this line of research suggests that, trade liberalization (and even subsidization in some cases) in the host country may be at the margin complement to FDI liberalization from the welfare point of view of the host country as it decreases the likelihood of the Johnson\Bhagwati-Brecher phenomenon when there is a FDI inflow.

C. New Trade Theory and Multinationals. FDI flows and Trade flows.

The early 1980s saw the beginning of the industrial organization approach to trade which incorporated increasing returns to scale and imperfect competition into the general equilibrium model of trade. Along that line of research, two branches discuss the relationship between trade and FDI. The first one describes multinational and FDI activities as “vertical FDI” in the sense that single plant firms fragment the production

process into stages based on factor intensities and locate activities according to international differences in factor prices (Helpman and Krugman (1985)). According to this line of research, multinational activity will arise between countries which differ in terms of factor endowments. The second branch considers “horizontal FDI” and emphasizes the role of firm level and plant level economies of scale as well as trade costs between countries (see Brainard 1993, Markusen and Venables (1998), (2000)). Contrary to the “vertical FDI” model, the “horizontal FDI” model predicts that, given moderate to high trade costs, multinational activity arises between similar countries in size and relative factor endowments. Markusen ((1997), (2001)), integrated these two branches of the literature into what is now known as the “capital-knowledge” approach, emphasizing the role of skill intensive knowledge-based assets that can be fragmented from production and can be joint public inputs into multiple production facilities.

What does this new approach tell us about the complementarity or the substitutability between FDI flows and Trade flows? Clearly, affiliate production and trade flows should be substitutes in the “horizontal” approach to the multinational, though the relationship can become subtler when there are both intermediate and final goods within the firm. It is also reasonable to say that affiliate production is complementary to trade in the “vertical” approach.

Markusen and Maskus (2002) draw out the implications of how FDI liberalization affect trade flows. The type of FDI which is stimulated (and therefore the impact on trade flows between two countries) depends on the differences between country size,

relative skill endowments and the level of trade costs. More precisely; when countries are similar in size and relative factor endowments and trade costs are moderate to high, FDI liberalization tends to stimulate “horizontal FDI” and to reduce exports from the source country to the host country. On the other hand, when countries differ in relative factor endowments and in size, and that trade costs are low, then FDI liberalization is likely to stimulate “vertical FDI” and to promote trade flows (exports of intermediates from the source to the host country, exports of assembled products from the host country as an export-platform back to the source country or another third destination).

D. New Trade Theory: interactions between FDI and trade policies

Markusen (1997) provides an interesting variation of the same argument, but this time concentrating directly on the relationship between trade and investment liberalization from the point of view of a small host\developing economy facing a large source\developed country. This is actually one of the very few papers explicitly considering the degree of complementarity or substitutability between two policy instruments rather than the relationship between trade and FDI flows (the policy outcomes).

While precise results are derived from numerical simulations and therefore depend on the precise configuration of parameters, three general results tend to emerge from the analysis. First, investment liberalization and trade liberalization do not seem to be substitute in that they often have opposite effects on important variables (like sectoral outputs, factor rewards, etc...). Second, together they have quite different effects than

either alone. For instance, FDI liberalization alone may lead to “horizontal FDI” while coupled with trade liberalization, it may rather promote “vertical FDI”. In a welfare sense, trade and investment liberalization appear as complements. Finally from a distributive point of view, trade and investment liberalization together may avoid the curse of Stolper-Samuelson, in the sense that the real incomes of all factors can rise in full liberalization, even though the relative price of one factor may fall.

2.2 Review of Empirical Literature

While the explosion of FDI flows in recent years is unmistakable, the growth effects remain unclear. The economic rationale for offering special incentives to attract FDI frequently derives from the belief that foreign investment produces externalities in the form of technology transfers and spillovers. Romer (1993), for example, argues that there are important “idea gaps” between rich and poor countries. He notes that foreign investment can ease the transfer of technological and business know-how to poorer countries. These transfers may have substantial spillover effects for the entire economy. Thus, foreign investment may boost the productivity of all firms -- not just those receiving foreign capital (Rappaport, 2000).

While there are sound conceptual reasons for believing that FDI can ignite economic growth, the empirical evidence is divided. Firm-level studies of particular countries often find that FDI does *not* boost economic growth and these studies frequently do *not* find positive spillovers running from foreign-owned to domestic-owned firms. Aitken and Harrison’s (1999) study finds no evidence of a positive technology

spillover from foreign firms to domestically owned ones in Venezuela between 1979 and 1989. Similarly, Germidis (1977), Haddad and Aitken (1993), find that FDI does not accelerate growth. Taken together, firm-level studies do not lend much support for the view that FDI accelerates overall economic growth.

Unlike the microeconomic evidence, macroeconomic studies – using aggregate FDI flows for a broad cross-section of countries – generally suggest a positive role for FDI in generating economic growth especially in particular environments (De Gregorio, 1992). For instance, Borensztein, De Gregorio, and Lee (1998) argue that FDI has a positive growth-effect when the country has a highly educated workforce that allows it to exploit FDI spillovers. While Blomstrom, Lipsey, and Zejan (1994) find no evidence that education is critical, they argue that FDI has a positive growth-effect when the country is sufficiently rich. In turn, Alfaro (2000) find that FDI promotes economic growth in economies with sufficiently developed financial markets, while Salisu (1996) stress that trade openness is crucial for obtaining the growth-effects of FDI.

De Mello (1997) lists two main channels through which FDI may be growth enhancing. First, FDI can encourage the adoption of new technology in the production process through capital spillovers. Second, FDI may stimulate knowledge transfers, both in terms of labour training and skill acquisition and by introducing alternative management practices and better organizational arrangements. A survey by OECD (2002) underpins these observations and documents that many studies have found FDI to contribute positively to income growth and factor productivity.

Both de Mello and OECD stress one key insight from all the studies reviewed: the way in which FDI affects growth is likely to depend on the economic and technological conditions in the host country. In particular, it appears that developing countries have to reach a certain level of development, in education and/or infrastructure before they are able to capture potential benefits associated with FDI.

Other studies, relying on a variety of cross-country regressions, have looked into the conditions necessary for identifying FDI's positive impact on economic growth. Interestingly, they stress different, though closely related, aspects of development. First, Blomstrom, Lipsey and Zejan (1994) argue that FDI has a positive growth-effect when a country is sufficiently rich in terms of per capita income. Second, Balasubramanyam, Salisu and Sapsford (1996) emphasize trade openness as being crucial for acquiring the potential growth impact of FDI. Third, Borenztein, De Gregio and Lee (1998) find that FDI raises growth, but only in countries where the labour force has achieved a certain level of education. Finally, Alfaro et al. (2004) draw attention to financial markets as they find that FDI promotes economic growth in economies with sufficiently developed financial markets.

However, when Carkovic and Levine (2002) estimate the effects of FDI on growth after controlling for the potential biases induced by endogeneity, country-specific effects, and the omission of initial income as a regressor, the results of these four papers appear to break down. Carkovic and Levine conclude that FDI has no impact on long-run growth. Another strand of the literature has focused more directly on the causal relationships between FDI and growth and, these studies have tested for

Granger causality between the two series using different samples and estimation techniques. Zhang (2001) looks at 11 countries on a country-by-country basis, dividing the countries according to the time-series properties of the data. Tests for long-run causality based on an error correction model, indicate a strong Granger-causal relationship between FDI and GDP-growth. For six countries where there is no cointegration relationship between the log of FDI and growth, only one country exhibited Granger causality from FDI to growth.

Chowdhury and Mavrotas (2003) take a slightly different route by testing for Granger causality using the Toda and Yamamoto (1995) specification, thereby overcoming possible pre-testing problems in relation to tests for cointegration. Using data from 1969 to 2000, they find that FDI does not Granger cause GDP in Chile, whereas there is bi-directional Granger causality between GDP and FDI in Malaysia and Thailand. De Mello (1999) looks at causation from FDI to growth in 32 countries of which 17 are non-OECD countries. First he focuses on the time-series aspects of FDI and growth, finding that the long-run effect of FDI on growth is heterogeneous across countries.

Second, de Mello complements his time-series analysis by providing evidence from panel data estimations. In the non-OECD sample he finds no causation from FDI to growth based on fixed effects regressions with country-specific intercepts, and a negative short-run impact of FDI on GDP using the mean group estimator.

Nair-Reichert and Weinhold (2001) test causality for cross-country panels, using data from 1971 to 1995 for 24 countries. Like de Mello, they emphasize heterogeneity as a

serious issue and, therefore, use what they refer to as the mixed fixed and random (MFR) coefficient approach in order to test the impact of FDI on growth. The MFR approach allows for heterogeneity of the long-run coefficients, thereby avoiding the biases emerging from imposing homogeneity on coefficients of lagged dependent variables. They find that FDI on average has a significant impact on growth, although the relationship is highly heterogeneous across countries.

Choe (2003) uses the traditional panel data causality testing method developed by Holtz-Eakin, Newy and Rosen (1988) in an analysis of 80 countries. His results point towards bi-directional causality between FDI and growth, although he finds the causal impact from FDI to growth to be weak.

Finally the study by Basu, Chakraborty and Reagle (2003) addresses the question of the two-way link between FDI and growth. Allowing for country-specific cointegrating vectors as well as individual country and time fixed effects they find a cointegrated relationship between FDI and growth using a panel of 23 countries. Basu, Chakraborty and Reagle emphasize trade openness as a crucial determinant for the impact of FDI on growth, as they find two-way causality in open economies, both in the short and the long run, whereas the long-run causality is unidirectional from growth to FDI in relatively closed economies.

The presence of diverging results is due to econometric issues and to sampling differences. As far as econometrics is concerned, an inadequate treatment of the endogeneity problem characterizes much of the existing empirical literature on international capital flows and growth. To the extent to

which factors like the available stock of infrastructures, the market size, the presence of skilled labor, etc. are recognized to be fundamental determinants of foreign capital inflows to developing countries, we should expect that growth itself is conducive to higher levels of inward FDI. This means that a positive correlation between FDI flows and growth says nothing about the underlying causal relationship. Even when a researcher takes care to account for the endogeneity bias, it is not easy to find suitable instrumental variables, that is variables which are correlated with FDI flows but not with growth. (Andrea Marino, N.D.)

Summing up, the main message to take from this selective survey is that there seems to be a strong relationship between FDI and growth. Although the relationship is highly heterogeneous across countries, the studies generally agree that FDI, on average, has an impact on growth in the Granger causal sense.

3. FDI inflow to SSA region

3.1 Recent Trends

Until the mid-1990s, SSA received only a small share of FDI, relative to other developing regions, despite the fact that returns on capital were reportedly higher. Some studies suggest that this outcome is in part due to negative perceptions about the African continent as a location for FDI. This negative image is reflected in poor scores on policy and financial risk rating assessments – measures utilized to some degree by foreign investors in evaluating investment decisions and hence a contributing factor to low levels of investment.

Globalization, liberalization and privatization have spurred the global growth of FDI in recent years and increased FDI flows to many low and middle income countries. FDI to SSA rose significantly after the mid-1990. Although still relatively low, SSA's share of FDI flows reached \$12.8 billion in 2004; which is 5.5% of total flows to developing countries and 2.0% of the world (UNCTAD, 2005).

In the years 1980-1984, the average annual FDI flow to SSA was \$1.0 billion. This figure has escalated to \$2.7 billion and \$11.1 billion in the years 1990-1994 and 2000-2004 respectively. Before 1997, the ratio of SSA's net FDI flow to GDP represented less than 2%, but since 1997 it showed an annual increment and the ratio of net FDI flow to GDP has represented 4.5% in 2001. In the last 2 decades the

share of FDI flow to Gross Capital formation have increased by 276%(from 0.12 in 1980-1984 to 0.33 during 2000-2004).

This new important evidence contradicts the old view that Africa is unable to attract significant investment flows from abroad. The continuation of this trend depends in good part on the continued growth of global FDI. However, SSA countries can build on the trend of the past few years by continuing to implement good policies such as privatization and macroeconomic reform.

The recent growth of FDI in SSA is truly remarkable considering that until very recently foreign capital was regarded with suspicion and deterred by many regulations. The socialist development strategy adopted by many post-independence SSA countries nationalized foreign companies and created state-owned industrial sectors. Foreign equity participation remained low throughout the 1970s and 1980s and was confined to import substituting industries (in countries with a sizable domestic market) and to natural resource sectors (Asiedu, 1998).

3.2 Potential and Performance of SSA towards FDI flow

There are a number of indices which would help to measure the inward FDI potential and performance of a country. Of these, this paper has adopted UNCTAD inward FDI potential index.

a) SSA's Inward FDI Potential Index

UNCTAD's Inward FDI Potential Index captures several factors (apart from market size) expected to affect an economy's attractiveness to foreign investors. It is an average of the values (normalized to yield a score between zero, for the lowest scoring country, to one, for the highest) of the following 12 variables.

- GDP per capita, an indicator of the sophistication and breadth of local demand (and of several other factors), with the expectation that higher income economies attract relatively more FDI geared to innovative and differentiated products and services.
- The rate of GDP growth over the previous 10 years, a proxy for expected economic growth.
- The share of exports in GDP, to capture openness and competitiveness.
- As an indicator of modern information and communication infrastructure, the average number of telephone lines per 1,000 inhabitants and mobile telephones per 1,000 inhabitants.
- Commercial energy use per capita, for the availability of traditional infrastructure.
- The share of R&D spending in GDP, to capture local technological capabilities.
- The share of tertiary students in the population, indicating the availability of high-level skills.

- Country risk, a composite indicator capturing some macroeconomic and other factors that affect the risk perception of investors. The variable is measured in such a way that high values indicate less risk.
- The world market share in exports of natural resources, to proxy for the availability of resources for extractive FDI.
- The world market share of imports of parts and components for automobiles and electronic products, to capture participation in the leading TNC integrated production systems
- The world market share of exports of services, to seize the importance of FDI in the services sector that accounts for some two thirds of world FDI.
- The share of world FDI inward stock, a broad indicator of the attractiveness and absorptive capacity for FDI, and the investment climate.

According to UNCTAD rating, SSA's potential to attract FDI lags behind other regions of the world. For example during 2002-2004 no country in the SSA region appears in the first 60 ranks; with Botswana coming to the picture at the rank of 65 (by scoring an indice of 0.187) .During the period only four countries in the region (Botswana, South Africa, Angola and Namibia) scored a point above 0.15.

b) SSA's Inward FDI Performance Index

The UNCTAD Inward FDI Performance Index ranks countries by the FDI they receive relative to their economic size. It is the ratio of a country's share in global FDI inflows to its

share in global GDP. A value greater than one indicates that the country receives more FDI than its relative economic size, a value below one that it receives less (a negative value means that foreign investors disinvest in that period).

The index thus captures the influence on FDI of factors other than market size, assuming that, other things being equal, size is the "base line" for attracting investment. These other factors can be diverse, ranging from the business climate, economic and political stability, the presence of natural resources, infrastructure, skills and technologies, to opportunities for participating in privatization or the effectiveness of FDI promotion.

$$IND_i = \frac{FDI_i / FDI_w}{GDP_i / GDP_w}$$

Where,

IND_i = The Inward FDI Performance Index of the i^{th} country

FDI_i = The FDI inflows in the i^{th} country

FDI_w = World FDI inflows

GDP_i = GDP in the i^{th} country

GDP_w = World GDP

During the year 2002-2004, SSA's inward FDI performance has been attractive with 24 countries of the region scoring above 1.00 -indicating that this countries have received more FDI than their relative economic size . Angola ranks fourth in the world economy and first among SSA countries by receiving an FDI share of more than 10 fold its size (scoring 10.19). During the period five other countries in the region

(Gambia, Congo, DR. Congo, Mozambique and Ethiopia) received an FDI flow of more than three fold their size.

3.3 The Sectoral Pattern of FDI to SSA

Till recently, SSA has failed to attract a pattern of resource flows that would lead to a competitive upgrading of the productive or export structure. Even countries that have reformed their economies have failed to attract FDI to manufacturing and service sector. During the 1980's and 90's, 60-80% of FDI in SSA was in natural-resource exploitation (asiedu, 2003).

Few years back FDI flow to SSA was only associated to the primary sector. However improvements are taking place in SSA with regard to sectoral diversification. Nowadays FDI in services is increasing, particularly in telecommunications, electricity, management and trade. A large part of the increase is attributable to privatization programmes. In South Africa, FDI in telecommunications and information technology has overtaken that in mining and extraction. And in Mozambique too the service and manufacturing sector has overtaken the primary sector. (UNCTAD, 2005)

In this regard South Africa is a typical show case, where about 70% of inflows during 1998-2002 have gone to the service and manufacturing sector (UNCTAD, 2003). To make a further break dawn of the sectoral composition of South Africa's FDI during the period 1998-2002, about 16% went to the telecommunications sector, 15% to energy and oil, and more than 40% to the manufacturing sector. On the other hand,

Mauritius and Mozambique are two of the early success stories in attracting a significant proportion of FDI flow to the manufacturing sector; especially in textile industries. This is traceable to the provision of AGOA (African Growth Opportunity Act) by USA and the provision of everything but armaments by European Union.

The evidences suggest that SSA's sectoral diversification is changing. This change in the sectoral diversification can be attributed to various factors. The shift of the structure of FDI (especially to the service sector) is an international phenomenon; and the SSA region seems to prove that it is going along with the world in this regard. In the early 1970s, the service sector accounted for only one third of the world FDI stock; in 1990 this share was less than one-half, and by 2002, it had risen to about 60% (\$4 trillion). Over the same period, the share of the primary sector in the world declined from 9% to 6%. (UNCTAD, 2003)

More over the distribution of FDI inflow to SSA is changing across countries. For instance the two big economies in SSA (South Africa and Nigeria) accounted for 64.9% of total FDI inflows during 1995-97 but this figure has decreased to 31.2% and 24.2% during 1998-2000 and 2002-2004 respectively. The decline in the share of the two big economies in SSA is due to the fact that other African countries are attracting an increasing amount of FDI.

Few years back FDI flow to SSA was limited to oil exporting countries. But nowadays countries with good macroeconomic policies and political stability are attracting a huge amount of FDI. For instance in the year 1991-1994, Ghana, Ethiopia, Senegal,

Mozambique and Botswana have registered an FDI flow of only 2.64% of total FDI flow to SSA region. But the share of these five countries increased to 8.61% of the SSA region.

3.4 Privatizing Countries Attract More FDI

Privatization can be a very important instrument for improving the allocation of resources and stimulating private sector development. Privatization not only attracts FDI through the direct sell-off of enterprises, it also signals an improvement in the investment climate because of reduced government intervention. Estimates from Sader (1995) show that privatization initiatives are an important determinant of foreign investment decisions in developing countries.

Foreign exchange raised through privatization (in the form of both FDI and portfolio flows) represented about 47% of total revenue generated by privatization in developing countries during 1990-98 (up from only 8% in 1980s). In 1997, foreign exchange represented 84% of privatization revenue in SSA compared with only 43% in developing countries. Partial information suggests that while in other regions, notably East Asia, only 50% of this foreign exchange is in the form of FDI, the proportion is much higher- around 80-90%, in SSA. This reflects both a success of privatization programs and the fact that the domestic private sector is smaller in SSA than in other developing countries; foreign participation would therefore tend to be higher. (Asiedu, 2003)

Since the mid-1990s privatization is more widely accepted in SSA, while information flows and capital markets have improved. The round of privatization during 1994-2002 has involved large enterprises, particularly utility industries: power, railways, electricity, water and especially telecommunications. Foreign investors with the necessary capital and technical skills have been attracted by large equity stakes and management control. (ibid)

4. Results and Discussion

4.1 Cross-Sectional Results

Before seeing the impact of FDI on import and export, first an attempt was made to see as to whether FDI affects trade share* or not. Other than FDI, factors which affect trade share like per capital income growth, trade tax and total population are incorporated in the model. To put it mathematically:

$$tsh = B_1 + B_2 fdi + B_3 gdppcg + B_4 ttax + B_5 totpop + u$$

Where:

tsh = trade share

fdi = foreign direct investment

gdppcg = per capital income growth

ttax = trade tax (export tax + import tax)

totpop = total population

u = random error term

Table 4.1 Cross Sectional Regression for trade share

Source	SS	df	MS			
Model	27450.9878	4	6862.74695	Number of obs =	35	
Residual	11326.1978	30	377.539927	F(4, 30) =	18.18	
Total	38777.1856	34	1140.50546	Prob > F =	0.0000	
				R-squared =	0.7079	
				Adj R-squared =	0.6690	
				Root MSE =	19.43	

	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
fdi	12.89739	2.353091	5.48	0.000	8.091735	17.70304
gdppcg	5.053512	1.977013	2.56	0.016	1.015913	9.09111
ttax	-2.067962	.8525511	-2.43	0.022	-3.809104	-.3268206
avgtotpop	-6.53e-07	2.55e-07	-2.56	0.016	-1.17e-06	-1.32e-07
_cons	70.47401	9.453614	7.45	0.000	51.16715	89.78086

As can be seen from table 4.1, the regression result of the above model gives a high goodness of fit, with R^2 value of 70.7%. This indicates that 70.7% of the variation in trade share is explained by the variation in the explanatory variables. All the explanatory variables have the expected sign-a sign which is consistent with economic theories. Foreign direct investment and per capital income growth affect trade share positively while trade tax and total population affect trade share negatively. Moreover all the explanatory variables are statistically significant. FDI is significant at 1% significance level while the remaining explanatory variables are significant at 5% level.

The fact that FDI affects trade share positively and at a 1% significance level doesn't seem to change when we add additional explanatory variables to the model. Factors like access to sea port, import tax and export tax were incorporated in different order and the impact of FDI on trade share still remain significant.

Table 4.2: Regression for Trade Share

tsh	Coef.	Std. Err.	t	P> t
fdi	10.6822	2.924545	3.65	0.001
gdppcg	4.233521	2.006989	2.11	0.044
Xtax	-1.394207	.6343864	-2.20	0.037
mtax	-.4194626	.8016995	-0.52	0.605
totpop	-5.84e-07	2.55e-07	-2.29	0.030
access	-10.41925	6.898917	-1.51	0.143
_cons	80.08858	16.10673	4.97	0.000

```

. reg tsh fdi gdppcg xtax mtax totpop access
R-squared      = 0.7406

Adj R-squared = 0.6733

```

As shown in the above table the model has a high level of goodness of fit with R^2 value of 74.06% and an adjusted R^2 value of 67.33%. More over a good number of variables have the expected sign and statistically significant coefficient. (see appendix 1 for additional regression results)

The regression results show one striking point. In all the models, the sign of the import tax is as expected negative but statistically insignificant. One possible reason for this is that most of SSA's imports are structural and usually do not significantly respond to price (and tax).

When we split the effect of FDI on trade share in to export share and import share, the results still reveal that FDI affects both variables positively and at a statistically significant level. With regard to exports, initially, firms trade in the foreign market, and after learning more about the economic, social, political and ruling conditions of their trading partners they may establish a subsidiary in the host country (Liu et al., 2001) or they may embark on joint ventures with local enterprises. This implies FDI inflows, and, after some period, MNCs may start to export (ibid). The role of MNCs in expanding exports in host countries derives from the additional capital, new technology and better management and marketing strategies that they can bring with them (UNCTAD, 2002).

Likewise, there are two possible links between FDI and imports. First, if imports are evidence that a market exists for a commodity, FDI might be attracted to the host country to produce that product locally. In other words, a rise in imports in the host

country justifies investment and production by MNCs; thus, imports stimulate FDI inflows. Second, as soon as MNCs establish in the host country, they import certain types of supplies (basic components and intermediate goods produced by the headquarters) to satisfy the quality standards required by the international market; therefore, FDI inflows increase the demand for imports.

Other than FDI, import share is affected by variables like per capital income growth, import tax, export tax, total population and access to sea port. The same is true for export share except the fact that we have to substitute import tax by export tax. To put it mathematically;

$$ish = B_1 + B_2 fdi + B_3 gdppcg + B_4 mtax + B_5 totpop + B_6 access + u$$

$$xsh = B_1 + B_2 fdi + B_3 gdppcg + B_4 xtax + B_5 totpop + B_6 access + u$$

Where:

ish = import share

xsh = export share

fdi = foreign direct investment

gdppcg = per capital income growth

access = dummy variable for land locked countries. It takes the value 1 if a country is completely landlocked; 0 otherwise.

mtax = import tax

xtax = export tax

totpop = total population

u = random error term

Table 4.3 Regression for import share

imsh	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
fdi	7.396986	1.624291	4.55	0.000	4.069776	10.7242
gdppcg	1.927229	1.143301	1.69	0.103	-.4147173	4.269175
mtax	-.3126533	.4564753	-0.68	0.499	-1.247701	.6223939
totpop	-4.11e-07	1.45e-07	-2.83	0.008	-7.09e-07	-1.14e-07
access	-3.673895	3.881686	-0.95	0.352	-11.62517	4.277378
_cons	47.85288	9.119461	5.25	0.000	29.17251	66.53325

reg imsh fdi gdppcg mtax avgtotpop access

R-squared = 0.7494
Adj R-squared = 0.6957

Table 4.4 Regression for export share

xpsh	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
fdi	3.424183	1.72376	1.99	0.057	-.1067791	6.955146
gdppcg	2.267107	1.321827	1.72	0.097	-.4405335	4.974747
xtax	-1.059762	.4232088	-2.50	0.018	-1.926666	-.1928583
totpop	-1.61e-07	1.67e-07	-0.97	0.341	-5.02e-07	1.80e-07
access	-7.144566	4.535727	-1.58	0.126	-16.43558	2.146448
_cons	30.50204	10.16148	3.00	0.006	9.687194	51.31689

reg xpsh fdi gdppcg xtax avgtotpop access

R-squared = 0.5421
Adj R-squared = 0.4440

The results from the cross sectional data regression show that FDI affects both import share and export share positively and at a statistically significant level (see the tables above). As has been indicated before import tax do have the expected negative sign but it is statistically insignificant. A similar model was specified for export share and the results again seem to prove that FDI affects export share at a 10% significance level. From the above results it is clear that FDI significantly affects the import share as well as the export share.

4.2 Panel data regression results

Here we will repeat the above cross-sectional regression by making use of panel data so as to observe the medium term (as opposed to the long term) determinants of growth. By combining time series and cross section observations, panel data give more informative data, more variability, less collinearity among variables. Besides, this use of panel data will give us the chance to observe temporal effects (in addition to cross-sectional effects), increase the degrees of freedom (the available information), and control for country specific effects. The panel is constructed by taking decade averages of variables for a sample of 39 Sub-Saharan African countries, ensuing in three observations (covering the 1970s, 1980s and 1990s²) per country.

As regards to the use of a specific panel data analytic model, the researcher has considered the use of random and fixed effects models as well as running OLS regressions on pooled data. While results from random effect models revealed the expected signs with almost all of the variables being statistically significant, coefficient estimates based on fixed effects model are mostly statistically insignificant and in some of the cases it does not give the expected signs. These problems with the fixed effects model can be attributed to the existence of multicollinearity (which increases the standard errors and thereby drains the model of statistical power to test the

² Actually our data for the last period, 1990s, extends to 2002.

parameters) and loses of degrees of freedom. Both of these problems are the results of too many dummy variables needed to build the fixed effects model Yaffee (2003).

To test the impact of FDI on trade share, import share and export share, the researcher inclined to the random effects model for the following two basic reasons. One, if N(the number of cross sectional units is large and T(the number of time series data is small, random effect models are more efficient than fixed effect estimators (Gujarati,2003).Second, if the dummy variables do in fact represent a lack of knowledge, why not express this ignorance through the disturbance term u_{it} ? This is the approach suggested by proponents of random effect model. Since our data structure meets the above conditions and that the assumptions of the random effects model are satisfied, we stick to the random effects model.

The results from the panel data regression for trade share gives a high goodness of fit with an R^2 value ranging from 69.6% to 81.9%.Moreover a good number of variables have the expected signs with statistically significant coefficient.(one of the results is shown below; for additional regressions see appendix 2.)

Table 4.5: Panel Data Regression for Trade Share

tsh	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
fdi	2.419489	.7215225	3.35	0.001	1.005331	3.833647
gdppcg	1.484493	.6867723	2.16	0.031	.1384442	2.830542
mtax	-.9283393	.3969505	-2.34	0.019	-1.706348	-.1503307
xtax	-1.141514	.3427654	-3.33	0.001	-1.813322	-.4697062
lnpop	-16.44864	2.242645	-7.33	0.000	-20.84414	-12.05314
dum70s	-14.04428	4.354726	-3.23	0.001	-22.57938	-5.509169
dum80s	-5.416467	3.359167	-1.61	0.107	-12.00031	1.167379
cons	338.2017	36.9051	9.16	0.000	265.869	410.5344

The results reveal that FDI affects trade share positively and at a 1% significance level. Moreover when the effect of FDI is split in to import share and export share; it still affects these variables at a statistically significant level. When we look in to the magnitude of the effect of FDI on import share and export share separately, its impact on import share is consistently (in all the regressions) higher than its impact on export share suggesting that the net effect of FDI on trade balance is negative.

From the above regression results it is evident that FDI affects the import share and export share significantly. Once again it is important to underscore the fact that in the regression for import share, trade tax has the expected sign (negative) but statistically insignificant. This is because most of SSA imports are structural and usually do not significantly respond to price (and to tax).

5. Conclusion

The political and social instability that has historically plagued SSA is often given as one of the main reasons for the historically low level of investment (both private domestic and foreign). Collier and Gunning (1999) suggest that risk considerations are more important in SSA because of its lack of finance and asymmetric information and the virtual absence of second hand capital markets which make investment commitments nearly irreversible. The rate of return on FDI was highest in Sub-Saharan Africa, compared with other regions in the world, perhaps because, given perceived higher risks in the region, investors chose only high-return projects. (UNCTAD, 2005).

In recent years a number of countries in Africa have achieved peace and macroeconomic stability. They have successfully reformed their economies and have also improved their national policy and incentive frameworks for FDI. Political stability has returned in many SSA countries .This resulted in an increase in FDI flow.

Few years back FDI flow to SSA was only associated to the primary sector. However improvements are taking place in SSA with regard to sectoral diversification. Nowadays FDI in services is increasing, particularly in telecommunications, electricity, management and trade. A large part of the increase is attributable to privatization programmes. More over the distribution of FDI inflow to SSA is changing across

countries. For instance the two big economies in SSA (South Africa and Nigeria) accounted for 64.9% of total FDI inflows during 1995-97 but this figure has decreased to 31.2% and 24.2% during 1998-2000 and 2002-2004 respectively.(data source:UNCTAD,2005)

In this paper it is proved that FDI affects the components of trade balance (export and import) positively and at a statistically significant level. The results from cross sectional and panel data regression reveal that the impact of FDI up on trade share, import share and export share is strong. Almost all the regression results indicate that FDI affects these variables at a 1% significance level. However the magnitude of the FDI in import share is consistently higher than that of export share; indicating that the net impact of FDI on trade balance is negative.

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Appendices

Appendix 1. Results from Cross-Sectional Regressions

```
. reg tsh fdi gdppcg ttax avgtotpop
```

Source	SS	df	MS	Number of obs =	35
Model	27450.9878	4	6862.74695	F(4, 30) =	18.18
Residual	11326.1978	30	377.539927	Prob > F =	0.0000
				R-squared =	0.7079
				Adj R-squared =	0.6690
Total	38777.1856	34	1140.50546	Root MSE =	19.43

tsh	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
fdi	12.89739	2.353091	5.48	0.000	8.091735	17.70304
gdppcg	5.053512	1.977013	2.56	0.016	1.015913	9.09111
ttax	-2.067962	.8525511	-2.43	0.022	-3.809104	-.3268206
avgtotpop	-6.53e-07	2.55e-07	-2.56	0.016	-1.17e-06	-1.32e-07
_cons	70.47401	9.453614	7.45	0.000	51.16715	89.78086

```
. reg tsh fdi gdppcg ttax avgtotpop access
```

Source	SS	df	MS	Number of obs =	35
Model	28798.5841	6	4799.76401	F(6, 28) =	13.47
Residual	9978.60155	28	356.378627	Prob > F =	0.0000
				R-squared =	0.7427
				Adj R-squared =	0.6875
Total	38777.1856	34	1140.50546	Root MSE =	18.878

tsh	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
fdi	12.09556	2.477268	4.88	0.000	7.021104	17.17001
gdppcg	4.918803	1.968572	2.50	0.019	.8863669	8.951239
ttax33	-2.005612	.8438293	-2.38	0.025	-3.734118	-.2771061
avgtotpop	-6.41e-07	2.48e-07	-2.59	0.015	-1.15e-06	-1.34e-07
access	-12.31148	6.567702	-1.87	0.071	-25.76481	1.14185
_cons	86.23305	15.77918	5.46	0.000	53.91087	118.5552

```
. reg tsh fdi gdppcg xtax mtax avgtotpop
```

Source	SS	df	MS	Number of obs =	35
Model	27748.0832	5	5549.61663	F(5, 29) =	14.59
Residual	11029.1024	29	380.313877	Prob > F =	0.0000
				R-squared =	0.7156
				Adj R-squared =	0.6665
Total	38777.1856	34	1140.50546	Root MSE =	19.502

tsh	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
fdi	11.15763	2.661975	4.19	0.000	5.71328	16.60198
gdppcg	4.343425	1.971328	2.20	0.036	.3116078	8.375243
xtax	-1.578295	.6300747	-2.50	0.018	-2.866943	-.289648
mtax	-.3637113	.7492914	-0.49	0.631	-1.896184	1.168762

```

avgtotpop | -5.89e-07 2.57e-07 -2.29 0.029 -1.11e-06 -6.36e-08
_cons | 65.47056 10.73768 6.10 0.000 43.50953 87.43159

```

```
. reg tsh fdi gdppcg xtax mtax avgtotpop access
```

Source	SS	df	MS	Number of obs = 35		
Model	28716.8588	7	4102.4084	F(7, 27)	=	11.01
Residual	10060.3268	27	372.604696	Prob > F	=	0.0000
				R-squared	=	0.7406
				Adj R-squared	=	0.6733
Total	38777.1856	34	1140.50546	Root MSE	=	19.303

tsh	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
fdi	10.6822	2.924545	3.65	0.001	4.681527	16.68287
gdppcg	4.233521	2.006989	2.11	0.044	.1155208	8.351522
xtax	-1.394207	.6343864	-2.20	0.037	-2.69586	-.0925534
mtax	-.4194626	.8016995	-0.52	0.605	-2.064414	1.225489
avgtotpop	-5.84e-07	2.55e-07	-2.29	0.030	-1.11e-06	-6.07e-08
access	-10.41925	6.898917	-1.51	0.143	-24.57466	3.736153
_cons	80.08858	16.10673	4.97	0.000	47.0403	113.1369

```
. reg imsh fdi gdppcg mtax avgtotpop
```

Source	SS	df	MS	Number of obs = 35		
Model	9698.80558	4	2424.7014	F(4, 30)	=	19.09
Residual	3810.89291	30	127.029764	Prob > F	=	0.0000
				R-squared	=	0.7179
				Adj R-squared	=	0.6803
Total	13509.6985	34	397.344073	Root MSE	=	11.271

imsh	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
fdi	8.59018	1.473303	5.83	0.000	5.581294	11.59907
gdppcg	2.300348	1.138969	2.02	0.052	-.0257359	4.626432
mtax	-.4908873	.4326758	-1.13	0.266	-1.374529	.3927546
avgtotpop	-4.24e-07	1.48e-07	-2.86	0.008	-7.28e-07	-1.21e-07
_cons	34.46132	5.806845	5.93	0.000	22.60216	46.32048

```
. reg imsh fdi gdppcg mtax avgtotpop access
```

Source	SS	df	MS	Number of obs = 35		
Model	10123.7903	6	1687.29838	F(6, 28)	=	13.95
Residual	3385.90821	28	120.925293	Prob > F	=	0.0000
				R-squared	=	0.7494
				Adj R-squared	=	0.6957
Total	13509.6985	34	397.344073	Root MSE	=	10.997

imsh	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
fdi	7.396986	1.624291	4.55	0.000	4.069776	10.7242
gdppcg	1.927229	1.143301	1.69	0.103	-.4147173	4.269175
mtax	-.3126533	.4564753	-0.68	0.499	-1.247701	.6223939
avgtotpop	-4.11e-07	1.45e-07	-2.83	0.008	-7.09e-07	-1.14e-07
access	-3.673895	3.881686	-0.95	0.352	-11.62517	4.277378
_cons	47.85288	9.119461	5.25	0.000	29.17251	66.53325

```
. reg xpsh fdi gdppcg xtax avgtotpop
```

Source	SS	df	MS		
Model	5051.80138	4	1262.95035	Number of obs =	35
Residual	5099.24035	30	169.974678	F(4, 30) =	7.43
				Prob > F	= 0.0003
				R-squared	= 0.4977
				Adj R-squared	= 0.4307
				Root MSE	= 13.037

Variable	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
fdi	3.236625	1.648148	1.96	0.059	-.1293426	6.602592
gdppcg	2.099797	1.313123	1.60	0.120	-.5819574	4.781551
xtax	-1.140792	.4208654	-2.71	0.011	-2.000314	-.28127
avgtotpop	-1.68e-07	1.68e-07	-1.00	0.326	-5.12e-07	1.76e-07
_cons	29.61974	4.280858	6.92	0.000	20.87707	38.36242

```
. reg xpsh fdi gdppcg xtax avgtotpop access
```

Source	SS	df	MS		
Model	5503.04929	6	917.174882	Number of obs =	35
Residual	4647.99244	28	165.99973	F(6, 28) =	5.53
				Prob > F	= 0.0007
				R-squared	= 0.5421
				Adj R-squared	= 0.4440
				Root MSE	= 12.884

Variable	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
fdi	3.424183	1.72376	1.99	0.057	-.1067791	6.955146
gdppcg	2.267107	1.321827	1.72	0.097	-.4405335	4.974747
xtax	-1.059762	.4232088	-2.50	0.018	-1.926666	-.1928583
avgtotpop	-1.61e-07	1.67e-07	-0.97	0.341	-5.02e-07	1.80e-07
access	-7.144566	4.535727	-1.58	0.126	-16.43558	2.146448
_cons	30.50204	10.16148	3.00	0.006	9.687194	51.31689

```
. reg xpsh fdi gdppcg xtax avgtotpop access
```

Source	SS	df	MS		
Model	5498.28584	5	1099.65717	Number of obs =	35
Residual	4652.75589	29	160.439858	F(5, 29) =	6.85
				Prob > F	= 0.0002
				R-squared	= 0.5416
				Adj R-squared	= 0.4626
				Root MSE	= 12.666

Variable	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
fdi	3.329063	1.602213	2.08	0.047	.0521708	6.605956
gdppcg	2.226563	1.278022	1.74	0.092	-.3872859	4.840411
xtax	-1.050361	.4124684	-2.55	0.016	-1.893954	-.2067687
avgtotpop	-1.61e-07	1.64e-07	-0.98	0.333	-4.96e-07	1.74e-07
access	-7.294904	4.37293	-1.67	0.106	-16.23855	1.648742
_cons	32.04689	4.406204	7.27	0.000	23.03519	41.05859

Appendix 2: Results from Panel Data Regressions

xtreg tsh fdi gdppcg tttax lnpop dum70s dum80s

```

Random-effects GLS regression           Number of obs   =           82
Group variable (i): cid                 Number of groups =           36

R-sq:  within = 0.2234 |
       between = 0.6692 |
       overall = 0.6959 |
                                Obs per group: min =           1
                                avg =           2.3
                                max =           3

Random effects u_i ~ Gaussian           Wald chi2(6)     =           85.57
corr(u_i, X) = 0 (assumed)             Prob > chi2      =           0.0000
    
```

tsh	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
fdi	2.374174	.7961314	2.98	0.003	.8137852	3.934563
gdppcg	1.18385	.6990835	1.69	0.090	-.1863284	2.554028
tttax	-.7034093	.372045	-1.89	0.059	-1.432604	.0257854
lnpop	-16.50259	2.358524	-7.00	0.000	-21.12522	-11.87997
dum70s	-15.98313	4.184838	-3.82	0.000	-24.18526	-7.780998
dum80s	-8.106386	3.335693	-2.43	0.015	-14.64422	-1.568547
_cons	332.5267	38.52319	8.63	0.000	257.0226	408.0308
sigma_u	16.322835					
sigma_e	9.7727779					
rho	.7361258	(fraction of variance due to u_i)				

. xtreg tsh fdi gdppcg tttax lnpop access dum70s dum80s

```

Random-effects GLS regression           Number of obs   =           82
Group variable (i): cid                 Number of groups =           36

R-sq:  within = 0.2306 |
       between = 0.7360 |
       overall = 0.7821 |
                                Obs per group: min =           1
                                avg =           2.3
                                max =           3

Random effects u_i ~ Gaussian           Wald chi2(8)     =           110.04
corr(u_i, X) = 0 (assumed)             Prob > chi2      =           0.0000
    
```

tsh	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
fdi	2.067157	.7645773	2.70	0.007	.5686134	3.565701
gdppcg	.9358545	.667524	1.40	0.161	-.3724686	2.244178
tttax	-.5605523	.3543783	-1.58	0.114	-1.255121	.1340165
lnpop	-15.23983	2.234393	-6.82	0.000	-19.61916	-10.8605
access	-7.757226	6.198916	-1.25	0.211	-19.90688	4.392426
dum70s	-14.87064	3.979175	-3.74	0.000	-22.66968	-7.071603
dum80s	-7.488945	3.177156	-2.36	0.018	-13.71606	-1.261833
_cons	348.5312	36.25241	9.61	0.000	277.4777	419.5846
sigma_u	15.878201					
sigma_e	9.7727779					
rho	.72525758	(fraction of variance due to u_i)				

```
. xtreg tsh fdi gdppcg tttax lnpop access dum70s dum80s
```

```
Random-effects GLS regression      Number of obs      =      82
Group variable (i): cid            Number of groups   =      36
```

```
R-sq:  within = 0.2235              Obs per group: min =      1
      between = 0.6708                    avg =      2.3
      overall = 0.6987                    max =      3
```

```
Random effects u_i ~ Gaussian      Wald chi2(7)       =      84.59
corr(u_i, X) = 0 (assumed)         Prob > chi2        =      0.0000
```

tsh	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
fdi	2.380268	.7991028	2.98	0.003	.8140558	3.946481
gdppcg	1.19018	.7018047	1.70	0.090	-.1853316	2.565692
tttax	-.6996465	.3738497	-1.87	0.061	-1.432378	.0330855
lnpop	-16.41976	2.380285	-6.90	0.000	-21.08503	-11.75449
access	-3.227877	6.554415	-0.49	0.622	-16.07429	9.61854
dum70s	-15.91463	4.204605	-3.79	0.000	-24.15551	-7.673759
dum80s	-8.040801	3.350107	-2.40	0.016	-14.60689	-1.474712
_cons	332.524	38.7905	8.57	0.000	256.496	408.552
sigma_u	16.415619					
sigma_e	9.7727779					
rho	.73832194	(fraction of variance due to u_i)				

```
. xtreg tsh fdi gdppcg tttax lnpop dum70s dum80s
```

```
Random-effects GLS regression      Number of obs      =      82
Group variable (i): cid            Number of groups   =      36
```

```
R-sq:  within = 0.2313              Obs per group: min =      1
      between = 0.7271                    avg =      2.3
      overall = 0.7632                    max =      3
```

```
Random effects u_i ~ Gaussian      Wald chi2(7)       =     106.69
corr(u_i, X) = 0 (assumed)         Prob > chi2        =      0.0000
```

tsh	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
fdi	2.056146	.7649162	2.69	0.007	.556938	3.555355
gdppcg	.9420391	.668498	1.41	0.159	-.3681929	2.252271
tttax	-.5632491	.3555893	-1.58	0.113	-1.260191	.1336931
lnpop	-15.49878	2.241644	-6.91	0.000	-19.89232	-11.10524
dum70s	-15.19249	3.979979	-3.82	0.000	-22.99311	-7.391872
dum80s	-7.73454	3.174314	-2.44	0.015	-13.95608	-1.513
_cons	346.7089	36.509	9.50	0.000	275.1526	418.2652
sigma_u	16.051634					
sigma_e	9.7727779					
rho	.72956562	(fraction of variance due to u_i)				

```
. xtreg tsh fdi gdppcg mtax xtax lnpop dum70s dum80s
```

```
Random-effects GLS regression           Number of obs   =       81
Group variable (i): cid                 Number of groups =       36

R-sq:  within = 0.3908                  Obs per group:  min =       1
        between = 0.7106                                     avg  =       2.3
        overall = 0.7417                                     max  =       3

Random effects u_i ~ Gaussian           Wald chi2(7)    =    109.86
corr(u_i, X) = 0 (assumed)              Prob > chi2    =     0.0000
```

tsh	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
fdi	2.419489	.7215225	3.35	0.001	1.005331	3.833647
gdppcg	1.484493	.6867723	2.16	0.031	.1384442	2.830542
mtax	-.9283393	.3969505	-2.34	0.019	-1.706348	-.1503307
xtax	-1.141514	.3427654	-3.33	0.001	-1.813322	-.4697062
lnpop	-16.44864	2.242645	-7.33	0.000	-20.84414	-12.05314
dum70s	-14.04428	4.354726	-3.23	0.001	-22.57938	-5.509169
dum80s	-5.416467	3.359167	-1.61	0.107	-12.00031	1.167379
_cons	338.2017	36.9051	9.16	0.000	265.869	410.5344
sigma_u	16.082791					
sigma_e	8.9857023					
rho	.76210054	(fraction of variance due to u_i)				

```
. xtreg tsh fdi gdppcg mtax xtax lnpop access dum70s dum80s
```

```
Random-effects GLS regression           Number of obs   =       81
Group variable (i): cid                 Number of groups =       36

R-sq:  within = 0.3902                  Obs per group:  min =       1
        between = 0.7698                                     avg  =       2.3
        overall = 0.8189                                     max  =       3

Random effects u_i ~ Gaussian           Wald chi2(9)    =    137.69
corr(u_i, X) = 0 (assumed)              Prob > chi2    =     0.0000
```

tsh	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
fdi	2.190013	.698737	3.13	0.002	.8205141	3.559513
gdppcg	1.183553	.6610776	1.79	0.073	-.1121351	2.479241
mtax	-.8787481	.3806868	-2.31	0.021	-1.624881	-.1326157
xtax	-1.086427	.3263863	-3.33	0.001	-1.726133	-.4467218
lnpop	-15.45258	2.104599	-7.34	0.000	-19.57752	-11.32764
access	-8.381907	5.931781	-1.41	0.158	-20.00798	3.24417
dum70s	-12.54182	4.158771	-3.02	0.003	-20.69287	-4.390784
dum80s	-4.732974	3.219667	-1.47	0.142	-11.0434	1.577458
_cons	356.1862	34.80117	10.23	0.000	287.9772	424.3952
sigma_u	15.363009					
sigma_e	8.9857023					
rho	.74510165	(fraction of variance due to u_i)				

```
. xtreg msh fdi gdppcg mtax lnpop dum70s dum80s
```

```
Random-effects GLS regression                Number of obs    =      81
Group variable (i): cid                     Number of groups =      36

R-sq:  within = 0.2724                      Obs per group:  min =      1
        between = 0.6315                      avg =            2.3
        overall = 0.6169                      max =            3

Random effects u_i ~ Gaussian                Wald chi2(6)     =     81.59
corr(u_i, X) = 0 (assumed)                  Prob > chi2      =     0.0000
```

msh	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
fdi	1.4784	.5558982	2.66	0.008	.3888593	2.56794
gdppcg	1.537457	.4981191	3.09	0.002	.5611616	2.513753
mtax	-.4644525	.288919	-1.61	0.108	-1.030723	.1018183
lnpop	-9.217052	1.450741	-6.35	0.000	-12.06045	-6.373651
dum70s	-12.32736	2.796257	-4.41	0.000	-17.80792	-6.846797
dum80s	-4.84335	2.326466	-2.08	0.037	-9.403141	-.2835598
_cons	188.5108	24.1984	7.79	0.000	141.0828	235.9388
sigma_u	9.3935762					
sigma_e	6.8554576					
rho	.65248085	(fraction of variance due to u_i)				

```
. xtreg msh fdi gdppcg mtax lnpop access dum70s dum80s
```

```
Random-effects GLS regression                Number of obs    =      81
Group variable (i): cid                     Number of groups =      36

R-sq:  within = 0.2624                      Obs per group:  min =      1
        between = 0.7539                      avg =            2.3
        overall = 0.7728                      max =            3

Random effects u_i ~ Gaussian                Wald chi2(8)     =    138.58
corr(u_i, X) = 0 (assumed)                  Prob > chi2      =     0.0000
```

msh	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
fdi	1.261459	.5416938	2.33	0.020	.1997586	2.323159
gdppcg	1.088892	.4712434	2.31	0.021	.1652716	2.012512
mtax	-.3689154	.2673906	-1.38	0.168	-.8929913	.1551606
lnpop	-8.387025	1.239235	-6.77	0.000	-10.81588	-5.958169
access	-1.756778	3.367818	-0.52	0.602	-8.357579	4.844023
dum70s	-9.956686	2.668219	-3.73	0.000	-15.1863	-4.727073
dum80s	-3.625056	2.254698	-1.61	0.108	-8.044183	.7940708
_cons	200.6519	21.0154	9.55	0.000	159.4625	241.8414
sigma_u	7.5293901					
sigma_e	6.8554576					
rho	.54674756	(fraction of variance due to u_i)				

```
. xtreg msh fdi gdppcg mtax lnpop access dum70s dum80s
```

```
Random-effects GLS regression           Number of obs   =       81
Group variable (i): cid                 Number of groups =       36

R-sq:  within = 0.2739                  Obs per group:  min =       1
        between = 0.6326                  avg =           2.3
        overall = 0.6186                  max =           3

Random effects u_i ~ Gaussian           Wald chi2(7)    =      80.17
corr(u_i, X) = 0 (assumed)              Prob > chi2     =      0.0000
```

msh	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
fdi	1.44637	.5553078	2.60	0.009	.3579869	2.534754
gdppcg	1.531744	.4986931	3.07	0.002	.5543235	2.509164
mtax	-.4448031	.2920494	-1.52	0.128	-1.017209	.1276033
lnpop	-9.245022	1.466118	-6.31	0.000	-12.11856	-6.371484
access	1.985288	4.002424	0.50	0.620	-5.859319	9.829894
dum70s	-12.44355	2.799772	-4.44	0.000	-17.931	-6.956098
dum80s	-4.923837	2.323359	-2.12	0.034	-9.477536	-.3701374
_cons	187.9364	24.46305	7.68	0.000	139.9897	235.8831
sigma_u	9.5832536					
sigma_e	6.8554576					
rho	.66149066	(fraction of variance due to u_i)				

```
. xtreg msh fdi gdppcg mtax lnpop dum70s dum80s
```

```
Random-effects GLS regression           Number of obs   =       81
Group variable (i): cid                 Number of groups =       36

R-sq:  within = 0.2630                  Obs per group:  min =       1
        between = 0.7538                  avg =           2.3
        overall = 0.7689                  max =           3

Random effects u_i ~ Gaussian           Wald chi2(7)    =     139.40
corr(u_i, X) = 0 (assumed)              Prob > chi2     =      0.0000
```

msh	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
fdi	1.257139	.5385056	2.33	0.020	.2016873	2.31259
gdppcg	1.095752	.4685954	2.34	0.019	.1773215	2.014182
mtax	-.3509582	.2637793	-1.33	0.183	-.8679562	.1660398
lnpop	-8.420396	1.232523	-6.83	0.000	-10.8361	-6.004696
dum70s	-10.08898	2.643221	-3.82	0.000	-15.2696	-4.908366
dum80s	-3.709893	2.236466	-1.66	0.097	-8.093287	.6735
_cons	199.5598	20.81527	9.59	0.000	158.7626	240.357
sigma_u	7.5527385					
sigma_e	6.8554576					
rho	.54828166	(fraction of variance due to u_i)				

```
. xtreg xsh fdi gdppcg xtax lnpop dum70s dum80s
```

```
Random-effects GLS regression           Number of obs   =       81
Group variable (i): cid                 Number of groups =       36

R-sq:  within = 0.2626                  Obs per group:  min =       1
        between = 0.4793                                     avg =       2.3
        overall = 0.5293                                     max =       3
```

```
Random effects u_i ~ Gaussian           Wald chi2(6)     =      43.44
corr(u_i, X) = 0 (assumed)             Prob > chi2      =      0.0000
```

xsh	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
fdi	.8396638	.3534908	2.38	0.018	.1468346	1.532493
gdppcg	.1242727	.3619394	0.34	0.731	-.5851155	.8336609
xtax	-.4292571	.1850901	-2.32	0.020	-.792027	-.0664873
lnpop	-6.285194	1.525129	-4.12	0.000	-9.274391	-3.295997
dum70s	-5.475812	2.38424	-2.30	0.022	-10.14884	-.802787
dum80s	-3.264608	1.727349	-1.89	0.059	-6.65015	.1209346
_cons	128.135	24.03235	5.33	0.000	81.0325	175.2376
sigma_u	12.248831					
sigma_e	4.4980654					
rho	.88117099	(fraction of variance due to u_i)				

```
. xtreg xsh fdi gdppcg xtax lnpop access dum70s dum80s
```

```
Random-effects GLS regression           Number of obs   =       81
Group variable (i): cid                 Number of groups =       36

R-sq:  within = 0.2637                  Obs per group:  min =       1
        between = 0.5132                                     avg =       2.3
        overall = 0.5629                                     max =       3
```

```
Random effects u_i ~ Gaussian           Wald chi2(8)     =      46.50
corr(u_i, X) = 0 (assumed)             Prob > chi2      =      0.0000
```

xsh	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
fdi	.8079383	.350704	2.30	0.021	.120571	1.495306
gdppcg	.0763051	.3602065	0.21	0.832	-.6296867	.782297
xtax	-.4171709	.1836971	-2.27	0.023	-.7772107	-.0571311
lnpop	-5.907136	1.543836	-3.83	0.000	-8.932999	-2.881274
access	-6.213759	4.550939	-1.37	0.172	-15.13344	2.705918
dum70s	-5.088777	2.378007	-2.14	0.032	-9.749585	-.427968
dum80s	-3.078352	1.714452	-1.80	0.073	-6.438616	.2819121
_cons	133.8431	24.44793	5.47	0.000	85.92599	181.7601
sigma_u	12.425563					
sigma_e	4.4980654					
rho	.88413837	(fraction of variance due to u_i)				

```
. xtreg xsh fdi gdppcg xtax lnpop access dum70s dum80s
```

```
Random-effects GLS regression      Number of obs      =      81
Group variable (i): cid            Number of groups   =      36
```

```
R-sq:  within = 0.2623      Obs per group: min =      1
        between = 0.4979      avg =      2.3
        overall = 0.5578     max =      3
```

```
Random effects u_i ~ Gaussian      Wald chi2(7)       =      45.02
corr(u_i, X) = 0 (assumed)         Prob > chi2        =      0.0000
```

xsh	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
fdi	.8464413	.3534509	2.39	0.017	.1536903	1.539192
gdppcg	.1211228	.361687	0.33	0.738	-.5877707	.8300164
xtax	-.4339555	.1849354	-2.35	0.019	-.7964223	-.0714888
lnpop	-6.18044	1.521585	-4.06	0.000	-9.162692	-3.198188
access	-5.046853	4.426662	-1.14	0.254	-13.72295	3.629245
dum70s	-5.330723	2.384295	-2.24	0.025	-10.00386	-.6575905
dum80s	-3.179305	1.7277	-1.84	0.066	-6.565534	.2069236
_cons	128.5867	23.93372	5.37	0.000	81.6775	175.4959
sigma_u	12.190952					
sigma_e	4.4980654					
rho	.88017552	(fraction of variance due to u_i)				

```
. xtreg xsh fdi gdppcg xtax lnpop dum70s dum80s
```

```
Random-effects GLS regression      Number of obs      =      81
Group variable (i): cid            Number of groups   =      36
```

```
R-sq:  within = 0.2638      Obs per group: min =      1
        between = 0.4877      avg =      2.3
        overall = 0.5216     max =      3
```

```
Random effects u_i ~ Gaussian      Wald chi2(7)       =      44.03
corr(u_i, X) = 0 (assumed)         Prob > chi2        =      0.0000
```

xsh	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
fdi	.8083816	.3522216	2.30	0.022	.1180399	1.498723
gdppcg	.0901136	.3617797	0.25	0.803	-.6189615	.7991888
xtax	-.4147627	.18461	-2.25	0.025	-.7765918	-.0529337
lnpop	-6.089449	1.55005	-3.93	0.000	-9.12749	-3.051407
dum70s	-5.314877	2.385072	-2.23	0.026	-9.989532	-.6402229
dum80s	-3.202051	1.720308	-1.86	0.063	-6.573793	.1696908
_cons	132.1074	24.60889	5.37	0.000	83.87485	180.3399
sigma_u	12.477069					
sigma_e	4.4980654					
rho	.88498318	(fraction of variance due to u_i)				

```
. xtreg xsh fdi gdppcg xtax lnpop access dum70s dum80s
```

```
Random-effects GLS regression      Number of obs      =      81
Group variable (i): cid            Number of groups   =      36
```

```
R-sq:  within = 0.2623              Obs per group: min =      1
        between = 0.4979              avg =                2.3
        overall = 0.5578              max =                3
```

```
Random effects u_i ~ Gaussian      Wald chi2(7)       =      45.02
corr(u_i, X) = 0 (assumed)         Prob > chi2        =      0.0000
```

xsh	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
fdi	.8464413	.3534509	2.39	0.017	.1536903	1.539192
gdppcg	.1211228	.361687	0.33	0.738	-.5877707	.8300164
xtax	-.4339555	.1849354	-2.35	0.019	-.7964223	-.0714888
lnpop	-6.18044	1.521585	-4.06	0.000	-9.162692	-3.198188
access	-5.046853	4.426662	-1.14	0.254	-13.72295	3.629245
dum70s	-5.330723	2.384295	-2.24	0.025	-10.00386	-.6575905
dum80s	-3.179305	1.7277	-1.84	0.066	-6.565534	.2069236
_cons	128.5867	23.93372	5.37	0.000	81.6775	175.4959
sigma_u	12.190952					
sigma_e	4.4980654					
rho	.88017552	(fraction of variance due to u_i)				

```
. xtreg xsh fdi gdppcg xtax lnpop dum70s dum80s
```

```
Random-effects GLS regression      Number of obs      =      81
Group variable (i): cid            Number of groups   =      36
```

```
R-sq:  within = 0.2638              Obs per group: min =      1
        between = 0.4877              avg =                2.3
        overall = 0.5216              max =                3
```


```
Random effects u_i ~ Gaussian      Wald chi2(7)       =      44.03
corr(u_i, X) = 0 (assumed)         Prob > chi2        =      0.0000
```

xsh	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
fdi	.8083816	.3522216	2.30	0.022	.1180399	1.498723
gdppcg	.0901136	.3617797	0.25	0.803	-.6189615	.7991888
xtax	-.4147627	.18461	-2.25	0.025	-.7765918	-.0529337
lnpop	-6.089449	1.55005	-3.93	0.000	-9.12749	-3.051407
dum70s	-5.314877	2.385072	-2.23	0.026	-9.989532	-.6402229
dum80s	-3.202051	1.720308	-1.86	0.063	-6.573793	.1696908
_cons	132.1074	24.60889	5.37	0.000	83.87485	180.3399
sigma_u	12.477069					
sigma_e	4.4980654					
rho	.88498318	(fraction of variance due to u_i)				

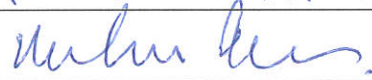
Declaration

I, the undersigned, declare that this thesis is my original work and has not been presented for a degree in any other university, and that all source of materials used for the thesis have been duly acknowledged.

Declared by:

Name: Mengistu Bessit
Signature: 
Date: 29-07-06

Confirmed by Advisor:

Name: DR. J. MAJIDHAR RAO
Signature: 
Date: 1-09-2006

Place and date of submission: _____.