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International capital flows, productive capacity and economic growth in Africa.

by

Hilary Nwokeabia.

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Abstract.

International trade can increase Africa's productive capacity and economic growth. However, in vast empirical literature that exists, there is still no general consensus concerning the mechanisms through which these benefits are optimally achieved. In this paper, we argue that sustainable development, through international trade, requires that countries do more than simply "open up" their economies and passively wait to grow. We show that trade in capital (FDI) is important to Africa's productive capacity and economic growth rate through two main channels: gross fixed capital formation (GFCF) and by facilitating the transmission of knowledge used to adapt and imitate processes for production and the products in what we call 'trade magnification effect'. We test the relationship between change in FDI-GFCF and export growth, using pooled-panel data technique for a sample of 53 African countries. Since the evidence and the mechanism for facilitating transmission of knowledge for increased productive capacity in Africa is not always clear and comprehensive, we also develop a simple framework that defines the key steps and indicators of the trade magnification effect. In this model, international trade may allow an economy to quickly increase its production in a self-reinforcing growth process through more than the volume of physical capital. The model suggests that transmission of knowledge and the magnification effects could be more important than the direct effect of GFCF on long-term and sustainable economic growth. The implication is particularly central for macroeconomic policy in many African countries striving to transform their economies, increase their contribution to global production and reduce their level of poverty.

Keywords: International trade, FDI, productive capacity, transmission mechanisms, trade magnification effect, macroeconomic policy and sustainable economic growth.

1. Introduction

International trade could improve Africa's productive capacity and economic growth. By international trade we mean the exchange of goods, including capital¹, and services between countries. In theory it is often argued that economies such as those of Africa can grow more efficiently; and easily become competitive economic participants in global production through international trade. In this line of thought, international trade not only results in increased efficiency but also allows countries to participate in a global economy, encouraging the opportunity of foreign direct investment (FDI) for instance. In this paper, we argue that the importance of FDI to Africa's productive capacity and economic growth could be quite significant but the full effects have to be managed within national macroeconomic policies. A major part of the argument is that 'ideas related to FDI, not machines make nations prosper over long term' (see for instance Romer 2000).

FDI inflows, specifically, are supposed to bring additional competition and variety to domestic markets, benefiting consumers, and enlarging markets for production and benefiting businesses. FDI inflows expose domestic firms to the best practices of foreign firms and to the demands of discerning customers, encouraging greater efficiency. Inflows also give firms access to improved capital inputs such as machine tools (sometimes measured as GFCF), boosting productivity and providing new opportunities for growth for developing countries. Until recently, the neoclassical growth model (Solow, 1956 and Swan, 1956) was the main theoretical framework used to explain economic growth through international trade. However, that framework does not offer a complete and formal link between trade policies and long-run growth. FDI essentially allows an increase in the region's GFCF and the transmission of knowledge that can be used to produce, adapt and innovate of production on a long-term basis.

Thus the effects of FDI are achieved through two main channels: gross fixed capital formation (GFCF) increases, and the transmission of knowledge used to adapt and imitate processes for production and the products, in what we call 'trade magnification effect'². Typically, in the trade magnification effect-model, sustainable development through international flow of capital (FDI) requires that countries do more than passively wait for growth to come. This process requires organizational arrangement and proactive absorptive capacity (see for instance Keller, 1996). Apparently, there is not general and discerning path in both theory and empirical literature through which developing countries, particularly those of Africa, can attain optimal growth effects from participating in international trade and FDI.

A new approach to development economics - the endogenous growth models (Romer, 1990, Rivera-Batiz and Romer, 1991 and Aghion and Howitt, 1998) provide such a new insight to the process and suggest different channels from those of neo-classical model, through which trade could affect economic growth in a typical developing country. One idea is that capital inflows, through FDI for instance, normally embody knowledge and

¹ Capital in the paper includes both physical and capital components.

² Magnification effect is defined in terms of the property of the Heckscher-Ohlin Model that changes in certain exogenous variables leading to larger changes in the corresponding endogenous variables. More information on the Heckscher-Ohlin Model is provided inside the paper.

innovations that may not be available in the local economy, prompting local researchers to gain further insights from these innovations. Therefore, by providing access to foreign innovations, FDI can promote a magnification effect of trade through technological diffusion, increased productivity and economic growth, but national policies are key for this to happen. **The danger without magnification effects is “open door to capital flows” could turn to “empty door for trade”, in the long run.**

In this context, we argue that the impact of FDI could easily be separated in two ways: the level effects, such as GFCF; and highly variable magnification and long-run effect that depend on a number of endogenous factors. More specifically, this paper focuses on three main questions: (1) Can FDI promote more than GFCF?; (2) What are the key steps for the process?; and (3) How can African countries get the maximum benefit from FDI inflows? It complements existing literature by including an empirical analysis of a more representative sample of African countries, and an analytical model for the magnification effects of FDI in the host economies. The empirical analysis is conducted using a unique panel data set of African countries. That said, the paper is divided in five sections: After the introduction is the background in section two. Section 3 provides the methodology. The results of the empirical analysis and model that explains the trade magnification effects are contained in section 4. Sections 5 and 6 contain the conclusions and recommendations.

2. Background

a. FDI inflows to Africa.

Africa has attracted increasing amounts of inward FDI in the past three decades, with FDI inflows rising from \$0.4 billion in 1980 to \$36 billion in 2006 (figure 1) and increasing further to \$53 billion in 2007. Inward FDI stock in the region rose from \$40 billion in 1980 to \$315 billion in 2006 (UNCTAD 2007a) (figure 2), and to \$393 billion in 2007. The ratio of FDI inflows to the region's gross fixed capital formation reached its highest level of 21% in 2001, declining to 13% during 2002-2004 and recovering to 20% in 2006.

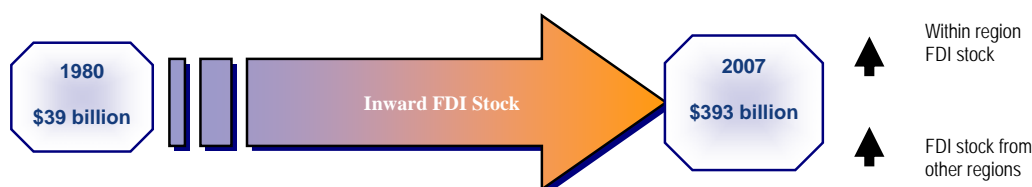
Figure 1.
FDI inflows to Africa.



Source: UNCTAD (www.unctad.org/Templates/Page.asp?intItemID=3277&lang=1).

In many countries, inflows rose mainly in the primary and services sectors, partly to exploit vast natural resources and a wide range of national privatization schemes. The profile of the foreign direct investors and their destinations in the region has varied over the years. TNCs from the developed countries and more recently, developing countries to a lesser extent, have invested in a wide range of industries, including among others, oil exploration, in which there have been many new exploration activities while at the same time existing TNCs have raised their stakes in previously operational mines.

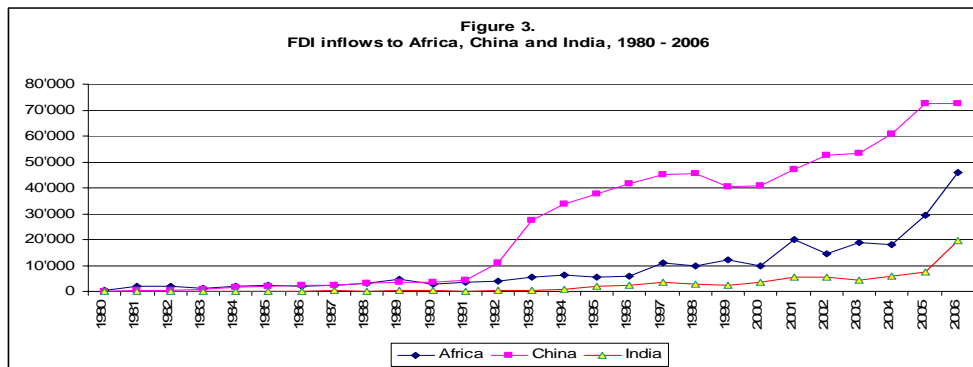
Figure 2.
FDI stock in Africa.



Source: UNCTAD (www.unctad.org/Templates/Page.asp?intItemID=3277&lang=1).

Nevertheless, the region's share in global FDI has declined, partly because of lower inflows to the manufacturing sector in the 1990s, before a slow recovery during 2000 to 2006.

The recent surge of FDI inflows to the African region, particularly over the period 2001-2007 (figure 1) followed from the twin forces of an upward spiral in commodity prices³ and a more positive climate for investments in the region backed by positive reform of policy frameworks for FDI, including, among others, for natural resource exploitation.



Source: UNCTAD (www.unctad.org/Templates/Page.asp?intItemID=3277&lang=1).

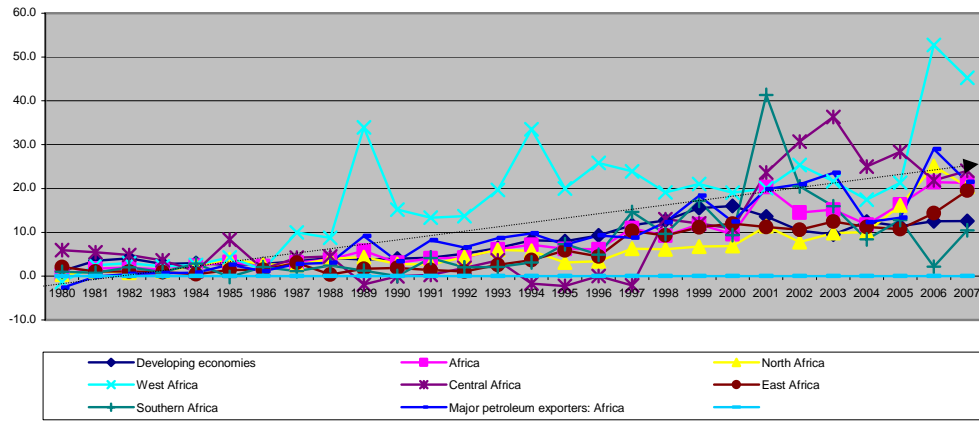
Analyzed comparatively, Africa has done fairly well in attracting FDI inflows compared with China and India, two economies that have similar but a bit large population than the entire Africa. Until 1999, Africa as an entity outperformed both China and India in attracting FDI inflows. Starting from 2000, China has significantly increased its FDI inflows while India which started at about the same level as Africa in 1980 still lagged behind by a significant margin in its FDI inflows.

A number of African countries have also received more commitments by the international community to scale up aid, support regional development initiatives and infrastructure development, and have been provided more market access initiatives, all of which contribute to shoring up FDI inflows. FDI is now subject to less restrictive compliance criteria and less cumbersome approval procedures. In many parts of the region, political conflicts and related sanctions on their economies have waned; governance has been strengthened and economic performance improved at a time when commodity prices have been rising rapidly.

As a consequence, the region's largest natural resource producers such as Angola, Algeria, Libyan Arab Jamahiriya, Mozambique, Nigeria and South Africa (table 1), which account for roughly three quarters of the region's commodities exports, also accounted for about more than three-quarters of the region's FDI inflows. Moreover, countries not traditionally known for large reserves of natural resources such as Ethiopia, Kenya, Mauritania, Somalia and Uganda (table 1), also became exploration hot spots, with TNCs investing billions of dollars in many of their projects.

³ Prices of commodities such as aluminium, copper, diamond, gold, nickel, oil and gem stones surged more than 300% between 2000 and 2006. Source: Bloomberg.com - Commodity futures (<http://www.bloomberg.com/markets/commodities/cfutures.html>), 10 October 2006.

Figure 4.
FDI inflows as a % of GFCF for Groups of developing countries, 1980 - 2007.



Source: UNCTAD (www.unctad.org/Templates/Page.asp?intItemID=3277&lang=1).

Table 1. FDI inflows to Africa 1970-2006
(Millions of dollars)

Host region/economy	1970-1979	1980-1989	1990-1999	2000	2001	2002	2003	2004	2005	2006
	(Average)									
Africa	1 124	2 202	6 625	9 685	19 979	13 571	18 677	18 018	29 648	35 544
North Africa	184	895	2 040	3 456	5 528	3 925	5 376	6 616	13 528	23 324
Algeria	118	34	154	438	1 196	1 065	634	882	1 081	1 795
Egypt	171	860	805	1 235	510	647	237	2 157	5 376	10 043
Libyan Arab Jamahiriya	- 173	- 250	- 21	141	- 113	145	143	357	1 038	1 734
Morocco	11	65	591	471	2 875	534	2 429	1 070	2 946	2 898
Sudan	2	7	92	392	574	713	1 349	1 511	2 305	3 541
Tunisia	55	179	420	779	486	821	584	639	782	3 312
Other Africa	940	1 307	4 585	6 229	14 451	9 645	13 301	11 402	16 120	12 221
West Africa	520	705	2 086	2 172	2 079	2 884	3 377	3 743	4 997	6 841
Benin	3	7	38	60	44	14	45	64	53	63
Burkina Faso	2	2	7	23	6	15	29	14	34	26
Cape Verde	..	1	14	33	17	10	16	20	76	122
Côte d'Ivoire	44	49	203	235	273	213	165	283	312	253
Gambia	2	2	18	44	35	43	15	49	45	70
Ghana	22	9	102	166	89	59	137	139	145	435
Guinea	..	5	20	10	2	30	83	98	102	108
Guinea-Bissau	..	1	3	1	..	4	4	2	9	42
Liberia	80	171	72	21	8	3	372	237	- 479	- 82
Mali	2	2	24	82	122	244	132	101	224	185
Mauritania	- 3	8	5	40	77	67	102	392	864	- 3
Niger	14	10	10	8	23	2	11	20	30	20
Nigeria	320	434	1 494	1 310	1 277	2 040	2 171	2 127	3 403	5 445
Senegal	14	7	57	63	32	78	52	77	45	58
Sierra Leone	10	- 13	3	39	10	10	9	61	59	43
Togo	13	11	14	41	64	53	34	59	77	57
Central Africa	176	223	146	552	1 551	2 146	3 307	2 712	3 716	3 786
Burundi	..	3	1	12	..	..	..	..	1	290
Cameroon	20	96	28	159	73	602	383	319	225	309
Central African Republic	4	5	1	1	5	4	19	25	29	24
Chad	12	12	22	115	460	924	713	495	613	700
Congo	27	28	117	162	71	131	321	- 13	724	344
Congo, Democratic Republic of	60	- 4	3	23	82	117	158	10	- 79	180
Equatorial Guinea	..	2	101	111	941	323	1 444	1 651	1 873	1 656
Gabon	48	65	- 132	- 43	- 89	39	263	219	321	268
Rwanda	4	17	4	8	4	3	5	8	11	15
São Tomé and Príncipe	..	..	1	4	3	3	1	- 2	- 1	..
East Africa	61	62	400	1 047	1 042	1 020	1 310	1 318	1 205	1 789
Comoros	2	4	..	..	1	..	1	1	1	1
Djibouti	..	..	2	3	3	4	14	39	22	108
Eritrea	..	..	77	28	12	20	22	- 8	- 3	4
Ethiopia	11	..	69	135	349	255	465	545	221	364
Kenya	31	30	21	111	5	28	82	46	21	51
Madagascar	4	4	19	83	93	61	95	95	86	230
Mauritius	2	10	28	266	- 28	32	63	14	42	105
Seychelles	4	14	31	24	65	48	58	38	86	146
Somalia	3	- 4	1	..	..	..	- 1	- 5	24	96
Uganda	1	1	72	181	151	185	202	222	257	307
United Republic of Tanzania	4	5	121	216	389	388	308	331	448	377
Southern Africa	183	316	1 953	2 458	9 779	3 595	5 307	3 629	6 202	- 195
Angola	3	134	574	879	2 146	1 672	3 505	1 449	- 1 303	- 1 140
Botswana	26	63	16	57	31	405	419	392	281	274
Lesotho	..	7	23	32	28	27	42	53	57	57
Malawi	10	7	13	40	60	6	7	22	27	30
Mozambique	1	2	92	139	255	347	337	245	108	154
Namibia	..	5	88	188	365	182	149	226	348	327
South Africa	92	14	850	888	6 789	757	734	799	6 251	- 323
Swaziland	15	28	59	91	29	92	- 61	71	- 50	36
Zambia	30	52	142	122	72	82	172	364	380	350
Zimbabwe	18	8	95	23	4	26	4	9	103	40
Memorandum										
Developing economies	5 922	20 580	118 185	256 088	212 017	166 318	178 699	283 030	314 316	379 070
World	24 365	93 878	403 802	1 411 366	832 567	621 995	564 078	742 143	945 795	1 305 852
Least developed countries: Africa ^a	286	463	1 670	2 988	6 069	5 707	9 762	8 245	6 212	8 052
Least developed countries (LDCs)	306	507	2 546	4 026	7 072	6 563	10 594	9 320	7 326	9 375
Major petroleum exporters: Africa ^b	342	445	2 186	2 887	4 488	5 092	7 038	5 021	5 265	8 447
Major petroleum exporters	1 071	3 562	8 527	4 952	8 872	10 964	19 853	25 037	44 917	48 558

Source: UNCTAD (www.unctad.org/Templates/Page.asp?intItemID=3277&lang=1).

^a Least developed countries in Africa include: Angola, Benin, Burkina Faso, Burundi, Cape Verde, Central African Republic, Chad, Comoros, Democratic Republic of Congo, Djibouti, Equatorial Guinea, Eritrea, Ethiopia, Gambia, Guinea, Guinea-Bissau, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mozambique, Niger, Rwanda, São Tomé and Príncipe, Senegal, Sierra Leone, Somalia, Sudan, Togo, Uganda, United Republic of Tanzania and Zambia.

^b Major petroleum exporters in Africa include: Algeria, Angola, Congo, Gabon, Libyan Arab Jamahiriya and Nigeria.

Additionally, the demand for Africa's natural resources, particularly oil is rising. The United States for instance, has been reducing its dependence on Middle East oil with the

goal of a 75% reduction, and increasing its interest in supplies from Africa.⁴ Petroleum from Libyan Arab Jamahiriya (light with low sulphur content and cheap to produce) became attractive to Europe after sanctions that had been imposed earlier were lifted. TNCs from China, India and Malaysia have also joined the search for oil (and other primary resources) to sustain their rapidly growing economies. In return, nearly every subregion in Africa has attracted new FDI flows into petroleum projects, thus increasing the spread and volume of FDI to many countries.

In a marked shift in distribution pattern, therefore more African countries have received larger FDI inflows, particularly after 2000. Only one African country received FDI inflows of more than \$1 billion in the early 1990s, but in 2006, that number had increased to eight, contributing to the volume of FDI inflows to the region which doubled in just the two years 2004-2006 (table 1). The region received total FDI inflows of \$145 billion in the seven-year period from 2000 to 2006, compared with only \$54 billion during the preceding seven years. Prior to the surge, a larger number of African countries received smaller FDI inflows, mainly into the services sector and linked to privatization programmes.

The rising amounts of FDI inflows over the recent past have, however, not led to an increase in Africa's share of global FDI, as flows to other regions have grown faster (figure 2). Starting from the early 1980s, the share of Africa's FDI inflows in global FDI converged to the levels of the region's shares in global GDP and trade (figure 3). Africa's share of global FDI inflows stagnated at about 3% between 2000 and 2006 (2.7% in 2006), a major decline from its share of about 9.5% in 1970. This decline in the region's share can be attributed to some problems which continued to be obstacles to FDI inflows, especially in the manufacturing sector.

The slowdown in manufacturing flows to the region is also reflected in a decline in the share of manufacturing in FDI in the region. The most discerning fact about problem related to the dramatic expansion of trade in Africa is that most if it is the result of surging energy demand and prices. Most of the foreign investments were concentrated in minerals, mainly oil and metal production. Particularly, non-oil trade to the United States, for instance, had declined by 16% mainly due to a decline in AGOA apparel import.

The industrial distribution of FDI inward stock and flows clearly show that resource-seeking FDI has traditionally played an important role in some African countries. In Botswana, the primary sector accounted for more than 60% of the FDI stock in 2005 (table 2). In South Africa and Nigeria – the largest and the second largest FDI recipients in terms of stock – the share of the primary sector has risen almost two-fold and eight-fold respectively since the mid-1990s, reflecting rising corporate profit and high commodity prices. According to FDI flow data, the primary sector accounted for the largest share in Nigeria (79%) in 2005 and Madagascar (71%) in 2006, while in Tunisia the share of flows in the sector declined from 80% in 1995 to 22% in 2006 (UNCTAD, 2008).

In the top two FDI-recipient countries in the region - South Africa, and Nigeria which together accounted for 37% of FDI stock in Africa in 2006, the share of the primary sector in inward FDI stock increased to 41% in 2006, from 5% in 1996 in the former, at

⁴ "Africa oil and gas: Africa's oilfields have become an important battleground of influence", *Financial Times*, 1 March 2006.

the same time that the share of the manufacturing sector almost halved: to 27% from 40%, while in Nigeria, the share of primary sector in inward FDI stock rose to 75% in 2005 from 43% in 1990. Similar changes took place in several other African countries (table 2). Only in a few relatively small FDI-recipient countries such as Madagascar, Namibia and United Republic of Tanzania did the share of manufacturing FDI inflows increase in the 1990s, although in Madagascar the share of the primary sector rose much more than that of manufacturing.

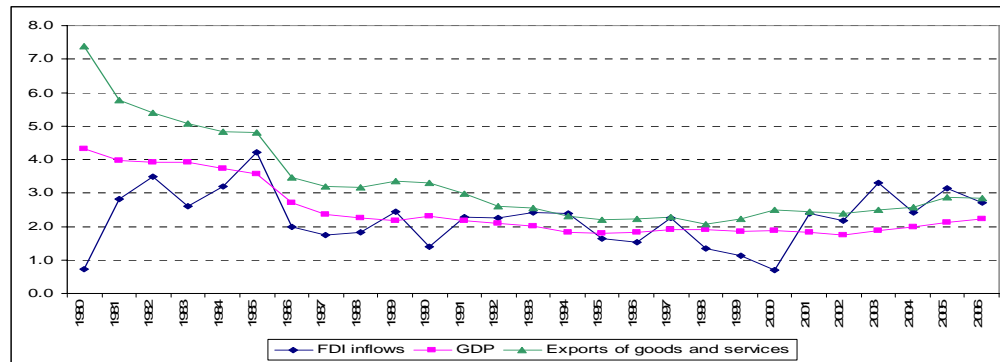
In some of the natural resource producing countries such as Angola, Botswana, Chad, Namibia, Nigeria and South Africa, and in others aspiring to attract more FDI to add value to their products, high cost of production was a major obstacle to investments in greater processing of diamond, gold, silver, including textile products for which the region has large preferential market access quotas. In Botswana, Namibia and South Africa, for instance, a high cost of production is still a major obstacle to the drive by the Governments, for greater beneficiation of the diamond production. Diamond polishing and cutting in South Africa costs up to \$40 per rough carat compared with \$10 to \$14 in India.⁵ In the apparel and textile industry, South Africa pays its workers \$1.38 an hour, as against the Chinese figure of \$0.88.⁶

In the latter industry, FDI inflows to Africa also suffered a major setback in 2005 with the end of the Multi-Fibre Arrangement (MFA). Enhancing the competitiveness of human resources and maintaining necessary skills require national policies focused on worker productivity and training. It also means adapting labour laws and the education systems to fit the needs of producers and the market economy, thereby addressing the problem of deficit in skills at all levels. In order to benefit from commodity-market boom and sustain growing FDI inflows, human capital is important. One of the challenges for Africa is thus how revenues obtained from commodity exports could be channelled towards education and human resource development which is essential for productivity improvements and for industrialization in general as well as for attracting FDI into the manufacturing sector.

⁵ "Beneficiation: in search of carrot that may persuade miners to process locally", *Financial Times*, 28 June 2005.

⁶ "Africa Economy: China syndrome", Economist Intelligence Unit (www.viewswire.com), 27 July 2005

Figure 5.
Shares of African countries in world FDI inflows, GDP and exports, 1980-2006 (%)



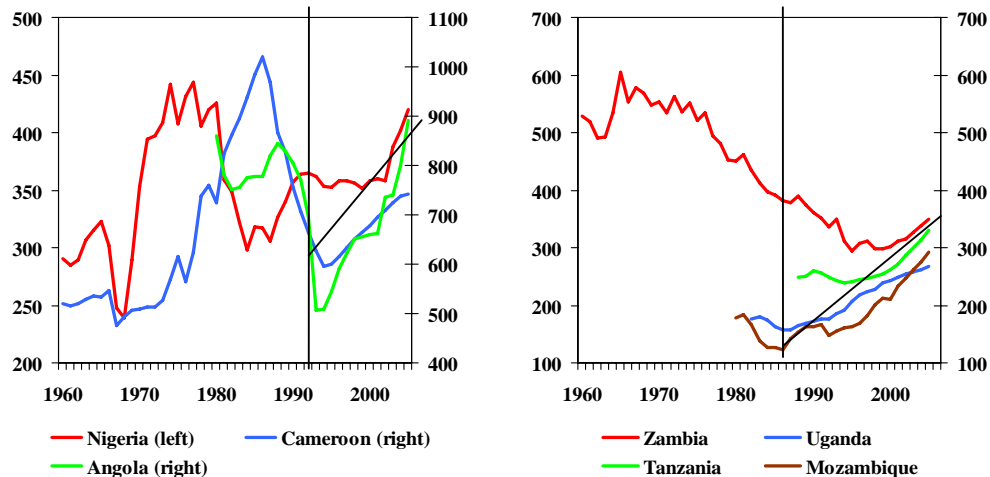
Source: UNCTAD (www.unctad.org/Templates/Page.asp?intItemID=3277&lang=1).

In some other countries, services and manufacturing are key sectors for FDI. For example, almost the same share (two fifths) of the FDI inflows in 2006 into Egypt (38%) went into services and the primary sector, with 8% going to the manufacturing sector (16% in unspecified). Morocco is another example of an African country that has a large amount of FDI stock in services (60%) and manufacturing industries such as textiles and electronic equipment (31%) and only 3% in mining, quarrying and petroleum. This is confirmed as well by FDI flow data (table 3) where there is an increase of flows to Morocco from 39% in 1996 to 65% in 2006 due to large investments in transport, storage and communications. Financial services accounted for a large share of inward FDI stock in Egypt, South Africa and Zambia while in Uganda the share increased from 18% in 2000 to 28% in 2003 (table 2); and in Mauritius, as much as half of FDI inflows went to financial industry (table 3).

A wider range of small and resource-poor countries have attracted slightly increased FDI inflows into the services sector, mainly from developed countries and South Africa, through privatization programmes. Nevertheless, several countries, particularly least developed countries (LDCs) mostly without large reserves of natural resources still lagged behind in their FDI inflows (table 1). Some of them were also troubled by civil wars and political instabilities, making it risky for TNCs to make long-term investment in these economies. Six LDCs – Chad, Liberia, Rwanda, Sierra-Leone, Somalia and Sudan – were mired in conflicts or their after effects. However, the situation was moderated with respect to FDI inflows to Chad and Sudan, where oil reserves have been turned into major recipients of FDI, starting from 2003 (table 1).

In terms of direct impact of large FDI inflows to Africa particularly, the natural resource-rich countries, it could be that the tide is already turning (figure 4).

Figure 6.
Real Per Capita GDP, in US dollars, in selected natural resource-rich countries



Source: Mercier (2007- based on World Bank).

Typically, since 1990, the income per capita has grown, though with annual fluctuations, in a number of African countries (figure 4). What is unique about the changed in per capita income is that it is not narrowed to the natural-resource producers only that receive large FDI inflows in the sector. Other countries that participated in privatization also witnessed their FDI inflows surge at the same time that efficiency and income per capita change in some cases. The number of African subscribing to mobile phone services, mostly offered by TNCs grew from 1.2 million in 1996 to over 200 million in 2006 (Source: ITU - www.itu.int/ITU-D/ict/statistics). Non-equity relations between State-owned firms and TNCs are also increasing in the services sector. For example, the Government of the United Republic of Tanzania contracted Eskom of South Africa to manage Tanzanian Electricity Supply Company. These anecdotes demonstrate some of the impacts of FDI in Africa's economy.

Both the empirical and theoretical literature have defined the implications of the international trade in capital, FDI for instance for a developing region like Africa, in various ways. We review these specifications, briefly, in the next section to help analyze the implications of FDI inflows to Africa's productive capacity and long-term economic growth.

b. Literature on growth effects of foreign capital.

Several empirical studies have considered the possible link between international trade in capital and technological diffusion. In general, the findings of these papers support the notion that international trade in capital contributes significantly to increased availability of goods and technological diffusion, although the precise mechanism through which trade promotes technological diffusion is not specified. Most of these studies have focused on general imports as a channel for technological diffusion (Coe and Hoffmaister, (1998), Eaton and Kortum, (1997) and Keller, (1996)).

Until recently also, the argument for free international trade was based upon static considerations of specialisation and international division of labour. In contravention to this view, many have equally argued that shifting production in international trade more in line with one's comparative advantage to raise income per capita does not have any

implication for long-run growth (see for instance Amsden 2007). Despite that, there is still no general consensus concerning the benefits from trade and the mechanisms through which these benefits are best achieved. Some argue that the existing measures and evidence concerning the direction of causality is not conclusive. Also it has become increasingly common to insist the measures and evidence tend not to relate to the mechanisms through which endogenous growth theory suggests are important.

In essence, Grossman and Helpman (1990) had suggested that FDI can potentially help disseminate technology to the host country. But, a country's ability to absorb foreign technology embodied in imports might depend on its level of infrastructure and absorptive, part of what we call base knowledge (see for instance Keller, 1996). Bardhan (1995), also argues that the flow of technology through FDI to a developing country is often constrained not so much by restrictive government policies as in the shortage of infrastructure.

The model assumes that physical capital inflows due to FDI depreciates but there are likely to be substantial positive externalities of international trade to human capital inputs and, perhaps to physical capital, to the extent that they embody new technology, so that the classical and neo-classical result of diminishing returns are avoidable through such economy-wide magnification effects. Basically, the argument is that the first (short-term) level impact increases the intensive margins of trade (traditional exports) at a decreasing rate (Aghion and Howitt (1998) and Abromovitz (1986). Others have argued about the extensive margins of international trade.

In this line, the issue of mechanisms for the effects of international trade on economic growth appears very genuine and important, though a comprehensive analytical and empirical testing of the argument is very much in its infancy, particularly with respect to magnifying trade in developing countries of Africa. These views in the literature provide a good guide to the sequence of methods for the analysis in this paper.

3. Methodology

As indicated at the beginning, we will do an empirical analysis of the impact of FDI on Africa's exports, as well as explore a model that defines the magnification effects of international trade on a local economy. The empirical specifications of the export growth regressions are based on the theoretical models developed by Grossman and Helpman (1990) and Barro and Sala-i-Martin (1995). The empirical analysis uses a pooled-panel data set consisting of a cross-section of 53 developing African countries. The panel regressions are estimated using country fixed effects. All variables are used in natural logs and expressed in real terms.

In the regression analysis, export growth is expected to correlate positively to the change of stock of physical capital (GFCF) as a result of FDI. In this function, change in GFCF as a result of FDI is supposed to have a direct effect on growth. We use annual data for the entire period. The functional form of the econometric model tested is that growth of export (X_{it} , in ln differences) as a function of the growth of GFCF (K_{it}), and is specified as follows:

$$X_{xit} = \beta_0 + \beta_1 K_{it}(t)(GFCF) + \mu_{it},$$

As before, in the fixed effects regressions, β_0 represents an individual effect which is unknown.

We used a sample of 53 African countries, and 212 pooled observations in a panel data technique to test this model. This model is similar to that estimated by Barro (1998).

In the second stage of the analysis, develop a magnification framework, a large part of which is based on fuzzy logic, that facilitates the transmission mechanism of knowledge through FDI. The mechanism involved in this model is essentially about turning the FDI boom in the developing countries of Africa into long-term capacity for sustained economic growth. In the model, we argue that international trade can impact upon growth by allowing trading countries, especially the less developed, access to the innovative products and processes of their trading partners. Here is how it works.

The impact of the short-term gains in physical capital may disappear over time and with fluctuations, as the economy settles at a new equilibrium. Production must, however, be at least zero or greater than zero as a minimum condition for economy to enter the magnification effect; which can also be the steady-state equilibrium given as a set of conditions. In the dynamics involving long-term structural transformation and the spill-over argument, endogenous parameters have greater, though more uncertain, impact on long-term and extensive margins of trade related technological progress and economic growth than the physical capital. It is the learning and spill-over that reverberate through the economy as more vertical specialization which is equivalent to number of trained worker in the focus industry, and presumably more productive workers innovate and their innovations re-enforce synergistically with other factors to affect the overall productivity of the economy, which also rises. Here are the empirical results and model for analysis of the international trade magnification effects.

4. Results

The panel data analysis confirms that a large proportion of the cross-country variation in the export performance of African countries through FDI. The variation is most important after four years of investment. The result of the econometric analysis is as follows:

Econometric regression results.

$$-0.03801 (-1.47) + 0.00214 (1.53) (GFCF)(-3) + 0.037(2.43)(GFCF)(-4).$$

Obs. = 212

R² = 0.48.

Coefficients are before the t-statistics.

t-statistics are in parentheses.

Significant at 0.01 level.

F-Statistics = 92.7.

We were only able to obtain some significance from the regression when the regressor is lagged for four years. The overall performance of the econometric models can be assessed as satisfactory. The fit of the regression is good with significant F -statistics at the 1% level in all cases. This is understandable considering that most of the input to the mining activities takes sometime to put to work. This result is robust to the inclusion of various additional variables in the export growth model. The model shows some important correlation between increase in FDI inflows and export in African countries. The coefficient of determination is fairly good at about 50% and coefficient of the regressor, though not very large in term of t -statistics, is acceptable. The lagged value of the other GFCF values proved to be collinear (multi-collinearity) with the acceptable values and had high error terms and low t -statistics for same years. As a result, they are not reported here. Basically, what this is saying is that GFCF as a result of change in FDI have influence on Africa's export performance, and its effect is much larger at the lag of four years.

The statistical importance of the regression still does not answer all the pending questions, especially those related to the sustainability of the economies. As we indicated at the beginning, most of the FDI inflows had gone to the natural resource-rich countries of Africa. Most recently, Africa's foreign investment for related exports are now concentrated in minerals, mainly oil and metal production. Particularly, non-oil related trade, for instance, had declined by 16%. At the same time, there had been noticeable changes in their income per capita, particularly in the resource exporting economies. But the changes in income per capita is only sustainable when viewed against the expectation of the limits of the on-going boom of foreign physical capital inputs to the "natural resource miracle" and a transformation out of these limits.⁷ Unfortunately, the biggest economic boom ever for Africa in recent times may be ending soon. A perspective to the answer can be provided on some proactive efforts of national policy for international trade to magnify the current boom into more than the level effect from the capital inflows. The dynamics is explained below.

The magnification mechanism shows that domestic factor endowment, particularly base knowledge and human capital, play an important role in a way that is consistent with the endogenous theoretical model dynamics of economic transformation (Keller 1996). Essentially the schematic nature of this model responds to the infancy of the research on endogenous growth model. Typically, the dynamics of this model which is based on fuzzy logic cuts across all layers of analysis: micro, institutional and macroeconomic factors. Moreover, the combined dynamics arguably defy most of the properties of statistical and econometric analysis.⁸ For these reasons, any claim of statistical and econometric analysis relevant will be subject to questions.

To understand how the international trade magnification effect model works, assume that there is a variable return to scale due to the factor input that could be indexed (see for instance, Aghion and Howitt, 1998). A general aggregate production function in the growth model for a representative economy is thus expressed in the following argument. Total output and employment are dependent on the accumulated capital stock (human, intellectual and physical, see for instance, Romer 2000).

⁷Source: *The Fin24.com* - "Skills shortage real - survey", (www.fin24.com) 6 June 2007; *The Star* - "Skills shortage hampering growth", (http://www.iojobs.co.za/article_view.php?fArticleId=3523171), 6 November 2007; *Mining Weekly* - "Project house offers solution to skills shortage", (www.miningweekly.com) 1 February 2008.

⁸ The trade magnification effect model specified in this paper, arguably, contains components that defy several statistical properties. The factors are a mixture of micro, meso and macro factor. A large number of them such as innovation and the creative destruction effect may have random walk that is non-stationary, co-integrate variously and probably have unit-root. These are subject to additional research and verification.

In this formulation, the level of magnification - learning, incubation of knowledge and the rate of its application are determined endogenously. Rather it is a functional allocation of productive human capital to learning activities. In this relationship, only a part of human capital (physical labour) is used for production process. The other part of human capital (intellectual) is used for trade magnification - learning and knowledge incubation process. If therefore, human capital is isolated and divided between the physical production and learning function, then innovation due to the related effort arrives randomly at a rate (influence mobility) indicating the highly variable productivity of the research. The productivity of research will have a Poisson/random distribution.⁹ For more on Poisson distribution, see Kuznets (1966).

Therefore, for learning and knowledge incubation process to lead to an increase in competitiveness in the research and innovation sector, the steady-state growth rate of the economy has to be transformed. A reduction in the entry cost in the business, amounts to increasing the value of and number of actionable knowledge (Poisson arrival rate of innovation per research firm), since the steady-state growth rate will also increase as a result of lower entry cost and more firms seeking to participate in production in the economy. In this context, growth now becomes partly an endogenous process incorporating the innovation in each research facility, increasing the size of the technological improvements and total and higher number of research facility firms in the economy.

In a simple language, what this model is saying is that in international trade, the domestic utility of the inputs emanates through two mechanisms: the level effect and spill-over effect (magnification). In the level effect, the number of differentiated products rises in the short-term due to availability of foreign varieties and intermediate goods. In the spill-over effect, the number of producers increase, competition also grows leading to search for more R&D and efficiency gains per firm to rise. In the dynamics for the spill-over effect, the increased rivalry and competition leads to increased domestic innovations, employment, total factor productivity and therefore sustained economic growth.

The commonly applied model on this follows Krugman (1986) assumptions of the effects of opening an economy to international trade and a case in which the consumers exhibit Dixit-Stiglitz utility function (Dagaspata (1986)). The details of magnification and conditions of this model can become a major algebraic diversion. An elaborate detail of the model could be obtained in Dasgupta (1986). (Some of the relationships are replicated in the schematic figure 7).

Figure 7. on the schematic of the two way impact of international trade on production helps to keep trace of the conceptual scheme of the impact of international trade in capital on sustained economic growth. The aggregate output of the final good is the summation given by the growth rate of economy-wide knowledge which is in turn governed by the spill-over equation.

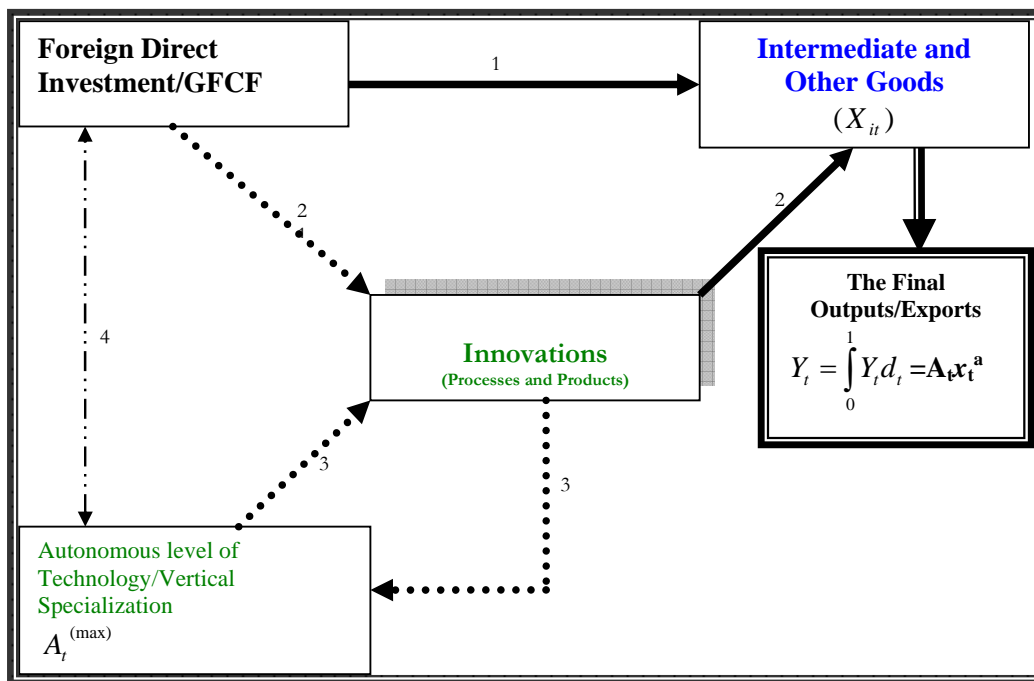
⁹ Mathematically, Poisson process means that at the time T, the possibility of an innovation occurring is a random variable whose distribution is exponential with a deterministic parameter. It implies that an innovator may find a new invention/innovation in the process of solving the particular problem, at a time unknown to him. Even by allocating a large amount of his time and resources, it is still uncertain to the innovator when the next innovation may take place.

In the long-run, the increased learning and need for innovation causes R&D to rise and companies to produce new goods (see Branstetter (1996) and Dosi (1988)). In so far as openness and international competition increase rivalry and competition among domestic firms, innovation will be stimulated and growth will rise given the availability of capable and willing capacity to undertake the required research activities. Prove of these dynamics and effects in the case of the Asian economies, particularly Japan, are available in Choi (1984) and Ito and Urata (1994).

The conclusion is simple, based on these models. The classical and neo-classical result of diminishing returns and total collapse of industrial effort as capital depreciates can be avoided through economy-wide spill-over effects of technology and cumulative and base level of spilled-over knowledge, if a benefiting economy possesses sufficient absorptive capacity to compliment and therefore contribute to learning and innovate in the focus-industry. Technology can be appropriated, to a degree, considering its tacit contents, by the creator - the private individual or firm.

Figure 7.

Dynamics of adjustment of a trade magnification model.¹⁰



Source: Author.

Thus, when international trade in capital takes place, the cost reduction effect on competitiveness will always be positive, encouraging more upward shift on investments, production and exports and therefore sustained economic growth. Particularly, following the principles of the model, if the value of cost reduction, as a result of absorptive capacity (base knowledge) contribution to the dynamics is large and long enough, the effect will dominate development through an upward transformation shock of investment inflows, diffusion of expertise and innovations. If on the other hand, the

¹⁰ Initial and variant version of this was developed in Aghion and Howitt (1998).

effects are large but not long enough, and factor input productivity that it compensates for remained constant, its end will also dominate negatively, on the direction of development which witnesses a downward transformation shock through disinvestment that occurs when cost competitiveness goes down as cost goes up.

Also, put in the arguments of the factor proportions (Heckscher-Ohlin model)¹¹ and optimal factor choice models the development objectives of international trade could fail, given the absence of absorptive technical competence.

As admitted at the beginning of this paper, exporting could be a rewarding growth strategy for African countries but it could also be a challenging and complex process. Also given that the endogenous theory argument of the magnification effect of trade is still at its infancy. In the model (figure 7), four main channels of influence are emphasized: 1.) direct contribution of international trade to intermediate goods and exports; 2.) contribution to innovation and knowledge; 3.) spill-over of knowledge from the innovation process to the local economy through vertical specialization, and; 4.) advanced contribution of incubation of knowledge (symbiotic) to the foreign inputs in a gradual process of internalization. Countries that are only able to achieve level 1, in the schematic fail to sustain growth beyond the effects of FDI (a good case of many African countries). Countries that reach level 2 and 3, sustain growth with or without the FDI and are likely to internalization the innovation process and specializations due to foreign inputs, indicated in level 4. At level 4., countries become contributors to investment in other countries.

It is to be remarked that whence a local economy is able to achieve internalization capacity, the foreign inputs could be excluded from the model and yet the production process sustains itself (see for instance Urata, 1994). As suggested in various studies in a volume edited by Griliches (1984), the stock of human capital and the level of R&D expenditures should also be positively correlated with the rate of knowledge diffusion and innovation. In addition, factors that affect the profitability of innovation, such as

¹¹ The standard **Heckscher-Ohlin (H-O) model**, also known as "Factor Proportions Model" begins by expanding the number of factors of production from one to two. The model assumes that labour and capital are used in the production of two final goods. Here, capital refers to the physical machines and equipment that is used in production. Thus, machine tools, conveyers, trucks, forklifts, computers, office buildings, office supplies, and much more, is considered capital.

All productive capital must be owned by someone. In a capitalist economy most of the physical capital is owned by individuals and businesses. In a socialist economy productive capital would be owned by the government. In most economies today, the government owns some of the productive capital but private citizens and businesses own most of the capital. Any person who owns common stock issued by a business has an ownership share in that company and is entitled to dividends or income based on the profitability of the company. As such, that person is a capitalist, i.e., an owner of capital.

The H-O model assumes private ownership of capital. Use of capital in production will generate income for the owner. We will refer to that income as capital "rents." Thus, whereas the worker earns "wages" for his or her efforts in production, the capital owner earns rents.

The assumption of two productive factors, capital and labour, allows for the introduction of another realistic feature in production; that of differing factor proportions both across and within industries. When one considers a range of industries in a country it is easy to convince oneself that the proportion of capital to labour used varies considerably. For example, steel production generally involves large amounts of expensive machines and equipment spread over perhaps hundreds of acres of land, but also uses relatively few workers. In the tomato industry, in contrast, harvesting requires hundreds of migrant workers to hand-pick and collect each fruit from the vine. The amount of machinery used in this process is relatively small. In the H-O model we define the ratio of the quantity of capital to the quantity of labour used in a production process as the capital-labour ratio. We imagine, and therefore assume, that different industries, producing different goods, have different capital-labour ratios. It is this ratio (or proportion) of one factor to another that gives the model its generic name: the Factor Proportions Model.

patents and the size of the market should also contribute positively to innovative activities.

This complex process, however, requires a challenging and sometimes tacit organizational capability. Africa can look at Asia for some common themes and problems. A good example is the Japanese model of industrialization with its public-technical support units for innovation on external inputs (Choi (1984) and Ito and Urata (1994)). Through the system, the Japanese auto-industry, for instance, was able to contribute innovations to the global auto-industry and trade.

5. Conclusions and recommendations.

Those African countries that receive more FDI from more technologically advanced countries are likely to benefit in terms of growth, particularly of their exports. The mechanism through which such growth effects accrue are the direct impact of the higher quality and wider variety of physical capital accumulation on the productive capacity, and through a magnification effect, knowledge spill-over, encouraging innovations. This last process is only possible if these countries build the necessary and relevant absorptive human capacity for the type of trade-related industry that they intend to promote. Therefore national policies for capacity building are very central as in the experiences of the 'tiger' economies of Asia.

Reference

- Abromovitz M. (1986). "Catching Up, Forging Ahead and Falling Behind", *Journal of Economic History*, 46(2): 385-406.
- Aghion P. and Howitt P. (1998). *Endogenous Growth Theory*. Cambridge Massachusetts: The MIT Press.
- Amsden, Alice (2001). *The Rise of the Rest: Challenges to the West from Late-Industrializing Economies*. New York: Oxford University Press.
- Bardhan P. (1995). "The contributions of endogenous growth theory to the analysis of development problems: An assessment," *Handbook of Development Economics*, in: Hollis Chenery & T.N. Srinivasan (ed.), *Handbook of Development Economics*, edition 1, volume 3, chapter 46, pages 2983-2998 Elsevier.
- Barro, R. J. and Sala-I-Martin X. (1995). *Economic Growth*. Cambridge Mass.: The MIT Press.
- Branstetter, L. (1996). "Are Knowledge Spill-overs International or Intra-national in Scope?" Micro-econometric Evidence from the U.S. and Japan. NBER Working Paper no. 5800.
- Choi, H.S. (1984). *Technology Development in Developing Countries*. Mimeo, Asian Productivity Organization, Tokyo.
- Coe T. David and Hoffmaister Alexander W. (1998). "North-South Trade: Is Africa Unusual". IMF Working Paper No. 98/94. Washington D.C.: IMF.
- Dasgupta, A. K. (1986). *Economic Theory and the Developing Countries*. Cambridge: St. Martin's Press Inc.
- Daniels Reza C. (2007). "Skills Shortage in South Africa: A Literature Review". Working Paper 07/121. Development Policy Research Unit. School of Economics, University of Cape Town, South Africa.
- Dosi, G. (1988). "Sources, procedures, and Microeconomic Effects of Innovation", *Journal of Economic Literature*, 36, 1120-71.
- Eaton and Kortum (1996). "Trade in Ideas: Productivity and Patenting in the OECD". *Journal of International Economics*, 1996.
- Gamberoni, Elisa (2007). "Do unilateral trade preferences help export diversification: an investigation of the impact of European unilateral trade preferences on the extensive and intensive margin of trade". HEI Working Paper No: 17/2007, Graduate Institute of International Studies, Geneva, Switzerland.
- Golub Stephen S. and Edwards Lawrence (2002). "South African Productivity: An International Comparative Perspective". Article, based on research conducted for the South African National Treasury.
- Griliches Z. (1984). "Research, Industrial; Patents; Industrial productivity; Congresses; United States". Conference Proceedings, Chicago: University of Chicago Press.
- Grossman, G. and Helpman, E. (1990) "Trade, Innovation and Growth", *American Economic Review*, 80, 796-815.
- Itoh M. and Urata S. (1994). "Small and Medium-Size Enterprises Support Policies in Japan". The World Bank Policy Research Working Paper (WPS 1403).
- Jordan, Paul (2007). "The Role of Extractive Industries in Fragile States in Africa", a presentation at the AfDB annual meeting on engaging with fragile states and the sustainable exploitation and transparent management of Africa's extractive resources, Shanghai, China, 16 - 17 May 2007.

- Keller, W. (1996). "Absorptive Capacity: On the Creation and Acquisition of Technology in Development". *Journal of Development Economics*, 49, 199-227.
- Krugman, P. (1986). *Strategic Trade Policy and the New International Economics*. Cambridge, Mass.: MIT Press.
- Kuznets, S. (1966). *Modern Economic Growth: Rate, Structure and Spread*. New Haven CT.: Yale University Press.
- Mercier, Jean-Francois (2007). "Sub-Saharan Africa - Turning A Commodity Boom Into Development", a presentation to Citigroup Investment Research - a division and service mark of Citigroup Global Markets Inc.
- Meyn S.P. and Tweedie R.L. (2005). *Markov Chains and Stochastic Stability*. Springer-Verlag: London.
- Muhammad U. Ilyas and Hayder Radha (2007). "The Influence Mobility Model: A Novel Hierarchical Mobility Modelling Framework". Michigan State University.
- Nwokeabia, Hilary (2001) *Why Industrial Revolution Missed Africa: A traditional Knowledge Perspective*. Addis-Ababa, Ethiopia.
- Nwokeabia Hilary (2007). "Linking Foreign Direct Investment to Technological Progress and Sustained Economic Growth in Africa". Paper prepared for the LAMOT 2007 Conference - University of Miami, Department of Industrial Engineering, USA.
- OECD (2008). *African Economic Outlook*. Produced jointly by the Africa Development Bank and the OECD Development Centre. OECD: Paris.
- Romer (2000). Ideas – Not Machines Make Nations Prosper. [web page] 2000. http://www.ac.com/ideas/outlook/6.98/over_currentf2.html. (Accessed 8, August, 2000).
- UNCTAD (2007). *Knowledge, Technological Learning and Innovation for Development: The Least Developed Countries Report 2007*. Geneva: UNCTAD.
- UNCTAD (2008). *World Investment Directory*, Volume X: Africa. Geneva: UNCTAD.

Annex table 1. Africa: FDI inflows as % of GFCF, 1980-2007

	1980	1980-1985	1986-1990	1991-1995	1996-2000	2001-2003	2004	2005	2006
Africa	0.4	1.9	3.6	5.5	9.5	16.7	11.8	16.3	21.4
North Africa	0.4	1.6	3.3	4.4	5.9	9.7	10.1	16.2	25.1
Algeria	2.4	0.4	0.0	0.2	3.2	7.0	4.3	4.7	6.3
Egypt	7.5	10.6	11.8	7.9	6.1	3.2	16.9	32.2	49.8
Libyan Arab Jamahiriya	-13.0	-4.6	0.6	0.4	-2.1	2.8	7.1	14.4	23.0
Morocco	1.8	1.3	1.6	5.6	8.2	17.7	5.9	9.8	13.0
Sudan	0.5	0.6	-0.4	1.6	14.0	30.8	35.4	41.3	42.2
Tunisia	10.0	9.3	3.9	11.5	10.3	11.5	9.9	12.1	45.5
West Africa	-1.4	2.2	13.9	20.0	21.8	22.3	17.5	21.3	52.7
Benin	1.4	0.4	11.8	16.1	7.5	6.2	8.1	6.3	5.8
Burkina Faso	0.0	0.5	0.6	1.3	2.0	2.0	1.2	2.7	2.4
Cape Verde	..	..	1.0	3.8	16.6	12.5	20.0	21.9	30.3
Côte d' Ivoire	3.8	2.9	5.1	11.7	19.7	19.1	19.1	18.3	17.9
Gambia	0.8	-0.5	9.0	14.0	38.9	37.2	44.6	37.3	57.8
Ghana	7.9	5.9	1.4	8.1	10.5	5.7	5.6	4.6	19.4
Guinea	0.3	0.1	3.4	2.1	4.4	8.5	18.5	23.4	20.0
Guinea-Bissau	..	3.3	2.4	4.8	12.2	5.9	4.7	19.8	35.1
Liberia	36.7	65.7	301.2	-36.2	229.6	336.4	390.2	-1'587.0	-242.3
Mali	1.0	1.8	0.1	2.9	7.5	25.7	11.9	26.4	7.6
Mauritania	15.9	6.2	2.3	2.9	4.5	28.9	56.2	97.8	19.5
Niger	7.6	1.6	5.7	3.6	2.4	4.2	4.3	5.6	7.7
Nigeria	-2.9	1.9	24.8	45.0	42.5	39.9	20.3	36.7	88.5
Senegal	2.8	2.1	1.5	2.9	8.9	4.1	4.2	2.0	9.1
Sierra Leone	-9.3	-3.5	-7.1	-0.7	78.0	13.8	74.7	104.8	69.2
Togo	12.9	4.9	3.8	5.4	12.9	19.9	15.7	18.8	16.7
Central Africa	5.9	4.9	1.7	0.4	6.8	30.2	25.0	28.3	21.8
Burundi	3.8	2.6	0.7	0.6	4.9	0.0	0.1	0.5	0.0
Cameroon	5.9	6.9	-0.9	0.1	7.6	15.7	11.1	6.7	7.8
Central African Republic	11.1	10.6	2.7	-2.0	6.4	11.3	22.6	21.5	22.4
Chad	-0.6	14.8	14.2	11.1	25.1	73.5	43.4	48.2	45.4
Congo	7.1	4.7	3.7	15.2	27.8	22.0	-1.2	47.5	18.3
Congo, Democratic Republic of Equatorial	8.9	-1.0	-2.2	-0.7	3.3	22.4	0.8	-7.5	-8.4
Guinea	..	12.8	10.6	36.9	44.1	69.6	77.9	71.2	52.5
Gabon	2.5	4.2	5.5	-8.5	-14.6	3.0	10.7	3.3	13.1
Rwanda	8.7	6.4	4.0	1.3	1.5	2.6	2.9	3.2	3.3
São Tomé and Príncipe	..	..	1.5	-1.4	14.0	18.0	15.6	64.1	74.5
East Africa	2.1	1.2	1.7	2.9	9.4	11.4	11.2	10.8	14.3
Comoros	..	0.5	11.1	1.8	0.9	3.3	2.1	1.6	1.3
Djibouti	0.5	0.2	0.7	1.9	3.6	6.1	30.4	42.0	111.4
Eritrea	..	..	..	..	30.5	9.9	-3.9	-0.6	0.2
Ethiopia	0.2	0.1	0.2	0.9	11.6	21.7	27.0	11.4	20.8
Kenya	4.5	2.0	2.3	0.7	1.9	1.6	1.8	0.6	1.2
Madagascar	-0.1	0.7	3.0	4.2	6.5	10.2	9.0	7.6	24.6
Mauritius	0.4	1.5	4.5	1.8	8.1	1.8	0.8	3.1	6.7
Seychelles	17.7	24.6	27.1	20.6	21.3	56.1	13.8	81.2	132.4
Somalia	-0.1	-5.7	0.5	0.3	0.1	-0.1	-1.1	5.1	19.8
Uganda	2.4	0.6	-0.2	6.9	11.5	14.4	16.6	17.6	15.8
United Republic of Tanzania	0.4	0.6	0.0	4.3	17.9	20.0	13.6	20.0	17.7
Southern Africa	1.0	1.2	1.4	3.7	11.1	25.9	8.4	12.8	2.1
Angola	3.5	9.6	6.2	19.2	58.6	164.6	80.4	-52.7	-0.6
Botswana	34.8	19.9	15.5	-4.5	6.0	19.8	19.2	14.7	26.9
Lesotho	2.9	2.9	4.9	3.9	6.5	9.2	11.3	11.2	15.5
Malawi	3.5	4.5	3.6	0.7	14.1	21.4	61.8	14.3	15.9
Mozambique	1.1	0.3	1.4	6.6	22.5	33.9	19.6	8.5	9.1
Namibia	..	8.6	1.9	18.9	13.8	30.2	15.7	22.2	23.6
South Africa	0.0	0.2	-0.4	1.7	6.6	16.8	2.3	16.1	-1.2
Swaziland	18.1	7.6	41.5	31.5	26.2	10.2	16.1	-9.8	7.7
Zambia	8.7	6.9	37.5	27.7	32.6	27.0	27.3	19.9	22.8
Zimbabwe	0.2	0.2	1.4	2.7	10.7	4.0	10.7	202.0	39.8

Source: UNCTAD (www.unctad.org/Templates/Page.asp?intItemID=3277&lang=1).

Annex table 2. Africa: Exports in US Dollars, 1980 - 2007

	1980	1980-1985	1986 - 1990	1991-1995	1996-2000	2001-2003	2004	2005	2006	2007
Africa	212'367	149'916	122'866	148'220	161'584	189'021	277'365	351'189	419'765	489'822
North Africa	52'350	40'561	35'130	48'316	58'766	75'388	111'998	145'347	178'367	209'453
Algeria	14'541	14'123	10'169	11'461	15'327	22'084	34'178	48'715	57'798	66'222
Egypt	7'263	4'629	6'625	12'939	15'889	17'872	23'725	28'276	32'268	40'222
Libyan Arab Jamahiriya	22'084	14'167	7'628	9'007	8'169	11'026	21'037	30'153	41'897	48'088
Morocco	3'999	3'759	5'968	7'887	9'898	12'423	16'458	18'656	21'258	23'866
Sudan	888	830	690	541	961	1'998	3'368	5'154	9'545	12'103
Tunisia	3'575	3'053	4'049	6'482	8'522	9'984	13'231	14'395	15'600	18'952
Other Africa	160'016	109'355	87'736	99'903	102'818	113'633	165'367	205'841	241'398	280'369
West Africa	109'523	68'269	38'824	39'493	32'461	33'051	44'114	54'549	65'084	74'323
Benin	516	358	386	500	646	643	811	940	869	994
Burkina Faso	206	179	262	303	283	310	504	520	545	621
Cape Verde	24	30	45	67	106	118	138	166	182	221
Côte d'Ivoire	3'661	3'070	3'332	3'419	4'902	4'913	6'544	7'066	8'460	9'593
Gambia	54	88	129	159	194	169	202	239	263	338
Ghana	275	236	965	1'216	2'284	2'696	3'063	3'256	4'299	5'025
Guinea	424	482	703	651	695	738	855	607	746	1'120
Guinea-Bissau	21	16	19	28	48	68	98	112	114	127
Liberia	614	515	401	56	107	123	171	201	233	278
Mali	278	223	331	459	626	1'024	1'218	1'405	1'708	1'853
Mauritania	252	315	459	468	439	361	478	667	1'503	1'527
Niger	610	429	428	343	338	358	470	598	642	748
Nigeria	101'089	60'976	29'494	29'853	19'756	19'283	26'495	35'534	41'864	47'532
Senegal	834	830	1'185	1'315	1'369	1'583	2'123	2'253	2'464	2'990
Sierra Leone	237	164	169	246	210	119	202	220	302	353
Togo	429	357	515	409	459	545	743	764	893	1'004
Central Africa	8'713	8'074	8'876	9'062	9'180	11'829	19'885	28'000	34'411	39'381
Burundi	81	95	111	99	67	43	55	70	86	94
Cameroun	1'782	1'711	2'119	1'915	2'122	2'346	3'061	4'210	5'031	5'785
Central African Republic	187	159	186	149	136	115	148	151	163	189
Chad	169	149	244	269	304	455	2'228	3'201	3'699	4'162
Congo	961	1'185	1'031	1'170	1'853	2'304	3'068	4'966	6'507	6'439
Congo, Democratic Republic of	2'180	1'983	3'102	2'609	1'095	1'207	2'308	2'242	2'593	3'028
Equatorial Guinea	9	10	47	67	625	2'244	4'646	7'249	9'036	11'062
Gabon	3'188	2'630	1'860	2'673	2'854	2'963	4'164	5'688	7'053	8'342
Rwanda	146	140	166	101	112	133	188	202	220	254
São Tomé and Príncipe	10	11	11	11	13	18	20	21	23	27
East Africa	5'089	4'325	5'668	7'455	10'204	11'676	15'259	17'260	19'200	23'160
Comoros	11	15	30	44	33	44	60	55	48	52
Djibouti	118	141	242	249	213	252	280	300	319	349
Eritrea	..	..	..	150	132	80	95	63	60	65
Ethiopia	584	562	657	587	925	1'006	1'345	1'798	2'007	2'571
Kenya	2'030	1'679	1'922	2'458	2'883	3'176	4'248	5'004	5'539	7'112
Madagascar	458	373	431	572	895	1'071	1'418	1'335	1'508	2'017
Mauritius	579	532	1'322	1'997	2'736	3'077	3'450	3'761	4'360	4'989
Seychelles	73	71	144	248	392	559	629	676	750	687
Somalia	29	28	30	4	6	6	7	7	8	8
Uganda	534	394	407	383	717	738	1'041	1'293	1'490	1'762
United Republic of Tanzania	673	530	482	825	1'272	1'667	2'687	2'968	3'110	3'545
Southern Africa	36'692	28'688	34'368	43'893	50'973	57'076	86'110	106'032	122'702	143'504
Angola	1'939	2'033	2'741	5'833	5'557	8'323	13'780	23'805	35'077	47'649
Botswana	528	566	1'506	1'997	2'562	2'908	3'380	4'588	4'948	5'907
Lesotho	77	53	76	162	248	402	763	714	605	648
Malawi	307	293	327	422	450	469	541	554	541	605
Mozambique	204	146	128	235	412	993	2'000	2'368	3'091	3'449
Namibia	1'522	1'029	1'157	1'519	1'635	1'765	2'644	2'509	2'648	2'823
South Africa	28'496	21'681	25'108	29'548	35'474	39'678	57'700	66'520	70'393	77'330
Swaziland	392	324	494	811	1'046	1'224	2'357	2'412	2'461	2'593
Zambia	1'608	1'116	1'050	1'186	890	913	1'059	1'192	2'060	2'110
Zimbabwe	1'618	1'446	1'781	2'181	2'699	402	1'886	1'371	878	392

Source: UNCTAD GLOBSTAT (<http://uds.unctad.org/IntraStat/TableViewer/tableView.aspx>).