

# The influence of HIV/AIDS on Foreign Direct Investment in Africa

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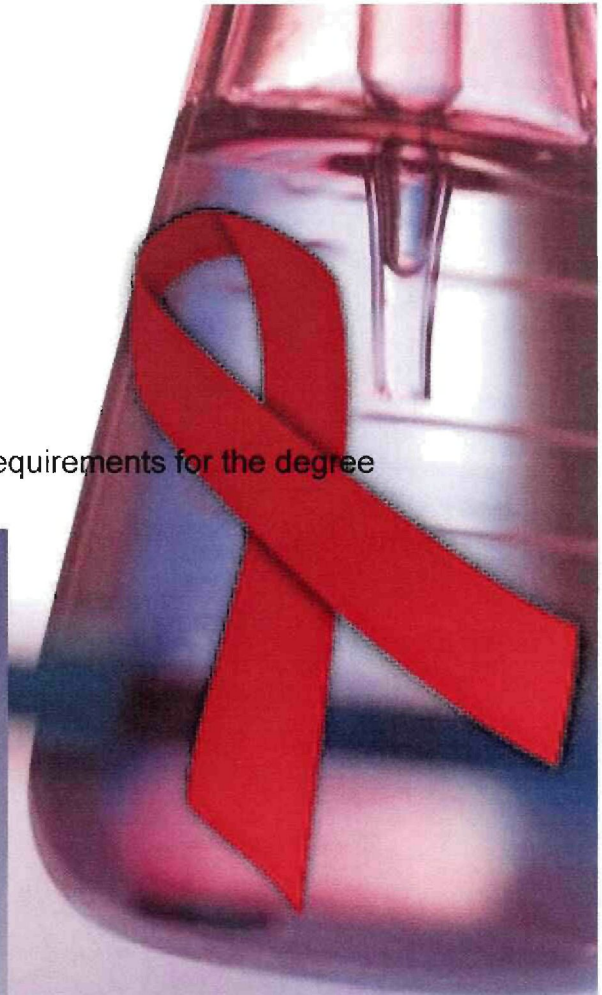
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## **Abstract**

The main aim of this research project is to determine the influence of HIV/AIDS on FDI flows to Africa. In order to do so, the following objectives were set: to explore the characteristics of HIV/AIDS, the current trends and statistics of HIV/AIDS, as well as its effect on the economy as a whole, to investigate the concept, distribution and determinants of FDI, as well as the link between HIV/AIDS on FDI inflows to Africa through regression analysis. The influence of HIV/AIDS on human capital and FDI were tested via regression analysis. Data from thirty-nine African countries were used and two cross-sections were compiled – one for the period of 1999 to 2003, and the other for the period of 2001 to 2005.

Firstly, the influence of HIV/AIDS on human capital was estimated and the results showed that HIV/AIDS has a significant negative influence on human capital in African countries.

Secondly, the human capital indicators were constructed from the regressed equation and introduced in the two types of FDI models. The results showed that the influence of these human capital indicators is negative, which was in contrast to expectations. It was reasoned that Africa might mainly attract resource- and market-seeking FDI that do not require high quality human capital. In contrast, efficiency-seeking FDI requires a higher quality human capital for investment and it is possible to believe that investors do not seek African countries as a destination for efficiency-seeking FDI.

Thirdly, when the dependent variable is the fraction of FDI that a country receives relative to other African countries, human capital has a significant positive influence. This may be an indication that although human capital may not be that important when choosing to invest in Africa, it becomes important when choosing between various African countries.

Lastly, it should be noted that in introducing HIV/AIDS prevalence on its own in the FDI regression equations, it is not significant. The same can be said about the Human Development Index (HDI), which can be seen as a proxy for health. Therefore, this research project concludes that the main channel through which HIV/AIDS influences FDI is human capital.

## **Uittreksel**

Die hoofdoel van hierdie studie was om die invloed te bepaal wat HIV/VIGS het op buitelandse direkte investering (BDI) na Afrika. Die volgende doelstellings is gestel om die hoofdoel te bereik: (i) om die eienskappe, huidige neigings en statistiek oor HIV/VIGS, sowel as die effek wat dit op die ekonomie as geheel het, te ondersoek; (ii) om die begrip, verdeling en determinante van BDI, sowel as die skakel tussen HIV/VIGS en BDI-vloei na Afrika deur middel van 'n regressie-analise te ondersoek. Data van 39 Afrikalande is gebruik om twee kruissnit-datastelle saam te stel – een vir die periode van 1999 tot 2003 en die ander vir 2001 tot 2005.

Die invloed wat HIV/VIGS op menslike kapitaal het, is eerste beraam en die resultate wys dat HIV/VIGS 'n statisties-beduidende negatiewe invloed het op menslike kapitaal in Afrikalande.

Daarna is die menslikekapitaal-toetssyfer bereken, deur gebruik te maak van die regressievergelyking, en hierdie syfer is ingestel in die twee tipes BDI-modelle. Die resultate wys dat die invloed van hierdie menslikekapitaal-toetssyfer, teenstrydig met verwagtinge, negatief is. 'n Moontlike rede hiervoor is dat Afrikalande hoofsaaklik hulpbron- en markgedrewe BDI lok, wat nie juis 'n hoë vlak van menslike kapitaal vereis nie. Daarteenoor vereis doeltreffendheidsgedrewe BDI 'n hoër vlak van menslike kapitaal vir investering en dit is moontlik om te glo dat buitelandse investeerders nie Afrikalande as bestemming sien vir doeltreffendheidsgedrewe BDI nie.

Daar is derdens bevind dat menslike kapitaal 'n statisties-beduidende positiewe invloed het, as die BDI-invloei as proporsie van totale BDI-invloei na Afrika die afhanklike veranderlike is. Hierdie resultaat kan 'n aanduiding daarvan wees dat, alhoewel menslike kapitaal nie werklik belangrik is as daar aanvanklik gekies word om in Afrika te investeer nie, dit belangrik word as daar tussen die verskillende Afrikalande gekies moet word.

Laastens moet dit genoem word dat die HIV/VIGS-koers individueel in die BDI- regressievergelyking ingestel is, maar nie statisties-beduidend was nie. Dieselfde kan gesê word van die Menslikeontwikkelingsindeks-syfer (MOI) wat as gesondheidsproksimaal gebruik is. Daarom word die gevolgtrekking gemaak dat die menslike kapitaal die hoofkanaal is waardeur HIV/VIGS buitelandse direkte investering beïnvloed.

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## List of Abbreviations

**\$** - US Dollar

**AIDS** - Acquired Immunodeficiency Syndrome

**ANON** – Anonymous

**ARV** – Anti-retroviral

**CDO** – Cambridge Dictionary Online

**CLRM** – Classical Linear Regression Model

**FDA** – Food and Drug Administration

**FDI** – Foreign Direct Investment

**FPI** – Foreign Portfolio Investment

**GBPC** – Global Business Policy Council

**GDP** – Gross Domestic Product

**GNI** - Gross National Income

**HAART** – Highly Active Anti-retroviral Therapy

**HDI** – Human Development Index

**HIV** – Human Immunodeficiency Virus

**ICT** – Information and Communication Technology

**IMF** – International Monetary Fund

**LDC** – Least developed country

**M&A** – Merger & Acquisition

**MDG** – Millennium Development Goals

**MNE** – Multinational Enterprise (referred to as TNC in this study)

**NGO** – Non-Governmental Organisation

**NIAID** – National Institute of Allergy and Infectious Diseases

**OECD** – Organisation for Economic Co-operation and Development

**R&D** – Research & Development

**SARB** – South African Reserve Bank

**SSA** – Sub-Saharan Africa

**TB** – Tuberculosis

**TFP** – Total Factor Productivity

**TNC** – Transnational Corporation

**UNAIDS** – Joint United Nations Program on HIV/AIDS

**UNCTAD** – United Nations Conference on Trade and Development

**UNDP** – United Nations Development Programme

**US** – United States of America

**USDHHS** – U.S. Department of Health and Human Services

**WHO** – World Health Organisation

## **Chapter 1 — Introduction**

### **1.1 Introduction**

In this research, the possible influence of HIV/AIDS on FDI will be explored by firstly elaborating on the magnitude of the epidemic and the overall economic influence of it. Secondly, the importance of FDI for a country and the current distribution of FDI between countries is discussed to substantiate the importance of this research. This will give rise to the problem statement, research aims and objectives. The method of investigation, the chapter division and some important definitions are discussed as well.

### **1.2 Background and problem statement**

A total of 39.5 million people were living with HIV in 2006, of which 24.7 million (63 per cent) were settled in sub-Saharan Africa. Globally, 2.9 million people died from AIDS-related illnesses in 2006 (UNAIDS & WHO, 2006a:1-2). This is equivalent to the population of the Free State Province of South Africa, which makes up 6.2 per cent of the total population of South Africa (Anon, 2006). It thus means that globally a number of people equivalent to the total population of the Free State province died in one year due to HIV/AIDS related illnesses. Of the 2.9 million who died, 2.1 million were situated in sub-Saharan Africa. These deaths were in spite of extensive efforts to improve global access to antiretroviral treatment. The total AIDS death toll in sub-Saharan Africa increased from 1.9 million people in 2004 to 2.1 million people in 2006 (UNAIDS & WHO, 2006a:3), and it is inevitable to ponder what the influence of this epidemic on a country may be.

The effects of HIV/AIDS on society are widespread and cannot be predicted or evaluated comprehensively, particularly in the long term. What can be predicted with certainty is that the economic and social effects of HIV/AIDS will remain significant long after prevalence begins to decrease (UNAIDS & WHO, 2006c:80-81).

The AIDS epidemic has a devastating impact on human development, according to the Joint United Nations programme on HIV/AIDS and the World Health Organisation (UNAIDS and WHO, 2006c:80), and, in some countries, interferes with the achievement of the Millennium Development Goals (MDG)<sup>1</sup>. Human development is measured by the United Nations Development Programme's (UNDP) Human Development Index (HDI), that ranks countries according to life expectancy at birth, the adult literacy rate, school enrolment, and the gross domestic product (GDP) per capita of the population (UNDP, 2005:21).

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<sup>1</sup> The eight millennium development goals of the United Nations (2008) is to (i) eradicate extreme poverty and hunger, (ii) achieve universal primary education, (iii) promote gender equality and empower woman, (iv) reduce child mortality, (v) improve maternal health, (vi) combat HIV/AIDS, malaria and other diseases, (vii) ensure environmental sustainability, and (viii) develop a global partnership for development.

HIV/AIDS is identified as the single most important factor responsible for the reversal in human development in countries that have the highest HIV/AIDS prevalence rate. These countries' HDI rankings fell sharply between 1990 and 2003, which include South Africa, which fell by 35 places; Zimbabwe, which moved down 23 places; and Botswana, which dropped by 21 places. These are only a few examples of African countries that showed substantial declines in the level of human development, mainly due to HIV/AIDS (UNDP, 2005:3 & 21-22).

Two of the most prominent effects of HIV/AIDS on human development are the decrease in life expectancy and a significant increase in the mortality rate for persons between the ages of 20 and 49. Adults falling into this age band are the most economically productive, which has detrimental financial (and other) effects on those dependent on them. In order to cope with rising health expenditure and decreasing income, households with HIV-infected persons spend more than average on medical services and products, but less on education and entertainment for their children (UNAIDS & WHO, 2006c:83 & 85).

The ability of HIV-infected adults to generate income and contribute to the economy decreases as they become increasingly debilitated due to their sickness, and often this is associated with job loss. Studies on the overall, short-term impact of HIV/AIDS on national economies (measured by GDP) have found the impact to be relatively small; recent work has shifted the focus to the long-term impact of the disease. Sustainable economic growth over the long-term depends on several factors, one of which is foreign investment. Investors consider the prevalence of HIV/AIDS in a country in deciding upon investing in a country (UNDP, 2005:98,102). Thus, it is postulated that a high rate of HIV/AIDS infection negatively affects foreign direct investment (FDI) inflows, and is thus a long-term deterrent of economic growth for countries with high HIV/AIDS-infection rates.

Foreign direct investment is discussed in the following section.

### **1.2.1 The importance of foreign direct investment**

As this research project is concerned with the possible influence of HIV/AIDS on FDI, the background of FDI and its current distribution is briefly discussed in section 1.2.1.1, and the importance of FDI for a host country is presented in section 1.2.1.2.

#### **1.2.1.1 Foreign direct investment and its current distribution**

International capital flows can be divided into two categories, namely: (i) public and private development assistance (foreign aid), (ii) FDI and foreign portfolio investment (FPI). The first category, foreign aid, is undertaken by individual national governments, multinational donor agencies, and non-governmental

organisations (NGOs; Todaro, 2000:577-578) In the second category, FDIs are usually undertaken by large transnational corporations (TNCs)<sup>2</sup> with offices in the host (also recipient) country, while FPIs are made in credit and equity markets in the host country by private institutions and individuals.

The most typical form of FDI involves a foreign company acquiring a controlling ownership share (at least 10 per cent of voting stock) in an existing domestic company with capital invested, often accompanied by new technology and management expertise (Sorensen & Whitta-Jacobsen, 2005:98; Perkins, Radelet & Lindauer, 2006:415). This form can be compared to an alternative form of FDI, referred to as 'Greenfield Investment', which involves a TNC setting-up a new production plant in a country.

After defining FDI in the previous paragraph, the distribution of FDI globally, as well as between developing countries, can be analysed to substantiate this research. Globally, total FDI inflows increased by 34 per cent from 2005 (\$916.3 billion) to 2006 (\$1.2304 trillion). This increase is largely a reflection of high economic growth and stronger economic performance globally in 2006 compared to 2005, although there are wide inconsistencies in FDI inflows between the FDI-receiving regions and countries. Developing countries received 30 per cent (\$367.7 billion) of global FDI inflows in 2006, which is a record high. FDI inflows to Africa, concentrated mostly in the west, north and central parts, totalled 10.6 per cent (\$38.8 billion) of developing country inflows in 2006, of which Nigeria received the most (14 per cent) (UNCTAD, 2007a). According to the United Nations Conference on Trade and Development (UNCTAD, 2006:40), Africa still exhibits limitations that hamper its ability to attract the kind of quality FDI that would create broader favourable outcomes in its economies.

### **1.2.1.2 The importance of foreign direct investment for a host country**

The importance of FDI to a country's economic development was not fully recognised (Jansen, 1995:193 & Crenshaw, 1991:1169) until the late 1990s, when developing and newly industrialising countries were encouraged to rely on FDI, to supplement their national savings and advance economic development after the Asian Crisis. Reliance on FDI was encouraged because FDI is considered less sensitive to crises, since direct investors have longer-term outlooks when they engage in FDI. It is also argued that FDI is a stronger driver of economic growth in the host country, in comparison to any other type of capital inflow (Nunnenkamp, 2001:3).

Dupasquier and Osakwe (2006:243-244) list a number of potential benefits of FDI (the first five) for a developing country:

- (i) generating employment (both directly and indirectly) that may lead to higher growth, and increasing the skills of local workers by training and learning through practice;

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<sup>2</sup> Also referred to as multinational enterprises (MNEs); refer to the definition in section 1.7.

- (ii) filling the gap between domestic savings and investment requirements;
- (iii) contributing to the integration of the host economy into the world economy;
- (iv) transferring modern technology;
- (v) increasing the efficiency of firms through increased competition; and
- (vi) the additional influence of FDI on the balance of payment.

These benefits are discussed individually below, from section 1.2.1.2.1 to section 1.2.1.2.6.

#### **1.2.1.2.1 Employment generation and skills development**

According to UNCTAD (2006:169), FDI is especially important for developing countries, because it improves employment opportunities. It also contributes to the skills of local workers, through training and learning through practice (Todaro & Smith, 2003:598). The impact on employment will vary depending on the activity in which the investment were made, thus foreign direct investment may only contribute to employment opportunities on a small scale (about 5 per cent of total employment). For example, if capital-intensive investments were made in industries (such as mining or petroleum), relatively few jobs would be created, but if labour-intensive investments were made, many more jobs would be created (Perkins *et al.*, 2006:420).

#### **1.2.1.2.2 Filling the gaps**

Prasad *et al.* (2003; cited by UNCTAD, 2005a:1) claim that FDI is the solution to bridging the resource gap of low-income countries and preventing further accumulation of debt, while tackling the causes of poverty. Todaro (2000:582-583) also recognises FDI's role in filling the gaps and identifies the following gaps that are filled by FDI:

- (i) the gap between the available domestic savings and the targeted level of investment;
- (ii) the gap between the targeted foreign exchange requirements and the foreign exchange obtained from net exports plus net foreign aid;
- (iii) the gap between the targeted government revenue and actual raised taxes; and
- (iv) the gap in management, entrepreneurship, technology, and human capital skills needed to achieve growth and development goals.

The gap between domestic savings and investment is the most relevant to this research project, as HIV/AIDS especially depletes domestic savings and investment. In particular it is necessary to elaborate on the effect of FDI on private investment. Foreign direct investment forms part of private investment, and thus increases total private investment. Local private investment and FDI are likely determined by the same factors, reflecting the investment climate of the host country. Therefore, an increase in FDI is likely to be accompanied by an increase in local investment, which in turn leads to a demand impulse that may increase income and investment further (Jansen, 1995:196).

Lim (2001:9-10) congruously claims that FDI might have a crowding-in effect on domestic investment, given favourable governance structures, including competitive markets, unrestricted entry and exit of firms, and minimal government intervention. However, leaving governance of the investment process to the price mechanism, is questionable. This is because of (i) information and motivation problems caused by high levels of uncertainty and externalities innate to the process, (ii) quick capital accumulation depending on the 'animal spirit' of local entrepreneurs, and (iii) the frequent failure of competitive markets to produce sufficient and stable profits that would motivate them to commit to longer-term investment projects, which are needed to increase productive capacity, create jobs, and build technological depth (UNCTAD, 2005a:16).

New FDI projects may invite complementary local investments to provide intermediary products for TNCs, or to use the products and services produced by TNCs. Also likely is that total private investment will be more than the FDI inflows received. This may be because only a part of the total investment project is financed by foreign equity capital, and local financial institutions finance the remainder. It is concluded that the influence of FDI on private investment depends on the local financial market circumstances and on the existing supply-demand equilibriums on commodity and factor markets (Jansen, 1995:196,199).

#### **1.2.1.2.3 Integration into the world economy**

Foreign direct investment contributes to the integration of the host economy into the world economy through integration of the host financial market into the world financial market, and through export opportunities.

Integration into the world financial market occurs in various ways. Jansen (1995:197), for example, argues that FDI is more likely to have a positive effect on economic growth in countries with tight foreign exchange controls, because FDI flows may help to liberate these controls. In addition, the presence of TNCs may also ease the access of the host country to international financial markets, and tension on the domestic financial markets may therefore be resolved through foreign borrowing. Moreover, FDI inflows by themselves may also lead to an increase in domestic credit supply by increasing the level of foreign reserves (Jansen, 1995:196).

Lim (2001:10) finds that countries with outward-oriented or neutral trade regimes may experience more significant growth effects than countries pursuing import-substituting strategies. This demonstrates that FDI inflows can contribute to export opportunities. Furthermore, in order for domestic firms to obtain the same marketing advantages that TNCs give, they may require years of experience in the industry. Transnational corporations make it easy to penetrate the foreign market as they give preferential access to customers, by giving long-term contracts for firms to deliver inputs or outputs (Perkins *et al.*,

2006:421). Improvements in local firms' competitiveness and efficiency, due to the spill-over effects of FDI, may also increase export performances for the host country (UNCTAD, 2006:169).

#### **1.2.1.2.4 Transfer of innovation and technology**

Research and development (R&D) are mostly undertaken in developed countries in North America, Europe and East Asia. It can thus be expected that firms operating in these countries are a rich source of innovative strategies and new technologies. Transnational corporations can transfer such innovative strategies and technologies, as well as management expertise, to the countries they invest in, which may improve their productivity and lower production costs. The benefits gained from these transfers may also spill over to local firms in the host country, either horizontally to competitor firms, or vertically to firms operating up and down the supply chain<sup>3</sup> (UNCTAD, 1999:10; Perkins *et al.*, 2006:421).

#### **1.2.1.2.5 Improving the competitiveness and efficiency of local firms**

Further, it is postulated that FDI tends to improve the competitiveness and performance of the local firms and industries involved, and can thus play an important role in the economic growth of developing countries (UNCTAD, 2006:169). For example, FDI, particularly in manufactured exports, can help to increase specialisation of production. That FDI creates stronger links to other divisions of the global chain may encourage a company to specialise in the production of particular goods, in which they have a comparative advantage. An example of this is the automobile industry, in which the various production processes are implemented in different countries. Thus, a country may manufacture the basic components, another country may assemble it, and yet another may test the final product (Perkins *et al.*, 2006:420).

Lim (2001:4), in summarising the findings of several studies, concludes that the overall efficiency of local firms is generally positively correlated with the presence of foreign firms in developed countries. In contrast, Lim (2001:4) reported mixed findings for developing countries. A number of studies showed a positive correlation between the productivity of local firms with the presence of foreign firms, but others pointed to limited or no spill-over effects for local firms.

#### **1.2.1.2.6 Balance of payments**

In order to determine the relationship between FDI and the balance of payments the latter must first be defined. Mohr (2004:128) defines a balance of payments as a summary of a country's economic transactions between residents in the reporting country and the rest of the world, during a specific period. For example, the South African balance of payments is divided into five sections: (i) the current account, (ii) the capital transfer account, (iii) the financial account, (iv) unrecorded transactions, and (v)

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<sup>3</sup> Either selling to or buying from the TNC (Perkins *et al.*, 2006:421).

the official reserves account (Mohr, 2004:129). Table 1.1, below, is a representation of a shortened balance of payments demonstrating the structure of the South African balance of payments.

**Table 1.1: South Africa's balance of payments**

<p><b>(i) Current account</b></p> <p>Merchandise exports, free on board</p> <p>Net gold exports</p> <p>Service receipts</p> <p>Income receipts</p> <p>Less: Merchandise imports, free on board</p> <p>Less: Payments for services</p> <p>Less: Income payments</p> <p>Current transfers (net receipts +)</p> <p><b>Balance on current account</b></p>
<p><b>(ii) Capital transfer account (net receipts +)</b></p>
<p><b>(iii) Financial account</b></p> <p>Net Direct investment</p> <p>Net Portfolio investment</p> <p>Net Other investment</p> <p><b>Balance on financial account</b></p>
<p><b>(iv) Unrecorded transactions</b></p>
<p><b>(v) (The official reserves account)<sup>4</sup></b></p> <p><b>Change in net gold and other foreign reserves owing to balance of payments transactions</b></p> <p>Change in liabilities related to reserves</p> <p>Special drawing rights (SDR) allocations and valuation adjustments</p> <p><b>Change in gross gold and other foreign reserves</b></p>

Source: Mohr (2004:130).

Export-oriented FDI may increase merchandise exports in the current account of the balance of payments, but simultaneously the increase in capital inflows may cause an appreciation of the real exchange rate,<sup>5</sup> which may neutralise the positive effect by reducing competitiveness and thereby decreasing merchandise exports again. However, should total capital inflow consist mainly of export-oriented FDI, it would be less likely to have a neutralising effect on exports. This is so, because the profitability of non-traded goods may be reinforced and exert a positive influence on the supply of non-traded goods and services that are complementary and encouraging to the export drive (Jansen, 1995:198).

<sup>4</sup> This account is not officially labelled this way, in the balance of payments, but in actuality, the section represents the official reserves account.

<sup>5</sup> An increase in capital inflows may increase domestic demand, which will lead to an increase in the relative price, that is, an appreciation of the real exchange rate (Jansen, 1995:198).

It is also argued that capital inflows may result in increased import dependency, as many TNCs rely on the importation of machinery and equipment, in addition to some intermediate inputs (Jansen, 1995:198). The effect of the increase in merchandise exports may be offset by the increase in merchandise imports and, according to Jansen (1995:198), imports may even exceed exports, leading to a high-level current account deficit. This deficit would be partly financed by non-debt creating capital flows, such as FDI and FPI, which form part of the financial account. The largest part, however, would be financed by private borrowing abroad. The question that arises from this is whether the current-account gap is sustainable or whether the debt accumulation will reduce the credit-worthiness of the country.

The influence of FDI flows on the current account is additionally complicated by the investment income payments arising from these flows. Foreign investors engage in FDI with the objective of making a profit and at least repatriating some of this profit to their home country, which may have a negative impact on competition in the local market, although the outflow of funds also tends to fluctuate with the cycle of the economy (Jansen, 1995:199; Hansen & Rand, 2006:21). This is only a true depiction in part, as not all FDI is in the form of equity funds, but also in investment loans with fixed payments of interest and principle; payments of technical fees, copyrights, and patent royalties usually accompany FDI inflows; and an increase in FDI flows may lead to an increase in the demand for foreign funds, all of which will eventually increase the debt service burden of the economy (Jansen, 1995:199).

The next section presents the research questions that this research project seeks to answer.

### **1.3 Research questions**

From the preceding sections, it is evident that HIV/AIDS has a significant negative influence on a country's economy and that FDI plays an important role in a country's economic growth. Because FDI plays an important role in a country's economic growth, the attraction of sufficient levels of FDI remains of high precedence in all countries. In deciding to invest in a certain country, foreign investors have specific criteria that guide their decision. The following criteria are some of the variables the Global Business Policy Council (GBPC, 2004:4) make use of in comparing countries' FDI potential to one another: education of the workforce, management abilities in the firms planned to be invested in, transparency of a country's governance, cultural barriers, government tax regimes, political and social stability, and quality of life. It should be noted here that UNCTAD (2006 & 2007e) also compiles an Inward FDI Potential Index that ranks countries according to their FDI potential. The broad categories of criteria of this index is similar to those of the GBPC (2004), but will be discussed in greater detail in section 3.3.4.

The health of the population certainly has an important influence on their quality of life. People living with HIV/AIDS are perceived to have a lower quality of life than healthy people and, as mentioned above, this has a negative influence on a country's attractiveness for investment. This is in agreement with

what was said in section 1.2 about investors considering the prevalence of HIV/AIDS in a country in deciding upon investing in a country (UNDP, 2005:98,102). In section 1.2, it has been shown that HIV/AIDS is particularly prevalent in Africa, and even more so in sub-Saharan Africa. Thus, it was postulated that a high rate of HIV/AIDS infection negatively affects foreign direct investment (FDI) inflows, and is thus a long-term deterrent of economic growth for countries with high HIV/AIDS-infection rates.

This, raises the questions that this research project seeks to address:

- (i) Does HIV/AIDS have an influence on FDI flows to Africa?
- (ii) If so, how does it influence FDI inflows to the continent?

#### **1.4 Research aims and objectives**

In response to the research questions, this research project aims to:

- (i) Determine the influence of HIV/AIDS on FDI flows into Africa
- (ii) Evaluate how HIV/AIDS influences FDI inflows to the continent.

In order to achieve the research aims, the project followed three main steps:

- (i) Explore the characteristics of HIV/AIDS and its impact on the economy in general, as well as current trends and statistics of HIV/AIDS.
- (ii) Analyse the concept, distribution and determinants of FDI, as well as the link between HIV/AIDS, FDI and economic growth.
- (iii) Test the influence of HIV/AIDS on FDI inflows to Africa through regression analysis.

#### **1.5 Method of investigation**

The steps mentioned in section 1.4 were achieved through a thorough literature review and an empirical analysis. All the relevant literature of HIV/AIDS and FDI were reviewed to set a background for the empirical analysis. Fact sheets, articles, reports, and papers were reviewed to sketch the background of the problem, while basic data was analysed to determine the position of African countries in the global scene.

The relationship between HIV/AIDS and FDI were explored in the literature review and it was concluded that the effect of HIV/AIDS on human capital accumulation, and health in specific, is especially important, as it weakens the mechanisms that generate human capital and give rise to a less-educated generation. To validate the use of human capital as the channel through which HIV/AIDS influence FDI, the study performed by Gries (2005) may be pointed out. Gries (2005) studied the role that FDI plays in South Africa's development process and postulates that FDI, human capital and technological spill-over effects

are important factors to catch up with industrialised countries in terms of GDP growth. It was found that human capital is the critical factor for technological progress and the absorption of FDI.

To elaborate on the use of a health proxy as a channel through which HIV/AIDS influence FDI, the study of Alsan, Bloom and Canning (2004) are used as reference. Alsan *et al.* (2004) studied the influence of health on FDI and postulated that bad health is certain to have a negative influence on the FDI inflows to a country, by decreasing productivity and affecting foreign investors' choice to invest in the country. Foreign investors may part with the idea to invest in a country which could affect their own and their workers' health (Alsan *et al.*, 2004:2). Alsan *et al.* (2004:5) used the life expectancy at birth as their proxy for health. In this research the HDI value was used as health proxy, since life expectancy is included in this index, but because of its insignificance, the health proxy was dropped from the final FDI models.

This research project models the influence of HIV/AIDS on FDI by introducing HIV/AIDS to the regression through two separate human capital indicators. The process through which these human capital indicators were determined will be discussed in detail in section 4.3.1. These human capital indicators were introduced separately in the FDI models through which the quantitative influence of HIV/AIDS via human capital on FDI inflows to Africa were determined.

## **1.6 Chapter division**

The aim and objectives of this research were discussed in this chapter, regarding the possibility that HIV/AIDS might influence FDI. Chapter two addresses the first objective of this study, namely to explore the characteristics of HIV/AIDS and its impact on the economy in general, as well as current trends and statistics of HIV/AIDS. Firstly, general information regarding HIV/AIDS will be discussed with reference to the characteristics, symptoms, and treatment of HIV/AIDS. Secondly, the trends and statistics of HIV/AIDS will be analysed. Thirdly, the economic influence of HIV/AIDS on households, the private sector, and the public sector will be examined. Lastly, the links between HIV/AIDS and economic growth will be examined in light of the factors that contribute to HIV/AIDS in Africa.

- (iv) Explore the characteristics of HIV/AIDS and its impact on the economy in general, as well as current trends and statistics of HIV/AIDS.
- (v) Analyse the concept, distribution and determinants of FDI, as well as the link between HIV/AIDS, FDI and economic growth.

Test the influence of HIV/AIDS on FDI inflows to Africa through regression analysis.

Chapter three addresses the second objective of this study, namely to analyse the concept, distribution and determinants of FDI, as well as the link between HIV/AIDS, FDI and economic growth. Firstly, the different types of FDI will be defined according to the two broad categories of FDI, the four motives for FDI, and the different ways in which FDIs are made. Secondly, the distribution of FDI will be analysed

by considering the global distribution of FDI, the distribution of FDI between developing countries, the characteristics that render Africa appealing for FDI, and the distribution of FDI to Africa. Thirdly, possible determinants of FDI will be presented and discussed. Lastly, the relationship between FDI and growth will be examined.

Chapter four will report on the empirical analysis of the influence of HIV/AIDS on FDI inflows to Africa. The data used in and the methods regarding the regression model will be discussed. As mentioned above, in section 1.5, the influence of HIV/AIDS on FDI will be measured through two separate human capital indicators, which is introduced in the FDI model. After reporting on the results of the regression models, chapter five would conclude this dissertation with a conclusion and recommendations.

## **1.7 Important definitions**

A thorough comprehension of the following terms is important for the study of this research:

**Acquired Immunodeficiency Syndrome (AIDS):** an illness (often if not always fatal) in which opportunistic infections or malignant tumours develop as a result of a severe loss of cellular immunity, which is itself caused by earlier infection with a retrovirus, HIV, transmitted in sexual fluids and blood (Oxford University, 2008).

**Foreign direct investment:** investment by a company in a country other than that in which the company is based. The objective of foreign direct investment is to obtain a lasting interest in an entity resident in the host country. The lasting interest implies the existence of a long-term relationship between the direct investor and the enterprise in the host country, and a significant degree of influence on the management of the enterprise. Direct investment involves both the initial transaction between the two entities and all subsequent capital transactions between them and amongst affiliated enterprises; both incorporated and unincorporated (OECD, 1999:7-8).

**Human immunodeficiency virus (HIV):** either of two retroviruses (HIV-1 or HIV-2) that causes AIDS (Oxford University, 2008).

**Home country:** the foreign country, in which the company that makes the foreign direct investment in the host country is based (UNCTAD, 2006).

**Host country:** the country that receives the foreign direct investment from the company in the home country (UNCTAD, 2006).

**Transnational Corporation (TNC):** a corporation or enterprise that conducts and controls productive activities in more than one country (Todaro, 2000:578).

The following section provides a summary of the chapter.

## **1.8 Summary**

This chapter has introduced the problem statement and provided the background to this research project in order to substantiate the research project. Framed against this background, the research questions were raised and the research aims in response to these questions were put forth. The steps through which these objectives are achieved were then summarised in a brief discussion, where after the research project's methods were discussed. Thereafter, the structure of this dissertation by way of chapter division was outlined. Definitions of topical words were lastly presented in concluding this chapter.

Chapter 1 has thus demonstrated that the study of the influence of HIV/AIDS on an economy, in particular on FDI flows to a country, is essential for policy making in countries with a high prevalence of HIV/AIDS infections. In order to understand the influence of HIV/AIDS on FDI flows, the way in which the epidemic operates must first be understood. Therefore, general information regarding HIV/AIDS, trends and statistics of HIV prevalence, the economic influence of HIV/AIDS, and the association between HIV/AIDS and economic growth will be examined in the chapter that follows.

## **Chapter 2 — Analysis of HIV/AIDS Today**

### **2.1 Introduction**

As shown in chapter 1, the Acquired Immunodeficiency Syndrome is currently an incurable disease, caused by the Human Immunodeficiency Virus (HIV), leading to the death of millions of people annually (refer to section 1.2). Contemporary discussion centres around, not only the social consequences, but also the financial and political problems caused by HIV/AIDS, as these problems become increasingly more complex (Bullers, 2001).

Acquired Immunodeficiency Syndrome was first announced in 1981, in the form of the United States' Centers of Disease Control and Prevention's report detailing five cases of a previously not encountered disease in homosexual men. However, it was not until 1983, that HIV was identified as the virus that causes AIDS. Thus placing, both doctors and scientists in opposition to a new and undeclared viral disease with the ability to 'outsmart' the human immune system (Bullers, 2001). Subsequently, AIDS has manifested into a worldwide epidemic, threatening the lives of many. To date, millions of people have been infected, with a major proportion of the infected dying annually from AIDS-related diseases, such as some types of cancer, nerve degenerations; and opportunistic infections, such as tuberculosis (TB) and pneumonia (Bullers, 2001; NIAID, 2005).

This chapter aims to analyse the channels through which HIV/AIDS affects a country's economy. In particular, the influence of HIV/AIDS on FDI is investigated. A significant factor, potentially exerting a positive influence on future AIDS-related mortality rates, is the introduction of HIV/AIDS treatments. Hence, the various treatments and their effects are examined, with reference to statistics regarding the treatments available African countries. The analysis presented in the chapter is developed initially through an understanding of the functioning of the disease and the general ways it negatively affects a community, in section 2.2. Thereafter, trends in the prevalence rate, globally, regionally, and for individual countries are analysed, in section 2.3. Lastly, in section 2.4, the influence of the HIV/AIDS epidemic on the economy of a country is reviewed, with specific reference to the effect on economic growth.

### **2.2 General information regarding HIV/AIDS**

This section presents background information on HIV/AIDS to understand the functioning of the disease. In section 2.2.1, the characteristics of HIV/AIDS are discussed. Thereafter, in section 2.2.2, the symptoms of the disease are described. Lastly, HIV/AIDS treatment is examined.

### **2.2.1 The characteristics of HIV/AIDS**

The Human Immunodeficiency Virus has been defined in chapter 1, as the virus that causes AIDS (Oxford University, 2008). The HI-Virus is a sub-microscopic parasite consisting of a core of ribonucleic acid (RNA)<sup>6</sup>, enclosed in a protein layer. The virus cannot replicate on its own and must thus invade a living cell, causing the functioning of a healthy cell to be controlled by the virus (Bullers, 2001).

Unlike a flu virus, which the human immune system can overcome, the HI-Virus specifically targets a type of immune cell called the CD4 lymphocyte. These immune cells control attack responses to viruses and other invaders, by the white blood cells and antibodies. Upon entering the CD4 cell, the HI-Virus forces the cell to replicate the virus. These replicas then exit the cell to create more replicas, and thus the process iterates. Because the original CD4 cell dies, increasing numbers of the cells die as the process repeats, leading to the degeneration of the immune system. This eventually causes the body's inability to protect itself from any kind of virus, bacteria, or parasite. At this stage, HIV infection develops into AIDS (Bullers, 2001).

The HI-Virus is passed from one person to another through contact with bodily fluids, for example through sexual contact, the sharing of needles amongst drug abusers, the transmission of the virus from mothers to their babies during pregnancy or breast-feeding, and in rare cases, blood transfusions.<sup>7</sup> The virus cannot however be spread through casual contact, such as shaking hands, hugging, using public facilities, sharing a drink, or being coughed or sneezed on by an infected person (USDHHS, 2007).

### **2.2.2 Symptoms of HIV infection**

Typically, no symptoms are visible with initial HIV infection. It is only after a few months that flu-like symptoms may develop, such as fever, headache, fatigue, and enlarged lymph nodes (glands in the neck and groin), disappearing within a week to a month. More severe symptoms may only appear after ten years or more, after infection (in adults) or within two years (in children born with HIV), although this varies for each individual. Consequently, the detection of HIV in the early stages is difficult, and reliable tests can only be conducted from six weeks to twelve months after infection (NIAID, 2005).

Although, not symptomatically evident, the virus may already be multiplying, and killing CD4 cells actively during the early period following infection, but can also lay dormant within these cells. A decline in the number of CD4-positive cells is the most obvious effect of HIV infection, causing the immune system to deteriorate, thus leading to more severe symptoms. These include swollen glands for as long as three months, fatigue, weight loss, frequent fevers and sweats, persistent infections and rashes (such

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<sup>6</sup> The RNA can be described as the DNA's messenger that manages daily cell activities and only carries the necessary information needed for the lifetime of one cell (Science Museum, 2004).

<sup>7</sup> With the introduction of heat-treating techniques to destroy HIV in the blood, transmission of HIV through blood transfusions has been significantly reduced (NIAID, 2005).

as herpes), and short-term memory loss (NIAID, 2005). The symptoms can be so debilitating for some that they cannot hold a steady job or do everyday chores, while others may only experience periods of illness interspersed with periods of normal or near-normal health. These symptoms of HIV/AIDS are the reason why this disease exerts a negative influence on overall health, and therefore also the productivity of workers.

### **2.2.3 The treatment of HIV/AIDS**

It was suggested that the most effective means of combating HIV/AIDS infection is prevention and this campaign encouraged abstinence, being faithful to one partner, and the use of barrier contraceptives, particularly condoms. Information, targeting intravenous drug users, on the dangers of sharing needles was also disseminated. In the late 1980s and early 1990s, it appeared that matured prevention and lobbying campaigns had begun to have a positive effect on reducing HIV/AIDS infection. In addition, medical research began to deliver new conclusions about the disease and introduced new medication for HIV/AIDS treatment (Bullers, 2001; USDHHS, 2007).

AIDS treatments were developed with the goal of stopping or slowing down the duplication of the HI-Virus inside the CD4 cells (Bullers, 2001). When HIV/AIDS was first discovered, patients were expected to survive for only a few years, but the development of effective medications has led to longer, healthier lives for those infected with HIV/AIDS (NIAID, 2006). Despite advances in the medical field, a cure for HIV/AIDS is still to be found (Bullers, 2001); even the most progressive medication developed can only stop the regression of the virus but cannot kill it (NIAID, 2006).

There are currently twenty-six antiretroviral medications that have been approved by the United States of America's Food and Drug Administration (FDA) as treatment for HIV-infected persons. These medications are categorised into three main classes: reverse transcriptase (RT) inhibitors, protease inhibitors (PI), and fusion inhibitors (NIAID, 2006). Table 2.1 lists the 26 approved medications in their separate classes.

The first class medications, RT inhibitors, intercede an essential process in the HI-Virus's life cycle known as reverse transcription. During the process, the HIV enzyme named reverse transcriptase, changes the HIV RNA to HIV DNA. There are two different RT inhibitors that prevent this from happening: Nucleoside and Non-nucleoside RT inhibitors. The first RT inhibitors are defective DNA building blocks that prevent the DNA chain from being completed, when they are built into the HIV DNA during the reverse transcription process. In this way, the virus is prevented from replicating inside the cell. The second RT inhibitors attach themselves to the reverse transcriptase and thus interfere with the enzyme's ability to convert HIV RNA to HIV DNA (NIAID, 2006).

**Table 2.1: Medications approved for HIV infection**

Nucleoside RT Inhibitors	Non-nucleoside RT Inhibitors	Proteases Inhibitors	Fusion Inhibitors
Retrovir (zidovudine, AZT) Videx (didanosine, ddl) Hivid (zalcitabine, ddC) Zerit (stavudine, d4T) Epivir (lamivudine, 3TC) Combivir (AZT and 3TC) Ziagen (abacavir) Trizvir (AZT, 3TC and abacavir) Viread (tenofovir) Emtriva (emtricitabine) Epzicom (abacavir/lamivudine) Truvada (tenofovir/emtricitabine)	Viramune (Nevirapine) Rescriptor (delavirdine) Sustiva (efavirenz)	Invirase (saquinavir-HGC) Norvir (ritonavir) Crixivan (indinavir) Viracept (nelfinavir) Fortovase (saquinavir-SGC) Agenerase (amprenavir) Kaletra (lopinavir and ritonavir) Lexiva (fosamprenavir) Aptivus (tipranavir) Reyataz (atazanavir)	Fuzeon (enfuvirtide)

Source: NIAID (2006).

The second class medications, PT inhibitors, affect the protease enzyme that the virus uses to generate infectious viral atoms. The third class medications, the fusion inhibitors, affect the virus's ability to fuse with the cellular membrane and thus block the entry into the host cell (NIAID, 2006).

AZT and other medications in the first class appear to lower the amount of virus in the blood (the viral load) for a period, but soon become ineffective as the virus begins to mutate in reaction to the medication. Systematically, the range of medications was expanded, with a major addition being the introduction of medications in the second class (PT inhibitors), which were made more widely accessible in 1995 (NIAID, 2006). When used on their own, these medications, from all classes, were found to be less effective than when used in combination with other HIV medications to form an effective 'cocktail' (Bullers, 2001; NIAID, 2006). These combinations of antiretroviral medications, which must be from at least two different classes, are known as highly active antiretroviral therapy (HAART; NIAID, 2006). In 1995, it was claimed that these cocktails decrease the rate of HI-Virus mutation. Gradually, the efficiency of cocktails has become less successful. While regular alternation of cocktail combinations has helped control the virus's resistance, there are insufficient combinations to keep pace with the continually mutating virus.

An apparent barrier to HAART is low adherence to complex medication regimens. Patients are required to take several medications according to a strict schedule and remain on them indefinitely. Several medications require fasting and others give rise to unpleasant side effects, which reduce the patient's sense of wellbeing. These include nausea, vomiting, and fatigue. Various medications may cause serious medical conditions, including bone density loss, high cholesterol levels, nerve damage and metabolic changes, such as abnormal fat distribution (NIAID, 2006; Bullers, 2001).

## **2.2.4 Conclusion: General information regarding HIV/AIDS**

The HI-Virus, which causes AIDS, is a sub-microscopic parasite that invades a living cell in order to replicate itself. It specifically targets immune cells that control attack responses to viruses. After invasion and initial replication, the replicas of the HI-Virus create more replicas and thus the process iterates, with the death of each invaded living cell after replication. This leads to the collapse of the immune system, which initiates HIV infection developing into AIDS.

The virus is spread through several ways, mainly through sexual contact. Symptoms of HIV-infection, which range from mild to debilitating, vary between individuals and the period after infection. Thus, reliable testing can only be performed from six weeks to twelve months post-infection. Earlier-stage symptoms include fever, headache, fatigue, and enlarged lymph nodes; while later-stage symptoms include swollen glands for as long as three months, fatigue, weight loss, frequent fevers and sweats, persistent infections and rashes (such as herpes), and short-term memory loss.

HIV/AIDS infection is approached in terms of prevention and treatment after infection. Campaigns emphasising abstinence, fidelity, and condoms have proved relatively successful. Allopathic treatment is through twenty-six approved antiretroviral medications that fall into three classes, combinations of which have been found to be more effective.

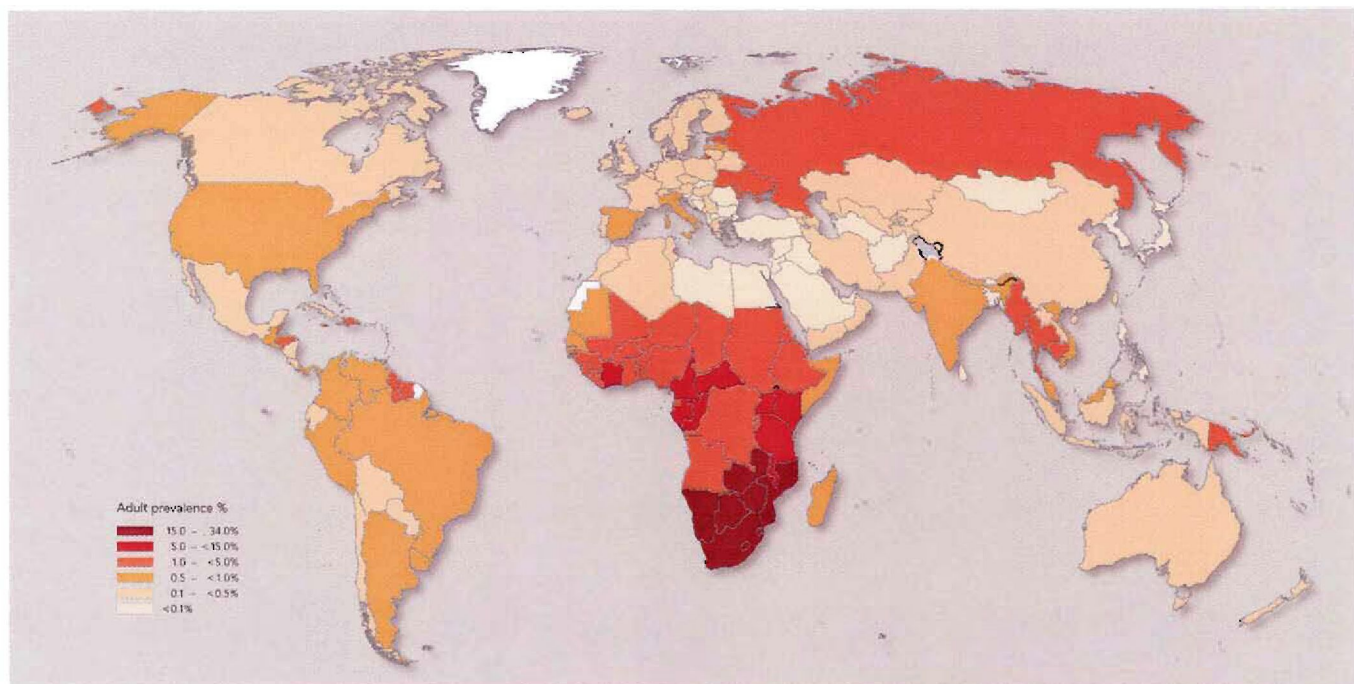
The next section details the HIV/AIDS trends and statistics.

## **2.3 Trends and statistics**

In section 1.2 the HIV/AIDS prevalence rate were briefly discussed. According to UNAIDS and WHO (2006a:1-2), a total of 39.5 million people were living with HIV in 2006, of which 24.7 million (63 per cent) were settled in sub-Saharan Africa. Globally, 2.9 million people died from AIDS-related illnesses in 2006. Of the 2.9 million who died, 2.1 million were situated in sub-Saharan Africa. Despite of extensive efforts to improve global access to antiretroviral treatment, the total AIDS death toll in sub-Saharan Africa increased from 1.9 million people in 2004 to 2.1 million people in 2006 (UNAIDS & WHO, 2006a:3).

According to UNAIDS and WHO (2006b), the adult prevalence rate is estimated to be the highest in sub-Saharan Africa, where the prevalence rate ranges between 15 per cent and 34 per cent. Figure 2.1 maps out the global HIV/AIDS prevalence rate, showing clearly that the prevalence rate is the highest in Africa. Since the diagnosis of HIV/AIDS, in 1981 the epidemic spread to 128 of the 159 countries in the world by October 1987. At that juncture, reports of HIV/AIDS prevalence rates in these countries were unreliable. Nevertheless, it was strikingly apparent that Africa had suffered the highest prevalence rate globally, from which it was deduced that Africa was the source of HIV/AIDS (Sabatier, 1987:96-98).

**Figure 2.1: A global view of HIV infection**



*Source: UNAIDS and WHO (2006b).*

This resulted in health researchers studying Africans, as they postulated that Africans might have acquired natural resistance to the disease over time. Researchers found that the African Green monkey carries a virus related to the HI-virus in humans, consequently they hypothesised that the virus might have been transmitted from monkeys to humans. No scientifically valid discoveries were made and it was established that the prevalence of the AIDS virus in Africa was overestimated. Moreover, HIV/AIDS was a relatively new disease in Africa. The continent was thus labelled as the origin of the global epidemic with no clear scientific evidence (Sabatier, 1987:98-99).

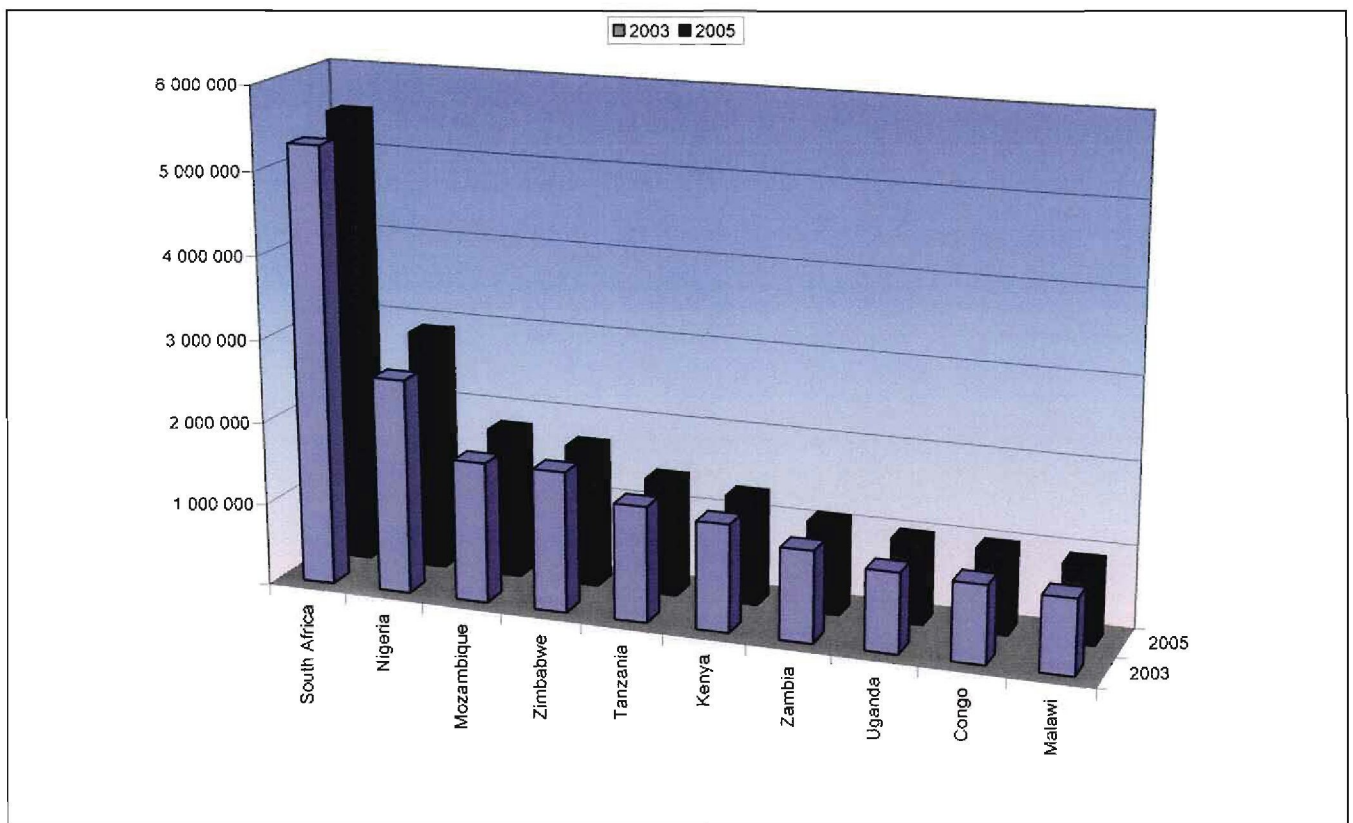
Reliable data on HIV/AIDS infections are not readily available for many countries (Dixon, McDonald & Roberts, 1999:176). The available data can also be inaccurate, particularly data from developing countries for a number of reasons. First, not all of those infected with HIV/AIDS are examined in hospitals or clinics. Hence, the reported HIV/AIDS cases documented by medical institutions may be incorrect. Second, some countries have a shortage of testing equipment and supplies. Thus, diagnosis of HIV/AIDS is through alternative methods, such as the derivation of HIV/AIDS cases from the diagnosis of AIDS-related diseases, such as chronic weight loss together with persistent diarrhoea and coughs. Such diagnoses may be incorrect and misleading in populations with a high prevalence of TB and malaria. Third, governments may withhold the true prevalence rate of their country for fear of negative consequences to the country's economy; for instance, a decrease in foreign tourist income (Larson, 1990:7).

Arndt and Lewis (2000:858-859) states that HIV/AIDS tend to strike young adults in particular, tend to move slowly and that infection rates differ by skills class. Thus, the disease affects the working population in specific, and makes the early detection thereof even more difficult, therefore contributing to the problem regarding the accuracy of HIV/AIDS data.

As previously mentioned, Africa is particularly affected by the HIV/AIDS epidemic, as is demonstrated by figure 2.1. The high prevalence rate in Africa may be attributed to the African culture encouraging multiple sexual partners and the frequent change of partners, which can contribute to the continent’s vulnerability to HIV/AIDS. One determinate historical event that had a significant impact on sexual behaviours in Africa was the colonial scheme introduced to allow black men to migrate to white settler farms, plantations, mines and cities to work. Women were left behind to farm their own lands, with the men only returning occasionally to their farms. This situation led to prostitution, which increased the spreading of HIV/AIDS (Larson, 1990:16-17). Today, men still migrate to work in the urban areas of the country, and when visiting their families, in the rural areas they may transmit the infection to these areas (Pisani, 2000:68).

Figure 2.2, on the following page, plots the estimated number of people living with HIV/AIDS in the ten most infected countries in Africa. The number of infected people has continued rising, as is evident in the movement from 2003 to 2005.

**Figure 2.2: Estimated number of people living with HIV/AIDS**



Source: UNAIDS and WHO (2006d; data with graph plotted by author).

According to UNAIDS and WHO (2006d) South Africa had the highest number of infected people in 2003 and 2005, Nigeria had the second highest number, and Mozambique the third highest. A potential reason South Africa and Nigeria are amongst the countries with the highest number of infected people is that these countries have the highest populations in Africa. Had these numbers been calculated as a percentage of the populations, the order of the countries from the highest to lowest prevalence might have been different. Moreover, it should also be considered that South Africa may also have the most reliable and accurate data of all the African countries, as this is the most developed country on the continent.

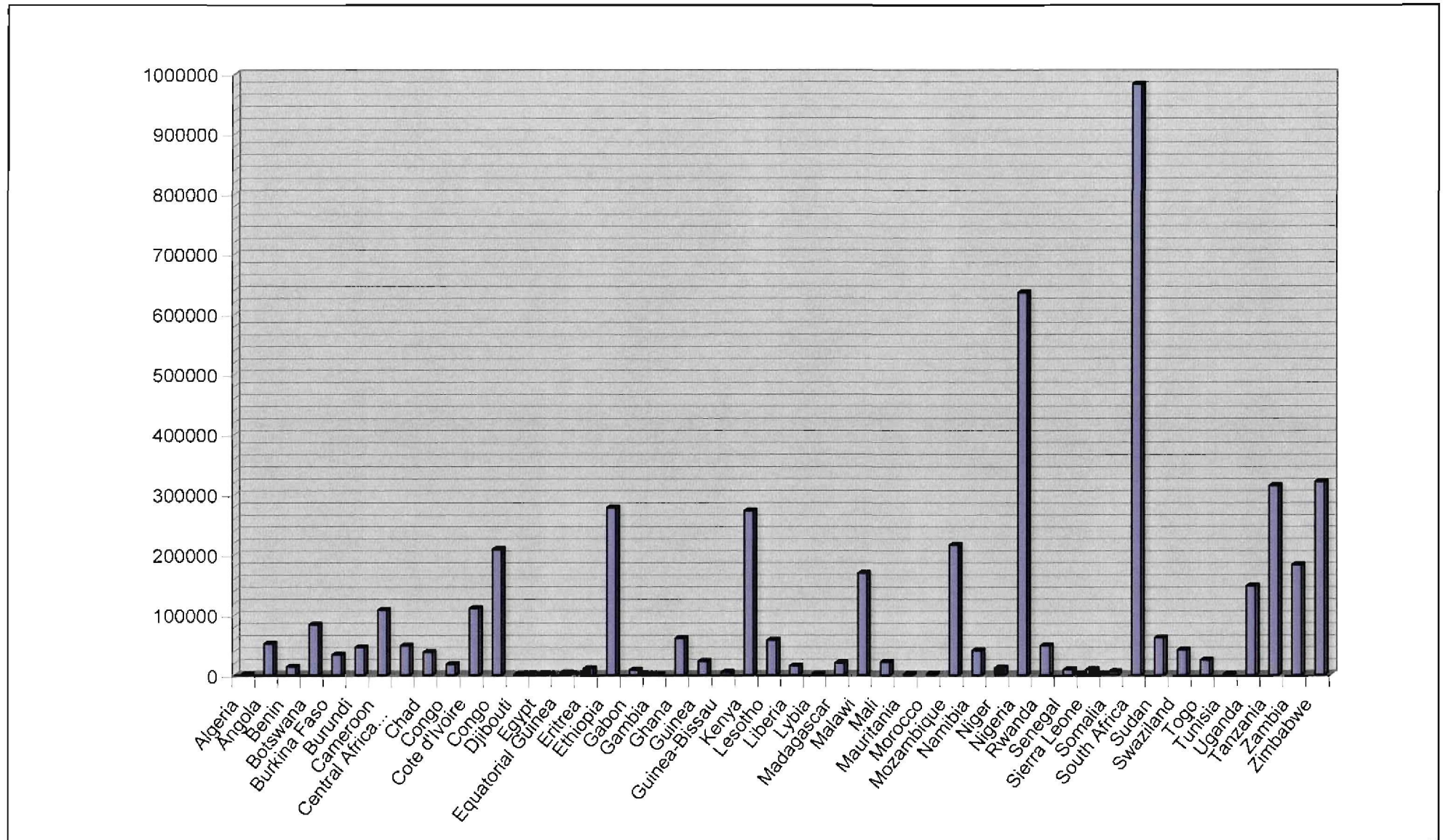
To overcome the problem of data availability and accuracy, the estimated number of people in need of ARV therapy may be used to serve as an estimate for the number of people infected with HIV/AIDS. Figure 2.3, plots all the countries with data available on the number of people in need of ARV therapy, between the age of zero and forty-nine years. In figure 2.3, it can be seen that South Africa still has the greatest number of people in need of ARV therapy. The country with the second most people needing treatment is Nigeria, followed by Zimbabwe, Tanzania, Ethiopia, Kenya, Mozambique, the Democratic Republic of Congo, Zambia and Malawi.

In this section it was concluded that the HIV/AIDS prevalence rate is the highest in Africa. This may be due to the African culture encouraging multiple sexual partners and the frequent change of partners that contribute to the continent's vulnerability to the disease. The problem regarding reliable and available data on HIV/AIDS prevalence in African countries are identified as an obstacle in the research of this disease. The inaccuracy of data may be contributed to reasons, such as incomplete medical records due to the fact that not all infected people omit themselves to be examined in a hospital or clinic; a shortage of testing equipment and supplies; governments withholding the true prevalence rate in fear of negative consequences for the country's economy; and the tendency of the disease to move slowly.

It was also suggested that the estimated number of people in need of ARV therapy may be an alternative proxy for the estimated number of people living with HIV/AIDS.

The section that follows describes the influence of HIV/AIDS on economy

Figure 2.3: Estimated number of people 0 – 49 years old needing ARV therapy, 2005



Source: UNAIDS and WHO (2005).

## 2.4 The economic influence of HIV/AIDS

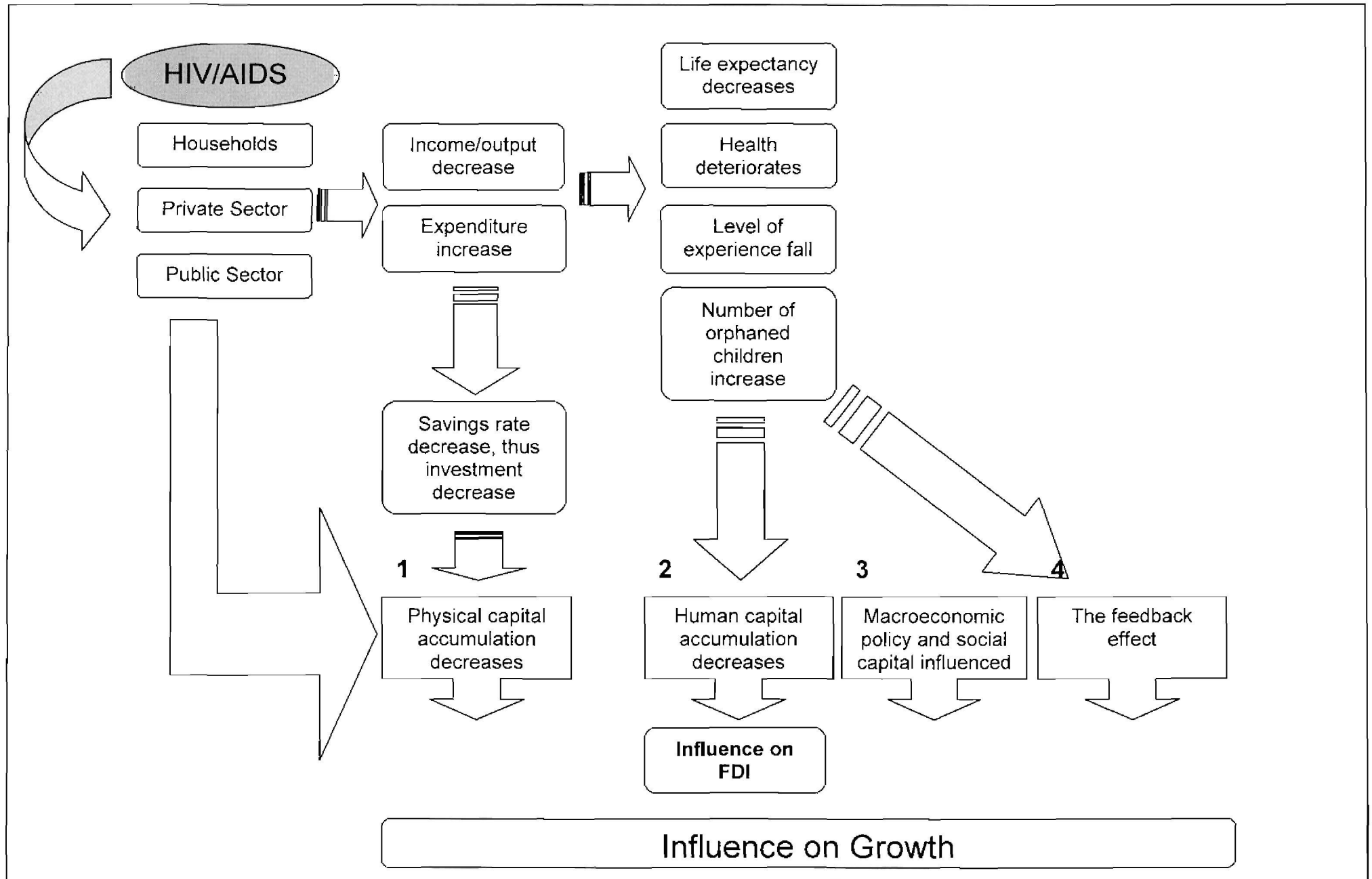
Several studies have been conducted to determine the different channels through which HIV/AIDS influences the economy of a country. One of the initial studies was conducted by Cuddington (1993), in order to determine whether HIV/AIDS has an important economic effect on society, with particular reference to Tanzania. He analyses the effects of HIV/AIDS on the growth paths of potential GDP and GDP per capita, by extending the classic Solow model to include the key macroeconomic consequences of HIV/AIDS.

The demographics of a country change in two ways because of HIV/AIDS. Firstly, the overall size of the population decreases as mortality rates increase and birth rates decrease, and secondly, the composition of the population changes to a younger age structure. The changes in the age structure can be expected to have significant effects on both the aggregate supply and aggregate demand side. On the supply side, the working-age population, and therefore the labour force, will shrink. The smaller labour force will directly and indirectly (through reduced productivity) reduce output. On the demand side, the changes in the size and structure of the population can affect the composition of public expenditure and the total savings rate (Cuddington, 1993:177).

Figure 2.4, on the following page, demonstrates the ways in which HIV/AIDS influences the three main participants in an economy, namely: households, the private sector and the public sector; and how they in turn influence growth through four main channels: physical capital accumulation, human capital accumulation, macroeconomic policy and social capital, and the feedback effect.

This section summarises the findings of studies on African and other developing countries, regarding the effects of HIV/AIDS on an economy, following the division demonstrated in figure 2.4. This is done through the discussion of the influence of HIV/AIDS on households in section 2.4.1, the private sector in section 2.4.2, and the public sector in section 2.4.3. Lastly, the relationship between HIV/AIDS and economic growth is examined in section 2.4.4.

Figure 2.4: Channels through which HIV/AIDS influences Growth



## **2.4.1 Households**

The first participant in an economy listed by Arndt and Lewis (2000:860-861), through which HIV/AIDS can influence the economy, is households. Households experience the negative impact of the HIV/AIDS epidemic directly, as family members die and children are left orphaned. The economic effects and costs of HIV/AIDS for a household are divided into direct, indirect, and systematic costs, which are detailed in the subsequent sections. The direct costs mainly represent changes in actual expenditure, while indirect costs represent changes in income (Naidu & Harris, 2005:534-535). The systematic costs of HIV/AIDS for a household do not refer to a change in income or expenditure, but rather to the sociological influence of the disease on households.

### **2.4.1.1 Changes in expenditure (direct cost)**

A family's health expenditure increases as one or more members become ill due to HIV/AIDS. This may include expenditure on HIV/AIDS treatment and more frequent illness. When HIV-infected members die, funerals can be somewhat expensive for families, particularly in traditional societies. In addition, workers take off time from work and may have to travel great distances to attend funerals. Therefore, families may seek to increase their savings if they anticipate paying for a funeral in the near future (Cuddington, 1993:175).

When providers in the family lose their jobs, children are taken out of school to work and thereby generate income to cover increased expenditure, help with chores at home or take care of the sick family members (Beckman & Raj, 2004:10). The costs associated with caring for HIV/AIDS-infected family members may change families' expenditure patterns, reduce their savings, lead to the sales of their assets, and lower their investment in human capital (Arndt & Lewis, 2000:860-861). In turn, this may have an adverse effect on economic growth. An individual's incentive to invest in their own education and training may also be reduced, as their life expectancy is lowered (Cuddington, 1993:175-176).

### **2.4.1.2 Changes in income (indirect cost)**

The provider of a family falling ill is in most cases associated with job loss or at least a decline in earnings, because of reduced productivity. This change in income represents only the earned income side. Naidu and Harris (2005:534-535 & 537) argue that the definition of household income should rather include both earned and non-earned income. Non-earned income includes money transfers (from migrant workers or other households); special events, such as marriage (Lobola, an African marriage dowry); once-off donations; and social grants from the government. The net change in income is the difference between the change in earned income and the change in non-earned income. The loss of income for households and the increase in the number of AIDS orphans, makes households more vulnerable; hence, they may require government transfers (Arndt & Lewis, 2000:860).

Increased expenditure by households, together with the loss of income, results in less spending on other goods and services, and/or more borrowing, and/or depleting savings. Thus, this decreases the savings rate. According to Cuddington (1993:175), HIV/AIDS may also affect savings through its effect on the growth rate, life expectancy, age structure, and overall health of the population. The state of a country's health care delivery system determines whether the negative-savings effect falls primarily on private (by households and firms) or public (by the government) saving.

#### **2.4.1.3 Systematic costs**

Systematic costs are associated with the social impact of HIV/AIDS on a person, and can include reduced morale and productivity of co-workers, changes in sexual behaviour, negative influence of stigma and discrimination, and the loss of quality of life (Naidu & Harris, 2005:353).

The number of AIDS orphans has increased significantly over the last few years, and because in many African countries little public sector provision of housing, schooling, and food is made for these children, they become vulnerable to abuse (Okorosobo, 2000:18-19).<sup>8</sup> In Tanzania, half of the orphaned children was due to HIV/AIDS, leading to an increased number of child-headed households, lacking the guidance and skills transmission from generation to generation. Such children are less likely to attend school and have increasingly reduced chances of adoption (Beckman & Rai, 2004:10). Relatives (typically the grandparents) may refuse to take in orphaned children because of inadequate income to support themselves and the children. Young girls, in particular, may find themselves vulnerable and pressured to marry early or turn to prostitution, which increases their chances of contracting HIV/AIDS (Beckman & Rai, 2004:10). A vicious cycle is thus set into motion, with HIV/AIDS-infected parents leading to the poor education of their children, leading to their children contracting HIV/AIDS, who in turn are less able to invest in their own children's education (Bell, Devarajan and Gersbach, 2006:57).

Schierhout (2005:611-612) conducted a study on South Africa and the influence that household illness and death have on education. Overall, it is concluded that the higher the HIV/AIDS prevalence, the higher the likelihood that children will be vulnerable to educational disadvantages, such as school absenteeism, school drop-out, and orphaning of children. Should the necessary interventions to provide both physical and psychological support to orphaned children not be made, such children's educational chances will be negatively impacted. Interventions may include registering school attendance, following-up on absenteeism, providing sufficient support and motivation to teachers and learners to increase school attendance, and endorsing safe transport to and from school.

According to Veenstra and Whiteside (2005:198), increased poverty and inequality on the household level results from HIV/AIDS, but also fuels further spread of the epidemic. Masanjala (2007) agrees with

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<sup>8</sup> Child labour may also increase as orphans become increasingly dependent upon themselves for basic survival (UNAIDS, 2001:2).

this, and states further that HIV/AIDS is not associated with people suffering from poverty, simply because they are poor, but that aspects of poverty and inequality may drive them to risky behaviours as coping mechanisms. This is visible, for example, in women being forced into transactional sex, as they are more susceptible (both biologically and socially) than men to HIV infection (Veenstra & Whiteside, 2005:198). Women in Africa are more vulnerable to HIV/AIDS infection, because of gender inequality. They are typically economically dependent upon their husbands and may not have the freedom to express their contraceptive preferences, for example, using condoms as prevention mechanism (Fredland, 1998:563).

Greener, Jefferis and Siphambe (2000:901) conducted their study on Botswana and find that there was no significant change in the level of income inequality between households. Their results suggest that because of HIV/AIDS, large households are more likely to become poor than small households, and that the average income of the poorest quarter of households may fall by 10 per cent to 15 per cent. The dependency ratio increased in a way that every income earner could expect one extra dependent on average, except for those in the lowest quartile of per capita income, who can expect four extra dependents because of HIV/AIDS.

#### **2.4.1.4 Conclusion: Households**

The influence of HIV/AIDS on households can be divided into three categories, namely direct, indirect and systematic costs. Direct costs of the disease are associated with changes in actual expenditure, such as treatment for HIV/AIDS, and funerals. Children may also be taken out of school to help with the caretaking of sick family members, or to generate extra income. Less may be spent on the education or entertainment of children. Indirect costs are associated with changes in income due to job loss or a decline in earnings because of decreased productivity. Increased expenditure by households, together with the loss of income, results in less spending on other goods and services, and/or more borrowing, and/or depleting savings. Thus, this decreases the savings rate. HIV/AIDS may also affect savings through its effect on the growth rate, life expectancy, age structure, and overall health of the population. The state of a country's health care delivery system determines whether the negative-savings effect falls primarily on private (by households and firms) or public (by the government) saving.

Systematic costs are associated with the social impact of HIV/AIDS on a person, and can include reduced morale and productivity of co-workers, changes in sexual behaviour, negative influence of stigma and discrimination, the loss of quality of life, an increase in HIV/AIDS orphans, and especially an increase in the vulnerability of young girls and women. A vicious cycle is thus set into motion, with HIV/AIDS-infected parents leading to the poor education of their children, leading to their children contracting HIV/AIDS, who in turn are less able to invest in their own children's education.

## **2.4.2 Private sector**

The second participant in the economy listed by Arndt and Lewis (2000:860-861) through which HIV/AIDS can influence economic growth, is firms. They argue that the influence of HIV/AIDS on firms can be perceived in the changes in costs and the changes in income for a firm. Insurance and benefit costs increase for firms as the prevalence of HIV/AIDS increases, thereby affecting overall costs, profits, and savings. Further, they claim that increased absenteeism and disruptions in production may affect overall productivity, and that higher worker morbidity may affect labour productivity, thus negatively influencing income.

Lui, Yin, Lyu, Chaikledkaew and Louie (2002) conducted a study, examining the economic costs of HIV/AIDS from the perspective of an employer. They developed a cost model that predicts both the direct and indirect costs relevant to a business. In their group model, they find that total costs of a typical untreated HIV-infected employee to their employer will be much higher than in the case of a non-infected employee. These various costs are discussed below, in the form of direct and indirect costs

### **2.4.2.1 Direct costs**

The following expenses constitute the direct costs: employment-based health insurance premiums, life insurance premiums, short-term and long-term disability benefits, and hiring and training expenses (Lui *et al.*, 2002). Costs for providing health care and other social services to employees and sometimes their dependents as well, will escalate as outlays on benefits, such as life insurance, medical care, funerals, and death benefits rise. The loss of investment made in training employees, and the costs associated with replacing workers, particularly for highly skilled and experienced workers, will increase (Okorosobo, 2000:18-19).

### **2.4.2.2 Indirect costs**

The economic value of reduced labour productivity constitutes the indirect costs of HIV/AIDS for a business (Lui *et al.*, 2002). There is consensus that HIV/AIDS negatively influences labour productivity. Not only the productivity of the person infected, but also their friends, family, and co-workers' productivity may be negatively affected (Cuddington, 1993:174). In firms, workers that leave because of HIV/AIDS-related illnesses may be replaced by less experienced workers, causing overall productivity to decrease (Okorosobo, 2000:18).

Lui *et al.* (2002), show strong incentives for policy-making in businesses to introduce antiretroviral therapies, in order to lengthen employees' life span and improve their quality of life, and therefore productivity. Rosen, Vincent, Macleod, Fox, Thea and Simon (2004) demonstrate similar incentives for their study of South African and Botswana firms.

### **2.4.2.3 Combined costs**

Together all of these direct and indirect costs lead to diminishing competitiveness in the global market. Many African countries' economic goals depend upon their ability to diversify their industrial base, expand exports, and attract foreign investment. HIV/AIDS renders labour more expensive; therefore, it reduces corporate profits, making investments in African businesses less desirable<sup>9</sup> (Rosen *et al.*, 2004:317 & 323; Veenstra & Whiteside, 2005:198).

Barnett, Whiteside, Khodakevich, Kruglov, and Steshenko (2000:1393-1394) make use of the concepts of susceptibility and vulnerability in approaching the potential consequences of the HIV/AIDS epidemic on the Ukraine. Their study follows the framework of Barnett and Whiteside (1999; 2000). Susceptibility includes the factors that determine the rate at which the epidemic is spread, such as the physical, environmental, cultural, economic, and social factors of a country. Vulnerability describes the features of a country that make it more likely that excess morbidity and mortality will have a detrimental impact on that country. Veenstra and Whiteside (2005:200) apply these concepts to their analysis of the influence of HIV/AIDS on a business. The susceptibility and vulnerability of various types of firms will determine the severity of the impact of HIV/AIDS. African firms, certainly appear more susceptible and vulnerable to HIV/AIDS.

For countries dependent upon agriculture, the epidemic will have a negative effect on agricultural productivity. Shortages of able-bodied adults, particularly in the peak seasons of planting and harvesting, may result in lower agricultural yields (Okorosobo, 2000:19). Malnutrition and a heavier burden on woman working on farms may also be evident as the existing labour bottlenecks are intensified (UNAIDS, 2001:2).

### **2.4.2.4 Conclusion: Private sector**

The influence of HIV/AIDS on the private sector can be summarised as follows. Should workers fall ill because of HIV/AIDS, they become less productive and absenteeism increases. Workers also become morbid about their situation, which makes them less productive and capable of coping with work stress. A skill shortage may occur as highly skilled workers die, and in order for firms to cope with these losses of labour and productivity, their insurance expenditure and training expenditure increase. The loss of productivity and labour can also lead to increased production costs, and may cause a decrease in output, and thus decrease profit and savings. All of these effects lead to less investment in the accumulation of human and physical capital.

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<sup>9</sup> It is especially difficult to attract industries that depend on low-cost labour (Rosen *et al.*, 2004:323).

### **2.4.3 Public sector**

The third participant in the economy, through which HIV/AIDS influence an economy, is the public sector. Governments are challenged by needing to make complicated choices on the allocation of scarce resources. Because little information is available about the cost-effectiveness of HIV/AIDS intervention, or what the fiscal implications will be for governments, it is particularly difficult to decide how much resources will be diverted to the prevention and treatment of HIV/AIDS. The information available, however, suggests that prevention strategies are cost-effective in terms of reducing morbidity and mortality (Dixon *et al.*, 1999:174,177). Cuddington (1993:175) argues that changes in household income and in the private sector's production structure affect revenue income for the government from taxes, such as income tax, value-added-tax (VAT), and trade taxes.

The public sector is especially influenced in terms of the health and education sectors, as these provide social services to citizens. The influence on the health sector and negative effects on education are investigated in the subsequent sections.

#### **2.4.3.1 Health sector**

Dixon *et al.* (1999:174; Arndt & Lewis, 2000:860-861) suggest that one of the elements through which HIV/AIDS affects the economy, is the increase in health care expenditures (both private and public). These increased expenditures places strain on the government's budget and are likely to reduce savings rates (both private and public). HIV/AIDS causes the demand for medical care to increase and therefore reduces the supply of care at a given quality and price. As the prevalence of HIV/AIDS has increased in many countries, their access to medical care has become increasingly restricted and expensive. Many hospitals are overcrowded and beds are frequently occupied by two patients. Significant additional costs are also expected to result from replacing health workers who have become ill or died due to HIV/AIDS (Okorosobo, 2000:17-18).

Research to date has examined the costs of implementing specific HIV/AIDS programmes, the increased demand for health services in general, and the impact of HIV/AIDS on health care workers. Health services in Africa have not managed to cope with the increased demands of HIV/AIDS infections, which has had a negative economic impact. Although little work has been undertaken to determine the impact of HIV/AIDS on the supply of health care workers in Africa, what has been established is of serious concern (Veenstra & Whiteside, 2005:206-207). Shisana, Hall, Maluleke and Stoker (2002) conducted research on health facilities across South Africa, for the period of 1997 to 2001, and find that 13 per cent of deaths amongst health workers were attributable to HIV/AIDS. The numbers in the rest of Africa may potentially be worse, thus degrading overall health care.

Veenstra and Whiteside (2005:203) state that the negative impact on an economy due to HIV/AIDS can be managed through prevention and treatment interventions. Unfortunately, these interventions are costly to governments and individuals, therefore policy decisions to subsidise interventions have to take this cost into account, weighed against the benefits. Such decisions need to be guided by sound economic advice, but must also consider and the human element, in terms of human rights and saving lives. Natrass (2004; cited in Veenstra & Whiteside, 2005:204) argues that the best way of considering interventions is to determine whether a government can afford not to implement these interventions. To address this, the economic impacts of the epidemic must be analysed over time, using a baseline scenario of the costs of not introducing an intervention in comparison with the health sector costs of introducing an intervention. Further study regarding this is still required as in past studies not all the interventions have been assessed simultaneously. The prevention of mother-to-child transmission and the use of ARVs are especially important interventions to be researched in terms of economic impact, as these interventions may reduce the effects of HIV/AIDS on an economy (Veenstra & Whiteside, 2005:204).

Fredland (1998) concludes that AIDS has neutralised a significant fraction of development, especially human development (refer to section 1.2), in Africa achieved over the past three decades, especially developments in education and business. It is therefore necessary for governments to prioritise the prevention of AIDS, without depleting resources essential for other development goals. One reason for the inefficiency of prevention policies is that they were mainly developed in the West at that stage. Therefore they were thought to be too general and did not consider the different beliefs and norms of different cultures in Africa. It could not be implemented successfully, as many of the guidelines to prevent the spreading of AIDS was in contrast to peoples' beliefs. For example, where brothers take widowed sisters-in-law into their houses for economic security under the Masai tradition and do not remain monogamous.

#### **2.4.3.2 Education**

Peltzer *et al.* (2005) conducted research on the educational sector of South Africa, in order to investigate the factors that determine the supply and demand for educators, and to understand the reasons educators may leave the profession. They find that, although the number of children between the ages of six and eighteen years is increasing, the enrolment in schools is declining. According to Peltzer *et al.* (2005:xiii; Beckman & Rai, 2004:9), this may be due to a number of factors; the following are of the most significance to this research project:

- (i) the increasing number of defenceless children (particularly girls) with limited access to school; and
- (ii) the decline in the number of public schoolteachers since 1998, because either they died from AIDS or left the system because of the AIDS epidemic.

This has meant that the gains made so far, in terms of literacy rates are being eroded. In addition, concerns are arising regarding the loss of schoolteachers. Although it takes years to train to become a teacher, loss of schoolteachers is felt immediately in the decreasing quality of education for the current students (Dixon *et al.*, 1999:176). According to Peltzer *et al.* (2005:xv), 12.7 per cent of all educators are HIV-positive in their study on South Africa, which could have a disastrous effect on the educational system.

#### **2.4.3.3 Conclusion: Public sector**

The third participant in the economy through which HIV/AIDS influence economic growth, is the public sector. Governments need to make complicated decisions on the allocation of scarce resources. The government's revenue from taxes are affected by the change in the income and expenditures of households and the private sector. Additionally, the government's expenditures on health, especially regarding the prevention and treatment of HIV/AIDS, increase. The public sector is especially influenced in terms of the health and education sectors.

The following section analyse the relationship between HIV/AIDS and economic growth.

#### **2.4.4 Relationship between HIV/AIDS and economic growth**

The overall influence of HIV/AIDS on the economy can be seen through its relationship with economic growth. The three main participants in an economy which HIV/AIDS influences have already been identified, this section further refines the effects of HIV/AIDS by considering the four channels through which economic growth can be affected. The factors that contribute to HIV/AIDS infections in Africa and the effect of HIV/AIDS on economic growth are discussed in the subsequent sections.

##### **2.4.4.1 Factors that contribute to HIV/AIDS infection in Africa**

Two broad categories of factors can be identified, namely (i) economic and social factors, and (i) geographic and demographic factors. These two categories are presented in the following sections.

###### **2.4.4.1.1 Economic and social factors**

Barnett *et al.* (2000:1401-1402) conclude that the Ukraine is becoming increasingly vulnerable to the HIV/AIDS epidemic and further, that their health care system is particularly pressurised. As the Ukraine has similar economic and social characteristics to southern African countries, the same conclusions regarding susceptibility and vulnerability may be extended to these African countries.

According to Barnett *et al.* (2000:1394), the susceptibility and vulnerability of a country influence the likelihood of HIV/AIDS infection and therefore growth prospects. The key economic factors that

determine a society's susceptibility are its total income, income inequality, ability to mobilise resources, political volatility, and economic volatility. The key social factors determining a society's susceptibility are its level of social order, degree of population movement, sexual mind set and behaviours, and the overall level of health (specifically the rates of sexually transmitted diseases – STDs). According to the *Reproductive Health Matters* journal (2003:192), co-infection with other diseases of poverty (such as diarrhoea, respiratory infections (such as TB), malaria and other parasitic infections) may also be seen as a cause of susceptibility. Barnett *et al.* (2000:1394) respectively states that social determinants of vulnerability include a society's dependency ratios, labour and skills shortages, and the degree to which social effort and resources for coping with the effects of excess morbidity and mortality can be mobilised.

Bloom, Sachs, Collier and Udry (1998:235) identified the following social factors that specifically worsen Africa's vulnerability to HIV/AIDS: the tendency of multiple sexual partners (refer to section 2.3), the high rate of STDs, non-sterile medical practices, low rates of condom use, low levels of education, high proportions of the population in their sexually active years, and migration and urbanisation within the continent's borders.

#### **2.4.4.1.2 Geographic and demographic factors**

Bloom *et al.* (1998:211) argue that some significant factors are overseen in research preceding theirs. One of these factors is Africa's disadvantageous geography. This is due to sub-Saharan Africa being the most tropic region in the world, and thus having a high disease burden, leading to low agricultural productivity and low levels of international trade.

According to Bloom *et al.* (1998:229, 234-5), the geography of a country can have a noticeable impact on the prevalence and spreading of a disease. The climate in African tropics may affect health through a number of channels, such as nutrition, human behaviour, the prevalence of parasites, and exposure to natural disasters. Africa's geography makes it especially vulnerable to some infectious diseases, such as malaria and HIV/AIDS<sup>10</sup>. In contrast to the link between geography and malaria, Bloom *et al.* (1998:229, 234-5), however, find it difficult to link geography to the prevalence of HIV/AIDS empirically, but find that because of Africa's economic, social, and cultural conditions, the continent is extremely vulnerable to the spread of the epidemic.

Another factor responsible for Africa's poor growth is its demographic structure. It has the highest youth dependency ratio globally and low life expectancies, causing reduced productive capacity per capita and lower savings and investment (Bloom *et al.*, 1998:211). The high youth dependency ratio may be due to the fact that HIV/AIDS tend to increase the mortality rate for persons between the ages of 20 and 49, thus negatively influencing the most economically productive part of the labour market (refer to section 1.2).

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<sup>10</sup> AIDS recently overtook malaria as the biggest cause of premature death (Dixon *et al.*, 1999:173).

#### 2.4.4.2 The effect of HIV/AIDS on economic growth

In section 1.2 it was postulated that a high rate of HIV/AIDS infection may be a long-term deterrent of economic growth for countries with high HIV/AIDS-infection rates. Bell *et al.* (2006:55-56) use an overlapping generations model for South Africa to demonstrate that an otherwise growing economy could deteriorate to a low-level subsistence equilibrium should it be hit with an AIDS-type increase in premature adult mortality. This study (Bell *et al.*, 2006) contradicts earlier studies that showed a small impact on GDP growth. The original understanding of the interaction of an economy was that a high mortality rate decreases labour supply, and that this decrease exerts pressure on a country's land and capital. This then leads to an increase in labour productivity, exerting a positive influence on GDP. Although the decrease in savings and investment has a negative influence on GDP, Bell *et al.* (2006) found the net effect to be small. Early studies on the overall, short-term impact of HIV/AIDS on national economies (measured by GDP), as mentioned in section 1.2, have found the negative impact to be relatively small, but recent work is focusing on the long-term impact of the disease.

Young (2005) has a surprisingly different view on the HIV/AIDS epidemic. He claims that it is a humanitarian disaster with sustainable effect, but that it is not an economic disaster. He determines this for South Africa by using a Beckerian model that endogenises participation, fertility, and education decisions with behavioural equations estimated on household survey data. He states that HIV/AIDS has two contrasting effects on an economy. The first contrasting effect is an unfavourable effect on human capital accumulation (particularly due to the great number of orphaned children). The second contrasting effect is that widespread HIV-infection lowers the fertility rate, directly through a reduction in the willingness to engage in unprotected sexual activity and indirectly by increasing the shortage of labour and the value of women's time. The results of this study demonstrate that the positive effects of lower population growth could be strong enough to counteract the most pessimistic forecast scenario of the loss in human capital. Therefore, the conclusion is that HIV/AIDS enhances the future per capita consumption possibilities by creating additional resources to be used to improve overall quality of life for future South African generations (Young, 2005). However, the validity of this optimistic view is questionable and only the perceived negative effect of HIV/AIDS on economic growth will be discussed in the rest of this chapter.

According to Bonnel (2000:822), HIV/AIDS undermines three main determinants of growth: physical, human, and social capital. Bonnel (2000:824) introduces two hypotheses regarding the way in which HIV/AIDS influences growth. The first hypothesis is that HIV/AIDS decreases per capita income growth, because the labour and capital growth rate decreases, and a downward shift in the overall production function results from the erosion of institutions and policies. The second hypothesis is that the impact of HIV/AIDS on economic growth is increased over time by feedback effects that occur as part of the development process.

Bonnel (2000:824-830) refines these hypotheses by identifying four channels through which HIV/AIDS impacts growth. The first channel is macroeconomic policy, as sound fiscal, monetary and exchange rate policies have been found to be important for growth. The second channel is physical capital. Over time, physical capital accumulation will be negatively affected by HIV/AIDS as it reduces public<sup>11</sup> and private<sup>12</sup> savings. The third channel is human capital. HIV/AIDS degrades human capital, as a generation of educated civil servants, teachers, health workers, and professionals is reduced. The fourth channel of impact is social capital, which has recently surfaced as another important determinant of growth.

Based on the above, this research project examines the division of the channels of impact into (i) physical capital accumulation, (ii) human capital accumulation, (iii) macroeconomic policy and social capital, with the addition of the fourth level of influence, (iv) the feedback effect. The following sections discuss these channels and their influence on economic growth.

#### **2.4.4.2.1 Channel one: Physical capital accumulation**

HIV/AIDS reduces the physical and human capital stock. Earlier studies on the impact of HIV/AIDS on economic growth typically focussed on physical capital accumulation and the rates of technological progress, as the primary channels of impact. Cuddington (1993:175) claims that the decrease in savings, which leads to a reduction in capital formation, will in turn result in a potentially large adverse effect on per capita income over the long term. The focus of concern has more recently shifted to the impact of HIV/AIDS on human capital accumulation. The epidemic affects the adult population in their most productive years and it also undermines the population's incentive to save and invest (Bonnel, 2000:822-823).

Robalino, Voetberg and Picazo (2002:197,205) use a similar Solow-type model as Cuddington (1993) for a study on Kenya, but with the formalisation of consumption behaviour. In addition, they tested for the effect of HIV/AIDS on the optimal savings rate, which is a different approach to that of other studies. The optimal savings rate is negatively related to the stock of capital per worker<sup>13</sup> and positively related to labour productivity growth.<sup>14</sup> HIV/AIDS shrinks the labour force and therefore increases the level of capital per worker, reducing the optimal savings rate. At the same time labour productivity decreases, causing further reductions in the optimal savings rate.

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<sup>11</sup> Government's health care expenditure increases, as well as pensions paid for the AIDS-related deaths of civil servants. The increased fiscal costs cannot likely be offset by cutting other expenditures and raising taxes.

<sup>12</sup> Households must deplete their savings to finance increased health expenditures and other AIDS-related expenditures.

<sup>13</sup> Given diminishing returns to capital, as the stock of capital per worker increases, the incentive to save (to increase the total stock) decreases (Robalino *et al.*, 2002:205).

<sup>14</sup> As labour productivity increases, output per unit of capital also increases and therefore the incentive is to forego current consumption to increase output and consumption in the future (Robalino *et al.*, 2002:A 205).

#### **2.4.4.2.2 Channel two: Human Capital Accumulation**

Dixon *et al.* (1999:174-175) explain the interaction between the elements of an economy where the negative influence of AIDS is present. AIDS reduces the labour force, thus, income per capita will increase, *ceteris paribus*.<sup>15</sup> But, as life expectancy is lowered, level of health deteriorates, and the level of experience fall, overall productivity is also likely to decrease. Thus, the level of income per capita will decrease. The epidemic will also increase health expenditure (both public and private) that has to be funded by decreasing consumption and/or decreasing the savings rate. The net result, is an empirical question that will be investigated further in chapter 4.

There are thus four main means through which HIV/AIDS can affect human capital accumulation are identified as (i) lowered life expectancy, (ii) deteriorating health, (iii) decreasing level of experience, and (iv) increasing numbers of orphaned children. These means are discussed in the sections that follow.

##### **2.4.4.2.2.1 Lowered life expectancy**

The first mean, through which human capital accumulation is influenced, is through the reduction in life expectancy. Increased AIDS-related deaths decrease the life expectancy of people in a specific country. The labour force supply will eventually decrease, decreasing human capital accumulation, and therefore a country's output. This is due to both the deterioration in the quality of labour and the shortage of important skills (Dixon *et al.*, 1999:174).

##### **2.4.4.2.2.2 Overall deteriorating health**

The second mean is through the increased occurrence of illness and the deterioration of overall health. This adversely affects labourers' productive efficiency (Dixon *et al.*, 1999:174). As discussed in section 2.4.2.2, not only the productivity of the person infected, but also their friends, family, and co-workers' productivity may be negatively affected (Cuddington, 1993:174).

##### **2.4.4.2.2.3 Decreasing levels of experience**

The third mean is through the decrease in the level of experience. Decreased expenditure on education, as previously discussed in section 2.4.1, may have an adverse effect on human capital stock.

Cuddington (1993:175-176) firstly focuses on the impact of HIV/AIDS on the human capital stock, in which human capital is acquired through experience (learning-by-doing) and no explicit decision to invest in education is involved. AIDS leads to the premature death of experienced workers, thereby eroding the

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<sup>15</sup> This follows the Malthusian framework described earlier, which was applied to Europe's Black Plague. The plague resulted in a smaller population and higher real wages (Bonnel, 2000:820).

existing human capital stock and hence output. AIDS causes a change in the labour force composition over time, leading to a younger, less-experienced labour force.

Cuddington (1993:176) secondly focuses on the impact on human capital stock, in which human capital formation results from investment in education and training. In this case, there will also be a loss of existing human capital as educated workers die prematurely. But as HIV/AIDS becomes more prevalent, this will change the perceived costs and benefits of investment in education, which can prevent new investments. Investment may then shift toward more expenditure on health and less expenditure on education.

Arndt's (2006) paper differs from other studies in that the repercussions of HIV/AIDS on human capital are considered from both the demand and supply sides. Technical change is also assumed to be biased towards human capital, implying interactions between growth in the human capital stock, technical change, and the rate of economic growth. This is consistent with substantial evidence worldwide. His results point to the education sector as a key and policy-sensitive channel of impact, because HIV/AIDS may substantially reduce the number of children enrolled in school (as was evident in his Mozambican study; Arndt, 2006).

Cuddington (1993) laid the foundation for analysing the impact of HIV/AIDS on an economy, by comparing an AIDS and no-AIDS scenario, using the standard neoclassical growth model (Solow model). The neoclassical growth model used for analysis makes various assumptions and results should therefore be evaluated with caution. One of these assumptions is that the different types of labour are perfect substitutes within the time period considered (Dixon *et al.*, 1999:176). This assumption is addressed by Kambou, Devarajan and Over (1992), who used a multi-sector model (general equilibrium model) to estimate the repercussion of HIV/AIDS on an economy. Their analysis emphasises the effects of disruptions in labour supply and considers imperfect substitution between types of labour and in commodity trade. They find that a reduction in skilled labour will have a greater impact on the economy than a reduction in unskilled labour (Dixon *et al.*, 1999:177). In response to this, Bonnel (2000:826) argues that better educated workers will become less infected over time, as they become more informed and their incentives for prevention increase.

#### **2.4.4.2.2.4 Increasing number of orphaned children**

The fourth mean, through which human capital accumulation is affected, is the number of orphaned children. Corrigan, Glomm and Mendez (2005) use an overlapping generations model of human capital accumulation to study the impact of the AIDS crisis on economic growth in sub-Saharan African countries. In their model, life expectancy, and thus the incentive to save and accumulate physical capital, is decreased due to HIV/AIDS. They find that the AIDS crisis lowers the returns to human capital

investment by resulting in large numbers of AIDS orphans. They also find that a prolonged AIDS crisis can lower the growth rate significantly, by up to 40 per cent.

#### **2.4.4.2.3 Channel three: Macroeconomic policy and social capital**

HIV/AIDS also destroys social capital through negative influence on governmental institutions. At a micro level, it destroys the social fabric of societies and at a macro level, it undermines the capacity of governments to provide basic social services and regulate society (Bonnel, 2000:822-823). Important implications for the economy can be fiscal, in that the tax base is weakened, reducing resources needed to finance public expenditures on for example, health and education. Increasing pressure is thus placed on the government's finances (Bell *et al.*, 2006:57).

Bonnel (2000:825) states that HIV/AIDS worsens fiscal deficits and reduces the macroeconomic management capacity of governments, thereby negatively influencing macroeconomic policy outcomes. Furthermore, Arndt and Lewis (2000:880-881) find that in the AIDS scenario governments will spend more on the prevention and treatment of HIV/AIDS and less on other issues, causing total savings to decline. Investment in turn is dependant on the available savings; therefore, the decreased savings will lead to decreased investment. This then reduces capital formation and the rate of economic growth. Overall, the change in government spending and finance is responsible for 45 per cent of the difference in real GDP between the no-AIDS and AIDS scenario in 2010. The negative impact of HIV/AIDS on total factor productivity (TFP) is 34 per cent, reductions in the labour supply is 13 per cent, and the reduced factor specific productivity is 8 per cent of the difference in real GDP.

The effects of HIV/AIDS on the social structure of a country can be serious, as existing social networks and traditional support mechanisms are eroded. These effects can be particularly harmful to private sector developments and thus place further strain on government resources. This will cause a reduction in production efficiency and total output. These effects will only accumulate over time should serious interventions not be made and will lead to a decreasing GDP growth rate (Bonnel, 2000:823, 830).

#### **2.4.4.2.4 Channel four: The feedback effect**

Veenstra and Whiteside (2005:199) report that earlier comparisons of AIDS and non-AIDS scenarios treated the epidemic as exogenous, but instead it should be viewed as an endogenous influence on economic growth, requiring feedback loops to value its accumulative impacts in reality.

Bell *et al.* (2006:56) argue that the long-term economic costs of AIDS are certain to increase. The overlapping generations approach emphasises the importance of human capital and the transmission of knowledge and abilities from one generation to another. In this study (Bell *et al.*, 2006), AIDS is claimed to influence economic growth in three steps. Initially, it destroys the existing human capital, then it

weakens or even wrecks the mechanism that creates human capital in the next generation,<sup>16</sup> and finally, once children of AIDS victims become adults with low education and knowledge inheritance, they are less able to invest in their own children's education than they would have, had they not had parents with aids. The vicious circle gains momentum and eventually may cause a collapse of economic productivity.

In the overlapping generations model, the emphasis is placed on higher mortality risk undercutting the formation of human capital through three channels. The first channel is less productive capacity, in the case of one or both parents dying prematurely, their children will have less productive capacity as less human capital will have been transmitted. The second channel is reduced schooling due to the loss of income, caused by early death in a family. The third channel is less investment in education, because the chance of children becoming infected as adults makes investment in their education less attractive. Corrigan *et al.* (2005) consider the first and second channel in their study, but they allow for effects on the accumulation of physical capital, which are absent in the model used by Bell *et al.* (2006:57-58). Thus, Bell *et al.*'s (2006) study complements Corrigan *et al.* (2005) in the task of establishing the effects AIDS may have on the growth path of per capita income.

HIV/AIDS could also increase inequality between households, as some will have received the transmission of knowledge and skills from their parents, and others will not have (Bell *et al.*, 2006:57).

#### **2.4.5 Conclusion: The economic influence of HIV/AIDS**

In section 2.4, the economic influence of HIV/AIDS were analysed. The influence of HIV/AIDS on the three main participants in an economy, namely: households, the private sector, and the public sector; and how they in turn influence economic growth through four main channels, namely: physical capital accumulation, human capital accumulation, macroeconomic and social capital, and the feedback effect, were discussed.

The first participant, through which HIV/AIDS influence an economy, is households. The direct cost of HIV/AIDS for a household is the change in their actual expenditure. When one or more members of a family become ill due to HIV/AIDS, health expenditures increase. Funeral costs may also increase their expenditure. Children may be taken out of school to generate income for the family or take care of sick family members, in return lowering their investment in education, and therefore, human capital. The indirect cost of the disease for a household is associated with the change in their income. As the provider of a family falls ill, he/she may lose their job or at least experience decreased earnings (due to reduced productivity). Together the increase in expenditures and the decrease in income result in a decreased savings rate. There are also some systematic costs of HIV/AIDS for a household, including

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<sup>16</sup> The quality of child-rearing significantly depends on the parents' human capital. Therefore, if one or both parents die before their children reach adulthood, the transmission of knowledge and potential productive capacity across two generations will be weakened. Over the long run the poor education of children today translates into low productivity of adults in generations to come (Bell *et al.*, 2006:56).

reduced morale and productivity of co-workers, changes in sexual behaviour, negative influence of stigma and discrimination, and the loss of quality of life. The greatest social impact of HIV/AIDS on society comes through the increase of AIDS orphans. These children become even more vulnerable to the disease and a vicious cycle is set in motion, with HIV/AIDS-infected parents leading to poor education of their children, leading to their children contracting HIV/AIDS. In turn these children are less able to invest in their own children's education.

The second participant, through which HIV/AIDS influence an economy, is the private sector. The direct cost of HIV/AIDS for businesses includes the increase in expenditures, due to HIV/AIDS-infected employees. Examples of these expenditures are employment-based health insurance, life insurance, short-term and long-term disability benefits, and hiring and training expenses. The change in labour productivity, and therefore business income, constitutes the indirect costs of the disease for a business. Overall, the direct and indirect costs lead to diminishing competitiveness in the global market.

The third participant, through which HIV/AIDS influence an economy, is the public sector. Government income from taxes is influenced by the changes in household income and in the private sector's production structure. Government expenditure on prevention and treatment interventions for HIV/AIDS may also increase, affecting the government budget. The public sector is especially influenced in terms of the health and education sectors. The deteriorating effects of HIV/AIDS on overall health and education comes as no surprise, and the only thing certain is that prevention and treatment interventions can manage the negative influence of HIV/AIDS on an economy.

To assess the overall influence of HIV/AIDS on an economy, its relationship with economic growth must be analysed. Early studies on the short-term influence of the disease on GDP found the influence to be relatively small, suggesting that the disease has a long-term influence on economic growth. Firstly, some of the factors that contribute to HIV/AIDS infection in Africa were discussed, where after the four channels, through which HIV/AIDS influence economic growth, were identified. Regarding the former, two broad categories of factors were identified that contribute to Africa's HIV/AIDS infection, namely: economic and social factors, and geographic and demographic factors.

The first channel, through which HIV/AIDS influence economic growth, is physical capital accumulation. Decreased savings, due to increased expenditures and decreased income for households, the private and public sector, may lead to a reduction in capital formation. This in turn will result in a potentially large adverse effect on per capita income over the long term.

The second channel, through which HIV/AIDS influence economic growth, is human capital accumulation. The negative effect of the disease on human capital is felt through lowered life expectancy, deteriorating health, decreasing levels of experience, and increasing numbers of orphaned children. AIDS will impede economic growth by destroying human capital, particularly of young adults,

by weakening and wrecking mechanisms that generate human capital and investment in people, through loss of income and the death of parents; and by giving rise to a new generation with little education and knowledge, therefore less able to raise their own children and invest in their education (Veenstra & Whiteside, 2005:199).

The third channel, through which HIV/AIDS influence economic growth, is macroeconomic policy and social capital. HIV/AIDS destroys the social fabric of societies and undermines the capacity of governments to provide basic social services and regulate society. It also weakens the tax base, placing strain on the government's finances.

The fourth channel, through which HIV/AIDS influence economic growth, is the feedback effect. The accumulative influence of HIV/AIDS over generations were reviewed by referring to the vicious cycle where AIDS orphans are less able to invest in their own children's education, had they not had parents with AIDS.

Arndt and Lewis (2000:860-861, 875-879) summarise the influence of HIV/AIDS on economic growth through physical and human capital as follows: HIV/AIDS may negatively alter the growth path and the result of class-biased impacts may result in more uneven welfare effects. The findings from their model suggest that the real GDP growth rate will decrease as the influence of HIV/AIDS becomes more pronounced during the 1990s until 2008, after which the growth rate will bounce back and start increasing slowly until 2010. They also find that the GDP per capita will decrease over time, in the presence of HIV/AIDS. Because the model being used makes a distinction between skilled and unskilled labour (see Kambou *et al.*, 1992), they find that the unemployment rate for unskilled labour increases in the presence of HIV/AIDS. This is contrary to popular belief that the unemployment rate for unskilled labour will decrease due to this labour category having the highest HIV-infection and AIDS-related death rates.

The overall effect of HIV/AIDS on economic growth is an empirical question that can only to be answered as more data becomes available. The final section provides a summary of the chapter.

## **2.5 Summary**

This chapter analysed the channels through which HIV/AIDS affects a country's economy. Firstly, the focus was on understanding the functioning of the disease and the general ways in which it negatively affects a community. A significant factor, potentially exerting a positive influence on future AIDS-related mortality rates, is the introduction of HIV/AIDS treatments. Therefore, the various treatments of HIV/AIDS were examined, with reference to statistics regarding the treatments available African countries. Secondly, trends in the prevalence rate, globally, regionally, and for individual countries were analysed,

and lastly, the influence of the HIV/AIDS epidemic on the economy of a country was reviewed, with specific reference to the effect on economic growth.

The HI-Virus, which causes AIDS, invades a living cell in order to replicate itself. It specifically targets immune cells that control attack responses to viruses. After invasion and initial replication, the replicas of the HI-Virus create more replicas and thus the process iterates, with the death of each invaded living cell after replication. This leads to the collapse of the immune system, which initiates HIV infection developing into AIDS. The virus is spread through several ways, mainly through sexual contact. Symptoms of HIV-infection, which range from mild to debilitating, vary between individuals and the period after infection. Thus, reliable testing can only be performed from six weeks to twelve months post-infection. Earlier-stage symptoms include fever, headache, fatigue, and enlarged lymph nodes; while later-stage symptoms include swollen glands for as long as three months, fatigue, weight loss, frequent fevers and sweats, persistent infections and rashes (such as herpes), and short-term memory loss. Overall, it can be concluded that HIV/AIDS is currently incurable and has devastating influences on a person's health. Although progress has been made in terms of treatment, the virus is systematically becoming resistant to some treatments. A further barrier to successful treatment is that HIV/AIDS-infected persons in Africa find it difficult to maintain complex medication regimens, as patients must take several medications on a strict schedule and must remain on them for life.

It was concluded that HIV/AIDS prevalence rates are escalating with the number of people living with HIV/AIDS estimated at 39.5 million for 2006, globally, of which 24.7 million were settled in sub-Saharan Africa. Globally 2.9 million people died of AIDS in 2006, of which 2.1 million people were situated in sub-Saharan Africa. Africa is particularly hard hit by this epidemic, due to cultural, economic, social, geographic, and demographic factors. The problem regarding reliable and available data on HIV/AIDS prevalence in African countries were identified as an obstacle in the research of this disease. The inaccuracy of data may be contributed to reasons, such as incomplete medical records due to the fact that (i) not all infected people omit themselves to be examined in a hospital or clinic; (ii) a shortage of testing equipment and supplies; (iii) governments withholding the true prevalence rate in fear of negative consequences for the country's economy; and (iv) the tendency of the disease to move slowly. It was also suggested that the estimated number of people in need of ARV therapy may be an alternative proxy for the estimated number of people living with HIV/AIDS.

To determine the economic influence of HIV/AIDS several studies' findings were summarised. As shown in figure 2.4, HIV/AIDS influences the three main participants in an economy, namely: households, the private sector, and the public sector. In turn, these participants influence economic growth through four main channels: physical capital accumulation, human capital accumulation, macroeconomic policy and social capital, and the feedback effect.

The first participant, through which HIV/AIDS influence an economy, is households. The direct cost of HIV/AIDS for a household is the change in their actual expenditure, and the indirect cost of the disease is associated with the change in their income. Together these costs result in a decreased savings rate. There are also some systematic costs of HIV/AIDS for a household, including reduced morale and productivity of co-workers, changes in sexual behaviour, negative influence of stigma and discrimination, the loss of quality of life, and most importantly, the increase of AIDS orphans.

The second participant, through which HIV/AIDS influence an economy, is the private sector. The direct cost of HIV/AIDS includes the increase in expenditures, due to HIV/AIDS-infected employees, and the change in labour productivity, and therefore business income, constitutes the indirect costs of the disease for a business. Overall, the direct and indirect costs lead to diminishing competitiveness in the global market.

The third participant, through which HIV/AIDS influence an economy, is the public sector. Government income and expenditures change, therefore affecting the government budget. The public sector is also especially influenced in terms of the health and education sectors.

To assess the overall influence of HIV/AIDS on an economy, its relationship with economic growth must be analysed. Firstly, some of the factors that contribute to HIV/AIDS infection in Africa were discussed by categorising it in two broad categories, namely: economic and social factors, and geographic and demographic factors. Secondly, the four channels, through which HIV/AIDS influence economic growth, were identified.

The first channel, through which HIV/AIDS influence economic growth, is physical capital accumulation. Decreased savings, due to increased expenditures and decreased income for households, the private and public sector, may lead to a reduction in capital formation. This in turn will result in a potentially large adverse effect on per capita income over the long term.

The second channel, through which HIV/AIDS influence economic growth, is human capital accumulation. The negative effect of the disease on human capital is felt through lowered life expectancy, deteriorating health, decreasing levels of experience, and increasing numbers of orphaned children.

The third channel, through which HIV/AIDS influence economic growth, is macroeconomic policy and social capital. HIV/AIDS destroys the social fabric of societies and undermines the capacity of governments to provide basic social services and regulate society. It also weakens the tax base, placing strain on the government's finances.

The fourth channel, through which HIV/AIDS influence economic growth, is the feedback effect. The accumulative influence of HIV/AIDS over generations were reviewed by referring to the vicious cycle where AIDS orphans are less able to invest in their own children's education, had they not had parents with AIDS.

As discussed in section 1.2, the sustainable economic growth over the long-term depends on several factors, one of which is foreign investment. Investors, however, take the degree of the HIV/AIDS epidemic in a country into consideration when deciding whether to invest in a country or not. This is the concern of the next chapter that will analyse the concept, distribution and determinants of FDI, as well as the link between HIV/AIDS, FDI and growth. In chapter four, the influence of HIV/AIDS on foreign direct investment flows to Africa will be analysed empirically.

## Chapter 3 — Analysis of Foreign Direct Investment

### 3.1 Introduction

In section 1.2.1.2, the importance of FDI for a country's economic development was discussed. The potential benefits of FDI for a developing country were discussed, namely: (i) generating employment (both directly and indirectly) that may lead to higher growth, and increasing the skills of local workers by training and learning through practice; (ii) filling the gap between domestic savings and investment requirements; (iii) contributing to the integration of the host economy into the world economy; (iv) transferring modern technology; (v) increasing the efficiency of firms through increased competition; and (vi) the additional influence of FDI on the balance of payments.

Foreign direct investment typically involves a foreign company acquiring a controlling ownership share (at least 10 per cent of voting stock) in an existing domestic company by investing capital. These type of FDI are often accompanied by new technology and management expertise. However, there also exist other forms of FDI, such as 'Greenfield Investment' (refer to section 1.2.1.1). In some cases, an investment is hard to classify as FPI or FDI. For example, in some countries where FPI is liberalised, a portfolio investor may buy more than 10 per cent of company shares, without having a desire to control the company. Yet, this investment may be classified as FDI. Another example is foreign subsidiaries issuing bonds that are mainly purchased by parent firms. These transactions are actually FDI, but can also be classified as FPI (UNCTAD, 1999:6).

It was also identified in section 1.2.1.1 that FDI flows to Africa, concentrated mostly in the west, north and central parts, totalled only 10.6 per cent of developing country inflows in 2006. It is obvious that Africa still exhibits limitations that hamper its ability to attract the kind of quality FDI that would create broader favourable outcomes in its economies.

Most African countries experience a shortage of investment capital and are thus aware of the importance of FDI for bridging this gap (Loots, 2000:1). Foreign direct investment represents the largest portion of all international capital flows to middle-income developing countries since the 1990s. Foreign direct investment flows to low-income countries however were smaller, and in addition, these countries usually receive more foreign aid than FDI (Perkins *et al.*, 2006:415). In addition, FDIs are firm- or sector-specific, and therefore host countries cannot influence the application of these investments (UNCTAD, 1999:11). Todaro (2000:578) also states that TNCs employ a relatively small number of people in least developed countries (LDCs) and that these jobs tend to be concentrated in the high-wage, modern urban sector.

In 2005, foreign direct investments in Africa were predominantly made in natural resources (mainly oil) and services (such as banking). Increases in commodity prices, as well as the high demand for

petroleum, led to more exploration activities in oil-producing countries. The sum of FDI inflows to the oil-producing countries on this continent signified approximately 48 per cent of FDI flows to the region (UNCTAD, 2006:xix). Because foreign direct investments is often attracted by either resource endowments or long-term fundamental economic strengths, FDI is more stable than other forms of private foreign capital. These factors do not change instantaneously and investors are less likely (and less able) to withdraw during economic recessions (Perkins *et al.*, 2006:419).

This chapter presents an overview of FDI and its relation to this research project. Initially, the different types of FDI are distinguished in section 3.2. Thereafter, the recent distribution of FDI (globally, in developing countries and in Africa in particular) is examined in section 3.3. In section 3.4., the determinants of FDI and the possible influence that HIV/AIDS may have on them are presented. Lastly, the relationship between FDI and growth is analysed in section 3.5.

## **3.2 Types of foreign direct investment**

Foreign direct investment can be classified according to three aspects, namely the broad definition, the motives for investment, and the different types of transactions. Firstly, FDI can broadly be defined as being horizontal or vertical. Secondly, according to Dunning (1993:56), FDI can be classified more specifically according to the different motives of foreign direct investors: resource-seeking FDI, market-seeking FDI, efficiency-seeking FDI, and asset-seeking FDI. Thirdly, there are three definitions of different ways FDI are made, namely Greenfield investment, mergers and acquisitions (M&As), and collective investment funds. These three aspects are reviewed in the subsequent sections.

### **3.2.1 Broad categories of foreign direct investment**

Two broad categories of FDI can be distinguished, namely horizontal and vertical FDI.

#### **3.2.1.1 Horizontal foreign direct investment**

Horizontal FDI involves direct investment abroad to begin production of a differentiated product in the host country, which is also produced in the home country. An example of this is a company not wanting to license foreign producers to produce their product, because they want to retain control over patents and trade secrets. Instead, the company will establish another branch of their company in the host country, in order to serve the local market (Salvatore, 1995:375). This category of FDI is associated with market-seeking FDI, which is discussed in section 3.2.2.2.

#### **3.2.1.2 Vertical foreign direct investment**

Vertical FDI involves a home country wanting to obtain control of a scarce resource, in order to ensure the uninterrupted supply of an input at the lowest cost (Salvatore, 1995:375). An example of this is the

case in which various parts of a product are assembled in one country, and the remainder in another, with the final sale taking place in yet another country. This category of FDI is usually export-oriented and associated with resource-seeking FDI, which is discussed in section 3.2.2.1 (Lim, 2001:11).

Motives for FDI are discussed in the sections that follow.

### **3.2.2 The four motives for foreign direct investment**

According to Salvatore (1995:374; UNCTAD, 1999:7), the overall expected benefits from FDI are higher returns and risk diversification. Higher returns may result from higher growth rates in host countries, more favourable tax treatment, or greater availability of infrastructure, as well as an increase in sales (either in local markets or through exports), a reduction in production costs, and an increase in overall production efficiency. Risk diversification is explained with asset-seeking FDI, as it is closely associated with it.

The main motives for FDI result in four types of FDI: resource-seeking FDI, market-seeking FDI, efficiency-seeking FDI, and asset-seeking FDI, which are discussed in the following sections.

#### **3.2.2.1 Resource-seeking**

Resource-seeking FDI occurs when TNCs are motivated to invest abroad, in order to acquire particular resources at a lower real cost than could be obtained in the home country (should they be obtainable at all; Dunning, 1993:57). The incentive for this type of investment is to make the TNC more profitable and competitive in the markets it serves. There are three main types of resource-seeking FDI: FDI seeking physical resources, FDI seeking unskilled or semi-skilled labour, and FDI to firms seeking technological capabilities, management or marketing expertise, and organisational skills (Dunning, 1993:57).

The first type of resource-seeking FDI seeks physical resources, such as minerals, raw materials, and agricultural products. Foreign direct investment in the service industry may also intend to exploit location-bound resources, such as tourism, car rentals, oil drilling, construction, and medical and educational services. Transnational corporations may want to engage in this type of FDI, in order to minimise their costs and to obtain security of supply sources. Natural resource-based industries, such as petroleum, minerals, and agricultural production, are popular for investment. Investment in these types of activities is usually very capital-intensive and is predominantly negotiated directly with the host government (in order to make it a partner in the investment; Perkins *et al.*, 2006:418).

The second type of resource-seeking FDI seeks unskilled and semi-skilled labour that is highly motivated and can be employed at a low cost. Transnational corporations involved in the manufacturing or the service industry are the most likely to seek cheaper labour than those available in their home country.

The products manufactured using cheaper labour is then usually exported to other countries, in particular to industrialising countries. Host countries may set up free trade areas or export processing zones to attract this kind of FDI (Dunning, 1993:57).

The third type of resource-seeking FDI is motivated by firms in host countries seeking to acquire advanced technologies, management or marketing expertise, as well as organisational skills from other enterprises abroad (Dunning, 1993:57).

Resource-seeking FDI has previously been, and remains an important part of FDI for developing countries, but not for the rest of the world. The relative decline of resource-seeking FDI may not only be attributed to natural resources forming part of a declining share of global output, but also to FDI giving way to other arrangements for attracting natural resources to a country, such as joint ventures, non-equity engagements with foreign investors, and arms-length trade relations when host countries are no longer inhibited in terms of capital or technical skills (Nunnenkamp, 2001:11).

### **3.2.2.2 Market-seeking**

Market-seeking FDI seeks to invest in a country with a growing market size and progressive economic growth (Nunnenkamp, 2001:11). This type of investment is usually made in the manufacturing and service industries, and is aimed at the domestic market in the host country. For example, in consumer goods, capital-intensive goods, and services, which are in many cases partially protected against foreign import competition (Perkins *et al.*, 2006:418). Usually these markets would have been served previously by means of exports. This change towards FDI can be due to tariff or other cost-raising barriers implemented by the host country, or an increase in the size of the markets that were previously insufficiently large to justify local production (Dunning, 1993:58). Home countries may want to engage in FDI to avoid tariffs and other restrictions imposed on imports in the host country, or to take advantage of government subsidies that encourage FDI (Salvatore, 1995:374). Nunnenkamp (2002:36) however finds that the tariff-jumping motive for FDI has lost its relevance, as FDI have turned towards the non-traded service sector.

There are mainly four reasons for this type of FDI (Dunning, 1993:58). The first reason is for TNCs (after they have set up foreign production facilities in another country) to retain their main suppliers and customers, by following them abroad. The second reason is that products may need to be adapted to local tastes and needs, and to indigenous resources and capabilities. The investment would also prove to be advantageous because the investor familiarises themselves with local languages, business customs, legal requirements, and marketing procedures in the host country. The third reason to rather serve a local country from within its own borders is that the production and transaction costs of doing so are less than exporting it to the host country. Should a product be produced affordably, but be expensive to transport, the better choice would be to establish a production plant in the host country

rather than export the products there. The opposite is true should substantial economies of scale be yielded in the production of this product, and transportation costs for the product be relatively low. The fourth reason is that TNCs may find it necessary to have a physical presence in leading markets, as part of their marketing strategy (Dunning, 1993:58).

The importance of market-seeking FDI and the influence globalisation has exerted upon it, is difficult to assess. Due to protected local industries, FDI was conventionally the most reliable means of penetrating a foreign market. Because of fewer trade barriers in recent years, market-seeking FDI is becoming less important. Firms can now rather export their products to the foreign country than establish a production plant in that country. This is especially relevant for the manufacturing sector. The emergence of the service industry has however opened up new opportunities to market-seeking FDI, as FDI in this sector is beginning to increase as a percentage of total FDI. Regional integration is also believed to stimulate market-seeking FDI, as it increases the market size and improves economic growth (Nunnenkamp, 2001:11-12).

### **3.2.2.3 Efficiency-seeking**

Efficiency-seeking FDI is made in labour-intensive manufacturing sectors, intended for exports, in order to promote the efficiency and competitiveness of these firms. Investment in this type of activity can easily be moved to another country, should there be significant changes in production costs or the presence of macroeconomic or political instability (Perkins *et al.*, 2006:418). The benefits of this type of motive for FDI include economies of scale (and scope), as well as risk diversification. These originate from cross-border product or process specialisation, the learning experiences that result from producing in different backgrounds, and the opportunities for arbitraging cost and price differences across the exchanges. For efficiency-seeking FDI to occur, cross-border markets must be open and well developed, which explains efficiency-seeking FDI thriving in regionally integrated markets (Dunning, 1993:59). The positive effects of regional integration may be offset by the trade barriers that emerge against non-member countries, which may have a negative influence on efficiency-seeking FDI (Nunnenkamp, 2001:13).

There are mainly two forms of efficiency-seeking FDI. The first form takes advantage of existing discrepancies between countries' traditional factor endowments, for example, differences in the cost, quality, and availability of labour and natural resources. The second form takes advantage of economies of scale and scope (in countries with similar characteristics), and differences in consumer tastes and supply potentials (Dunning, 1993:60).

### **3.2.2.4 Asset-seeking**

Risk diversification, which is closely associated with asset-seeking FDI, is characterised by investments in different lines or products (and even countries) in order to spread and thus reduce the overall risks of the total investments. Salvatore (1995:374 & 753) concluded that, compared to domestic firms, firms engaging in the international market (either through exports, foreign production, or sales facilities), are more profitable and have a smaller variability in profits. Risk diversification may also be associated with TNCs seeking to sustain or advance their international competitiveness. They do this by acquiring the assets of foreign corporations, in order to add these assets to their existing asset portfolio and, to a lesser extent, to exploit the cost and marketing advantages held over their competitors (Dunning, 1993:60). Furthermore, foreign enterprises may also want to make use of FDI to obtain control of a foreign firm that may be future competition, thereby minimising future risk (Salvatore, 1995:374-375).

The following section discusses the various ways in which FDIs are made.

### **3.2.3 Foreign direct investment transactions**

Foreign investments are made in several ways in a host country. The following are the typical ways in which FDIs are made, namely greenfield investment, M&As, and collective investment funds. These three transaction types are discussed in more detail below.

#### **3.2.3.1 Greenfield investment**

According to UNCTAD (2006:15), Greenfield investment refers to investment projects that involve the establishment of new production facilities, as well as the movement of intangible capital (mainly in services). This capital movement affects both the investor in the home country and the enterprise in the host country's financial state. The enterprise in the host country is also known as the foreign affiliate, and uses the investment capital to purchase fixed assets, materials, goods and services, and to hire workers for production in that country. This type of investment thus adds to the production capacity and capital formation of the host country, as well as employment generation.

#### **3.2.3.2 Mergers and Acquisitions**

Cross M&As entail the partial or full takeover; or the merging of capital, assets and liabilities of existing enterprises in a country by TNCs from other countries. Mergers and acquisitions usually involve the purchase of assets and firms that already exist. The company being sold is influenced by the change in ownership, although such an influence may not be instantaneous (with the exception of the investor already having an interest in the company). Typically, influence is usually affected gradually as the amount of capital invested changes (for better or for worse), influencing the company's operation (UNCTAD, 2006:15).

The difference between Greenfield investment and M&As lies in the short-term effects on capital formation and employment. Greenfield FDI adds directly to the stock of productive capital, while M&As only represent a change in ownership, without necessarily affecting the capital invested in the short-term. The long-term effects of both are however approximately the same (UNCTAD, 2006:17). It should be noted here that the long-term effect of both type of FDI transactions may result from the positive spill-over of technology and innovation to local firms (refer to section 1.2.1.2.3, 1.2.1.2.4 and 1.2.1.2.5). This spill-over effect of FDI on economic growth will be discussed in more detail in section 3.5.2.2.

### **3.2.3.3 Collective investment funds**

Recently collective investment institutions and schemes<sup>17</sup> have become a growing source of FDI, mainly through cross-border acquisitions. Cross-border investments and hedge funds should be classified as FDI if these investments exceed the 10 per cent equity threshold of the acquired firm. This type of investment is another example of FPI turning into FDI (UNCTAD, 2006:16), as previously introduced in section 3.1.

Investments made by private equity funds are primarily made in firms in need of venture capital and in firms in distress. Investments are also made in firms that are separated by large enterprises, in order to concentrate on core competencies. Private equity funds usually acquire a majority of the shares or full control of the firms they buy. These funds tend to have a longer lifespan than other funds, thus they are more important for FDI than hedge funds. Hedge funds generally have broad investment terms and do not run a specified asset management business. They have few regulatory restrictions on the types of instruments<sup>18</sup> in which they deal and they are often referred to as speculative funds (UNCTAD, 2006:18).

### **3.2.4 Conclusion: Types of foreign direct investment**

This section has classified FDI according to the two broad types, vertical and horizontal. Thereafter, the motives for investment, which further classify FDI into four types were examined. These types based on investor motives are resource-seeking, market-seeking, efficiency-seeking, and asset-seeking FDI. Lastly, the different types of FDI transactions were presented. From these three main means of classifying FDIs, it can be concluded that foreign investors engage in different types of FDI according to their needs. Whether a firm wants to deliver a product or service, whether import controls exist or not, or whether a firm wants to retain a patent or trade secret, the characteristics of a host country and its people will determine if a firm will engage in FDI, and if so, the type of FDI a firm will engage in.

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<sup>17</sup> Including private equity firms and various financial investment funds, such as mutual funds and hedge funds. (UNCTAD, 2006:16).

<sup>18</sup> Such as short selling, leverage, and derivatives (UNCTAD, 2006:18).

In the next section, the distribution of FDI between developed, developing and transition economies is illustrated, as well as the FDI flows to Africa, in general, and the top five African recipient countries, in particular.

### **3.3 Distribution of foreign direct investment**

In the following sub-sections, the distribution of FDI globally, in developing countries and in African countries in particular, is analysed. The attractiveness of Africa as an investment destination is also examined.

#### **3.3.1 Global distribution of foreign direct investment**

According to UNCTAD (2007b) global FDI flows only began increasing rapidly during the 1990s, and peaked in 2000 at a record high of \$1.410 trillion, as can be seen in Figure 3.1, on the following page. After 2000, FDI flows decreased slightly until 2003, after this flows increased again, reaching a value of \$1.306 trillion in 2006. According to UNCTAD (2006:3; 2007a), global FDI inflows grew by 27 per cent in the period of 2003 to 2004, 29 per cent in the period of 2004 to 2005 and by 34 per cent in the period of 2005 to 2006. The increase during the 2004 – 2005 period in FDI was a reflection of an overall increase in cross-border M&As, both in terms of value and the number of deals (UNCTAD, 2006:3). The most recent increase in FDI is largely a reflection of high economic growth and stronger economic performance globally, although there are wide discrepancies between the FDI receiving regions and countries. The value of cross-border M&As was also heightened by increased corporate profits and higher stock prices. Foreign direct investment flows were further spurred by the liberalisation of investment and trade policies worldwide (UNCTAD, 2007a).

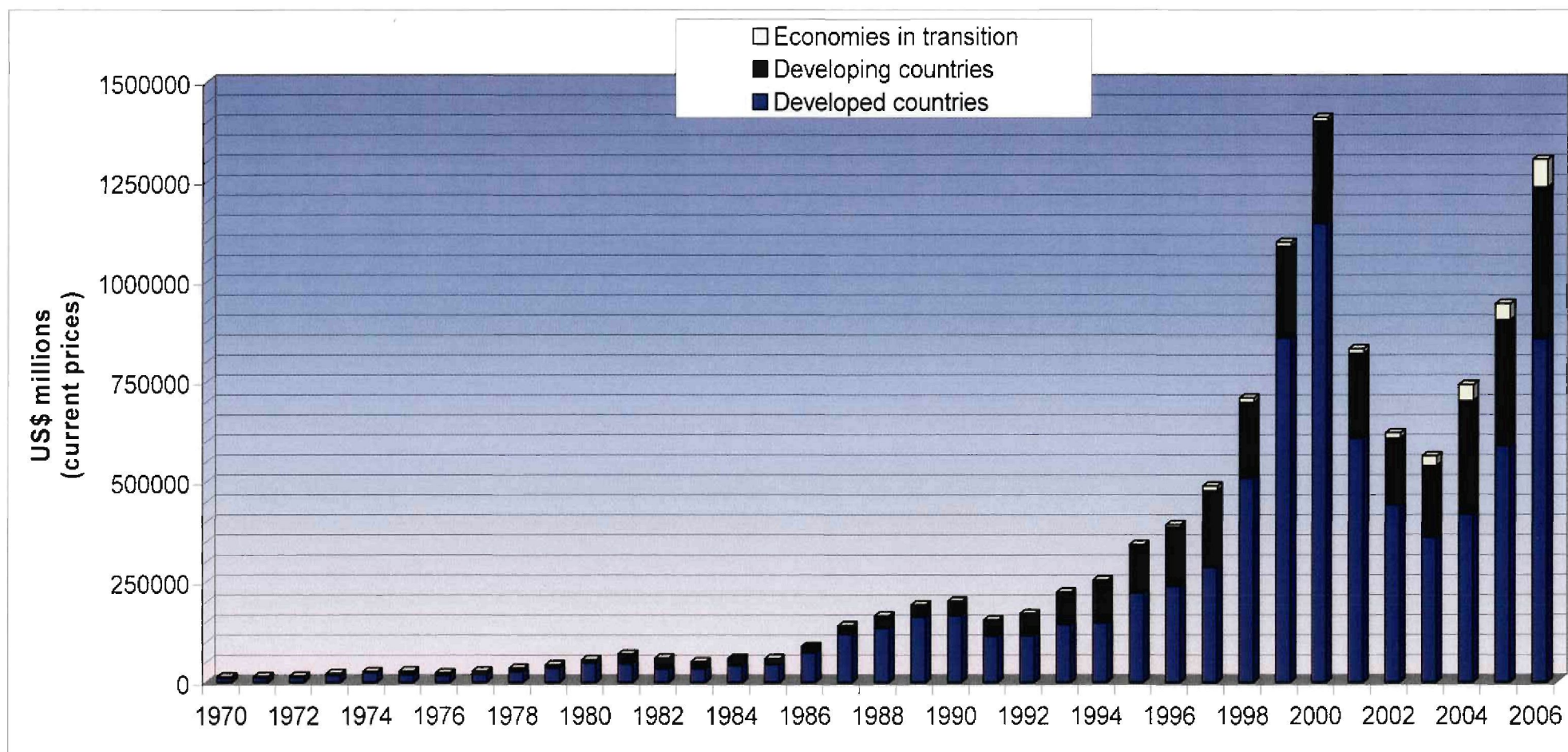
The next section presents FDI distribution between developing countries.

#### **3.3.2 Distribution of foreign direct investment between developing countries**

According to UNCTAD (2005c:4), developing countries are expected to progressively become the main engine of global economic growth. Developed countries still receive the largest proportion of global FDI flows, but developing countries obtained a record high FDI inflow of \$379 billion in 2006. Economies in transition are also gradually receiving more FDI flows. Figure 3.2 breaks down the composition of FDI flows to developing countries into three categories: Africa, Latin America and the Caribbean, and Asia and Oceania. It is clear that developing countries in Asia and Oceania and in Latin America have an advantage over the developing countries in Africa in terms of FDI inflows. However, Africa's FDI flows are increasing in terms of value, but are not significantly increasing in terms of the percentage of the amount distributed to developing countries (UNCTAD, 2007a; 2007b).

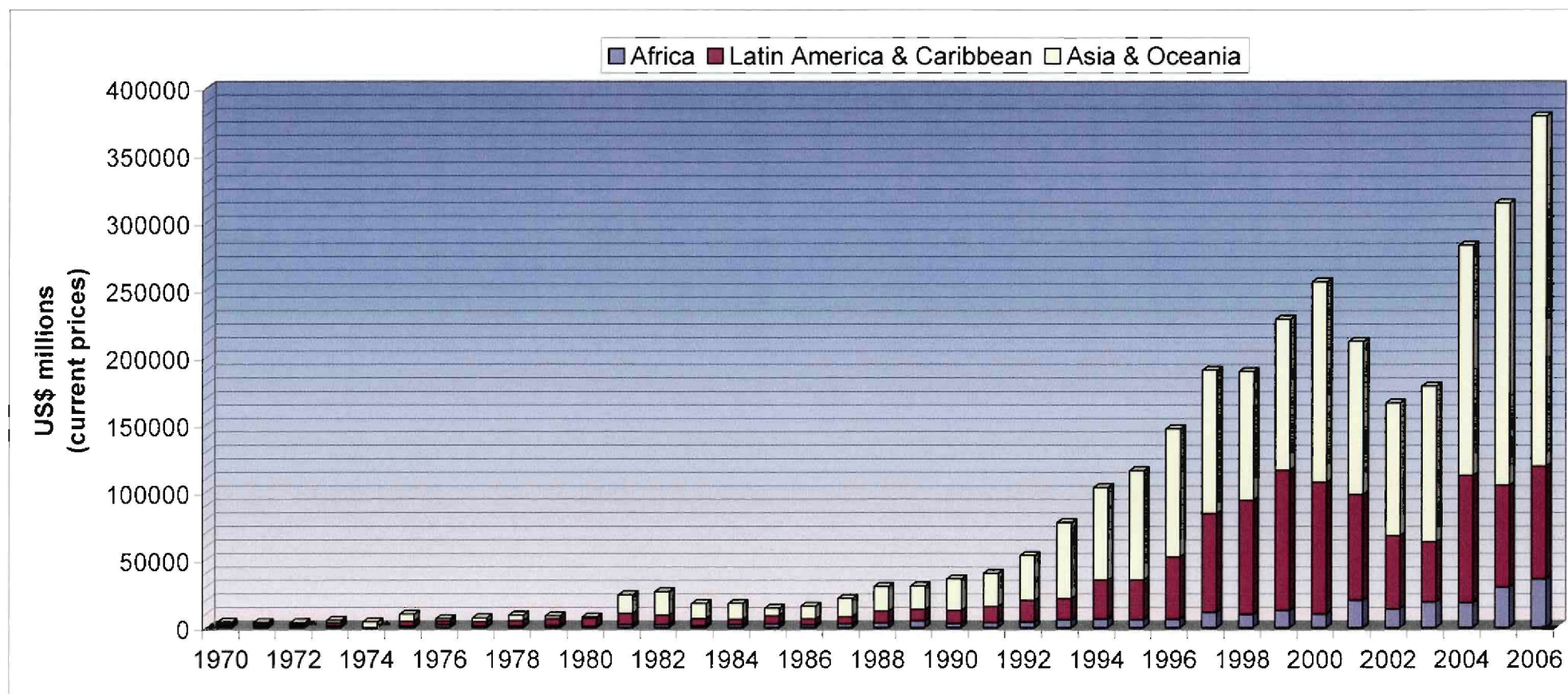
The next section examines the factors making Africa appealing to FDI.

Figure 3.1: Global foreign direct investment inflows to developed and developing countries, 1970 – 2006



Source: UNCTAD (2007a; 2007b).

Figure 3.2: Distribution of foreign direct investment flows to developing countries, 1970 – 2006



Source: UNCTAD (2007a; 2007b).

### 3.3.3 What makes Africa appealing to foreign direct investment?

The unique combination of Africa's geography, history and structural features have traditionally attracted FDI into cooperative export-oriented primary production. This was accomplished, using imported technology and the limited linkages to the rest of the economy (UNCTAD, 2005a:11).

The African continent is especially endowed with mineral wealth, including near-global monopolies of platinum, chromium, and diamonds; a significant proportion of the world's gold, cobalt, and manganese reserves; and widespread reserves of bauxite, coal, uranium, copper, and nickel (UNCTAD, 2005a:6). Therefore, it is not surprising that African countries are of particular attraction for resource-seeking FDI, as most FDI is concentrated in resource-based industries.

According to the UNCTAD (2006:40 & xix), African countries have made some positive changes in terms of regulatory regimes and the signing of new bilateral agreements related to investment and taxation. However, Africa exhibits limitations that hamper its ability to attract quality FDI of the kind that would create broader favourable outcomes in its economies. These impediments include very high business costs, weak governance, and poor economic growth (GBPC, 2005:33). UNCTAD (2005a:20-21) lists the following as potentially discouraging factors to foreign investors: lack of policy credibility, abuse of trade policies, unfavourable tax regimes, sluggish reform of the public sector (especially in terms of privatisation), inadequate intellectual property protection, and corruption.

The following potentially discourage growth in FDI in Africa for the period of 2005 to 2008 according to UNCTAD (2005c:iii-v):

- (i) financial instability in major source economies;
- (ii) price volatility of petroleum and other raw materials; and
- (iii) political instability and civil wars.

According to Dupasquier and Osakwe (2006), the following are additional factors responsible for Africa's low FDI attraction:

- (i) macroeconomic stability;
- (ii) low growth;
- (iii) weak infrastructure;
- (iv) poor governance;
- (v) inhospitable regulatory environments; and
- (vi) ill-conceived investment promotion strategies.

In order for Africa to attract more FDI, and in order for FDI to assist in a virtuous cycle of economic growth, job creation, and rising income, the GBPC (2005:34) suggests that African countries develop targeted public- and private-sector initiatives that link industry, education, human capital, and institutional capacity. Furthermore, it is important for African countries to reinforce the linkages between their export

sectors and the rest of their economy, by giving thought to physical infrastructure, production capacity, and institutions that encourage private investment (UNCTAD, 2006:xix).

The following section details FDI distributions in Africa.

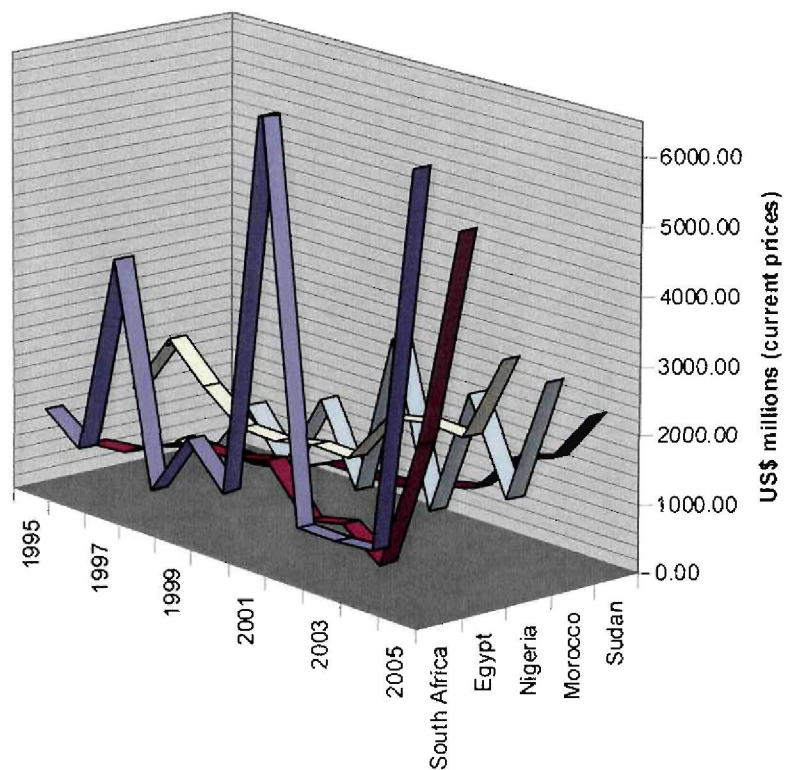
### **3.3.4 Distribution of foreign direct investment in Africa**

The preceding section indicated that FDI in Africa are mainly resource based, and that many factors can explain why Africa receives the smallest share of FDI flows worldwide. This section reviews and illustrates the distribution of FDI in Africa.

The increase in Africa's FDI inflows (up until 2005) was largely because of new large petroleum and mining projects, and thus about 80 per cent of total FDI to Africa was concentrated in natural- resource extraction, although this did not have the required effect on economic development. This is because the ventures the FDI supported were capital-intensive and did not create linkages to the rest of the economy in order for the greater economy to benefit from the investment. The costs of hosting FDI in the mining sector were aggravated by the environmental and social costs associated with it, and the fiscal impact was also limited to relative export values generated. Another problem associated with FDI in Africa, was that the profit remittances sometimes exceeded FDI inflows by a significant amount. In effect, it was concluded that FDI was more of a lagging than a leading indicator in the development process; FDI followed development rather than causing it in Africa (UNCTAD, 2005b:2).

According to UNCTAD (2007b; 2006:41) the top five African recipient countries of FDI inflows for 2005 were South Africa, Egypt, Nigeria, Morocco and Sudan. The value of FDI flows to these five countries is plotted in Figure 3.3, on the following page. Together these five countries received 66 per cent of Africa's FDI inflows. The flows to the five countries and the rest of Africa were relatively volatile over the last ten years, but have been showing a gradual increase since 2003 (except for Morocco, which showed a decline in FDI inflows in 2004).

Figure 3.3: Foreign direct investment inflows to top five African recipient countries (based on 2005 data), 1995 – 2005



	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
■ South Africa	1241.30	818.10	3817.20	561.10	1502.30	887.90	6788.70	756.70	733.70	799.20	6379.40
■ Egypt	595.20	636.40	886.90	1075.50	1065.30	1235.40	509.90	646.90	237.40	2157.40	5375.60
□ Nigeria	1271.05	2190.68	1642.47	1210.11	1177.71	1309.67	1277.42	2040.18	2171.39	2127.09	3403.34
□ Morocco	332.00	322.00	1207.20	460.30	1638.70	470.60	2874.80	533.80	2429.10	1069.80	2933.20
■ Sudan	12.00	0.40	97.90	370.70	370.80	392.21	574.00	713.18	1349.19	1511.07	2304.64

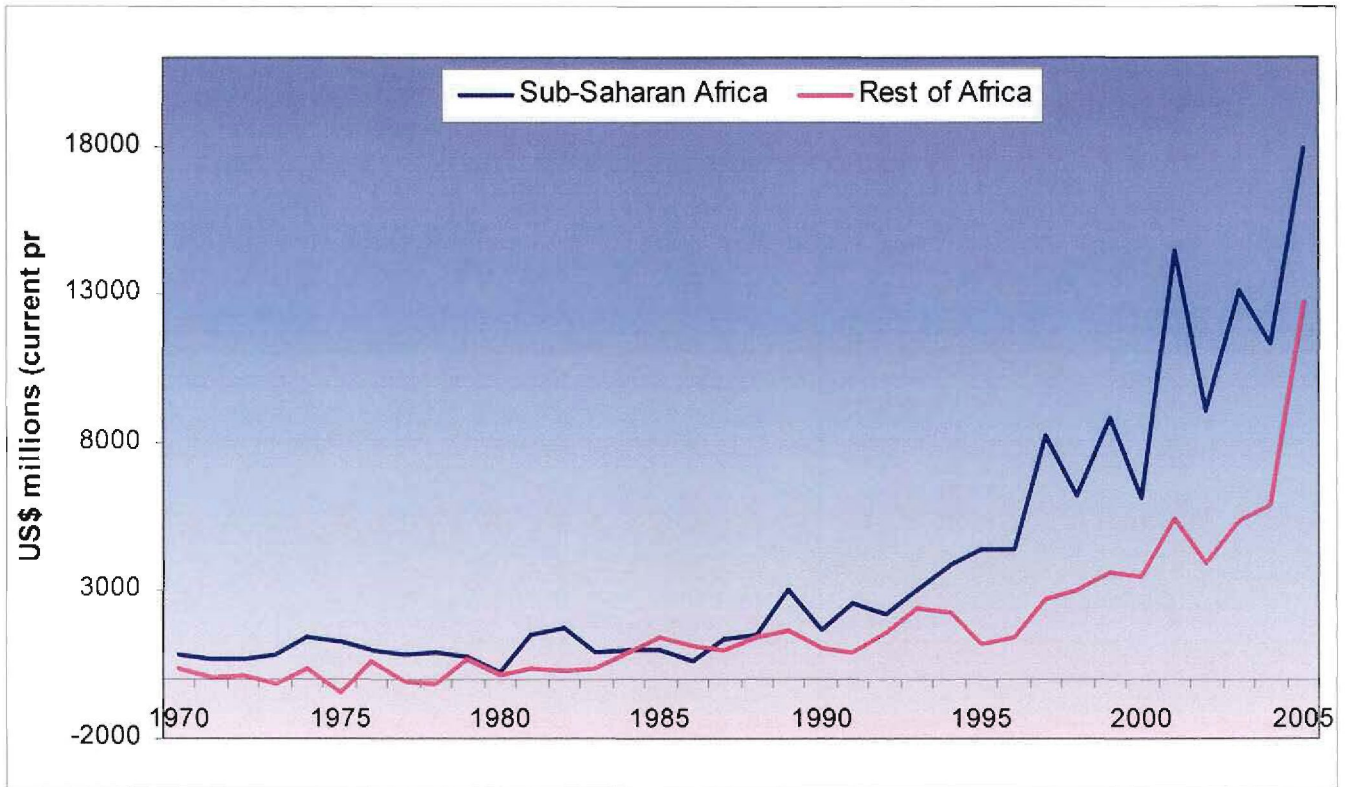
Source: UNCTAD (2007).

It should be noted that FDI flows to sub-Saharan Africa, compared to FDI flows to the rest of Africa, are higher. This was found to be true, even though (at the time of the survey) experts and TNCs believed that North African countries had greater FDI potential than those from sub-Saharan Africa (UNCTAD, 2005c:29). These flows are plotted in figure 3.4, on the next page. Viewed in perspective though, approximately three quarters of Africa fall under sub-Sahara Africa as can be seen in figure 3.6 (on page 64), which may explain why FDI flows would be greater in this region than in the rest of Africa. Yet, if the FDI inflows to these two regions are calculated as a percentage of the regions' GDP, flows to sub-Saharan Africa constitute a greater percentage of their GDP than the rest of Africa, as illustrated in figure 3.5. However, according to UNCTAD's Inward FDI Performance Index (UNCTAD, 2006:21) the North Africa region, especially Sudan, Egypt and Morocco, achieved the sharpest increase in rankings based on the value of FDI inflows to this region.

UNCTAD (2006:22; 2007e) also has an Inward FDI Potential Index that ranks countries according to their FDI potential, based on twelve economic and policy variables:

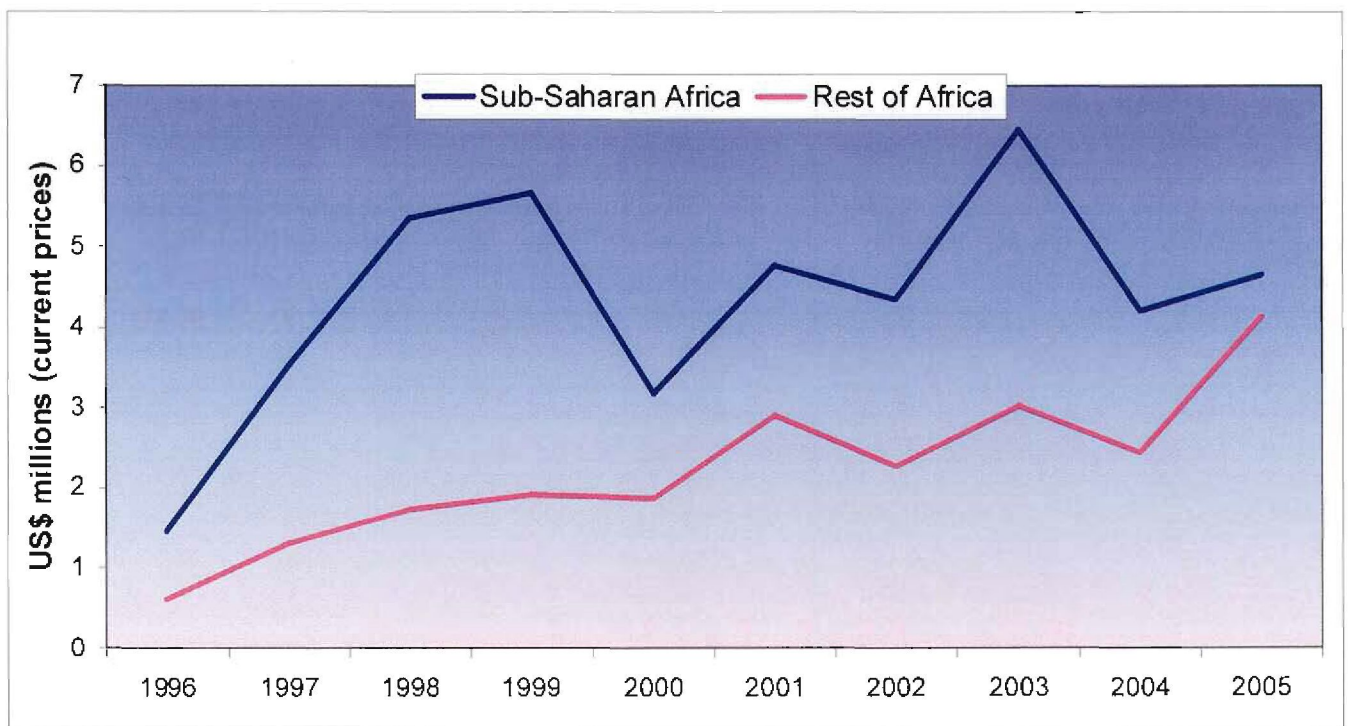
- (i) GDP per capita, as an indicator of the sophistication and size of local demand;
- (ii) the GDP growth rate over the previous ten years;
- (iii) the share of exports in GDP, as an indicator of openness and competitiveness;
- (iv) the average number of telephone lines per 1,000 inhabitants and mobile telephones per 1,000 inhabitants, as an indicator of modern information and communication infrastructure;
- (v) commercial energy use per capita, as a proxy for the availability of traditional infrastructure;
- (vi) the share of R&D spending in GDP, as an indicator of local technological capabilities;
- (vii) the share of tertiary students in the population, as an indicator of the availability of high-level skills;
- (viii) country risk, as an indicator of some macroeconomic and other factors that affect investors' risk perception of this country;
- (ix) the world market share in exports of natural resources, as an indicator of the availability of natural resources for extractive FDI;
- (x) the world market share of imports of parts and components, for automobiles and electronic products, as a proxy for participation in the leading TNC integrated production systems;
- (xi) the world market share of exports of services, as an indicator of the importance of FDI in the service sector;
- (xii) the share of world FDI inward stock, as an broad indicator the investment climate and the absorptive capacity of FDI.

**Figure 3.4: Foreign direct investment flows to sub-Saharan Africa versus foreign direct investment flows to the rest of Africa, 1970 – 2005**



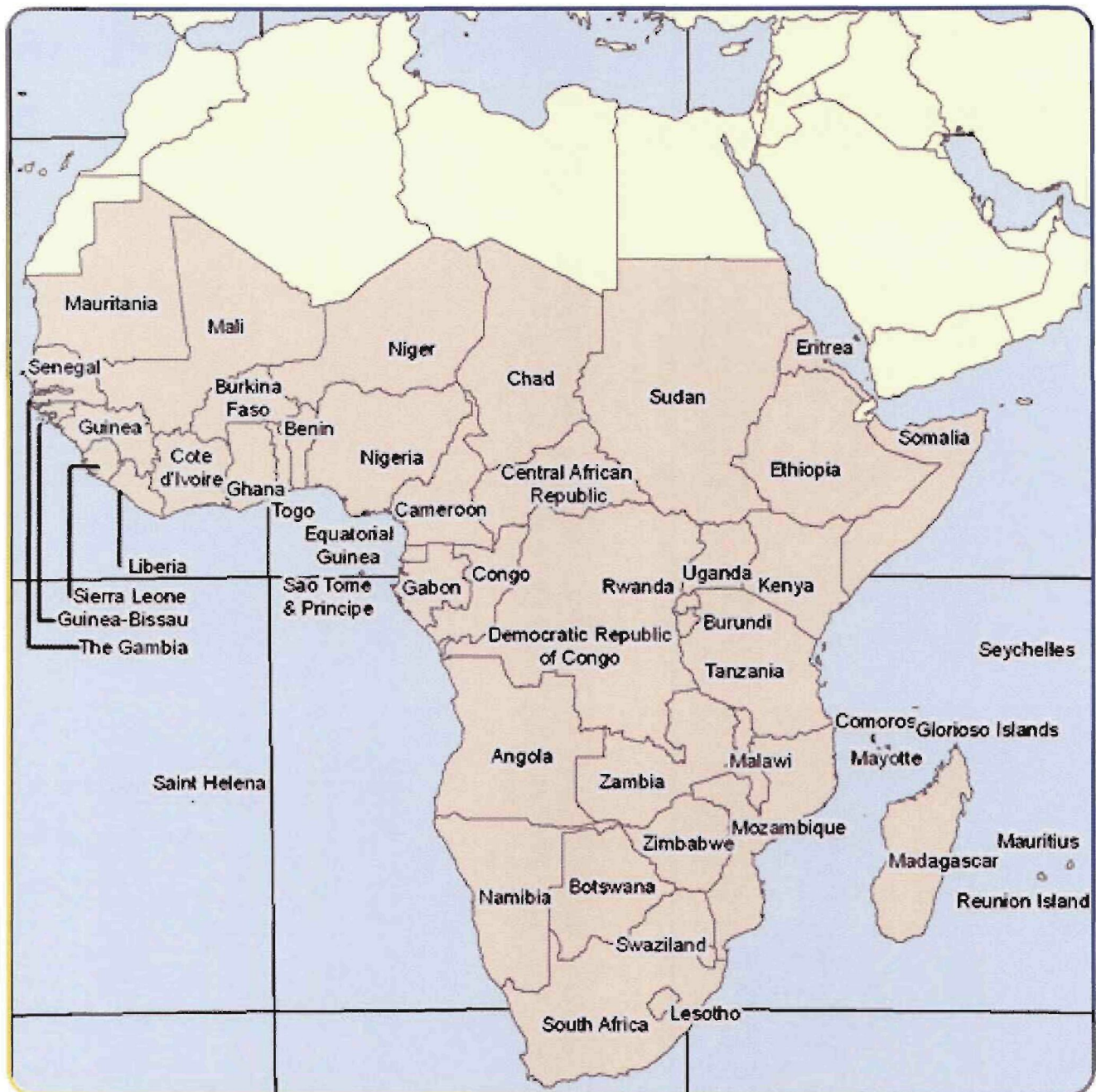
Source: UNCTAD (2007b).

**Figure 3.5: Foreign direct investment inflows as percentage of GDP for sub-Saharan Africa and the rest of Africa, 1996 – 2005**



Source UNCTAD (2007b).

Figure 3.6: Map of sub-Saharan Africa



Source: Worldmap (2007).

In 2005, the rankings of the Inward FDI Potential Index did not change much from the previous index in 2004. By comparing the Inward FDI Performance Index with the Inward FDI Potential Index, countries can be divided into four categories (UNCTAD, 2006:22):

- (i) Front-runners: countries with high FDI potential and performance fall in this category;
- (ii) Above potential: countries with low FDI potential, but strong FDI performance fall in this category;
- (iii) Below potential: countries with high FDI potential, but low FDI performance fall in this category; and
- (iv) Under-performers: countries with low FDI potential and performance fall in this category.

Unsurprisingly, many African countries rated in these indices fall in the latter category of under-performers, although more African countries are moving to the above-potential category. It is however unexpected to find that the two top FDI recipients in Africa for 2005 are currently in the under-performers category, while Nigeria, Morocco, and Sudan (the third, fourth and fifth highest FDI recipients) are in the above-potential category (UNCTAD, 2006; 2007c).

### **3.3.5 Conclusion: Distribution of foreign direct investment**

After analysing the distribution of FDI globally, to developing countries and to Africa in particular, it can be concluded that African countries are lagging behind in FDI inflows. Possible reasons for this include:

- (i) financial instability in major source economies;
- (ii) price volatility of petroleum and other raw material prices;
- (iii) political instability and civil wars;
- (iv) macroeconomic stability;
- (v) low growth;
- (vi) weak infrastructure;
- (vii) poor governance;
- (viii) inhospitable regulatory environments; and
- (ix) ill-conceived investment promotion strategies.

It was also concluded that the most common motive for FDI in African countries is resource seeking, because of these countries' richness in natural resources. Foreign direct investment flows to sub-Saharan Africa are currently greater than FDI flows to the rest of the continent, but Northern Africa are increasingly scoring higher rankings on the Inward FDI Performance Index (based on the value of FDI inflows).

In the following section, the determinants of FDI are investigated, focussing in particular upon those determinants on which HIV/AIDS may have an influence. This is especially important for FDI flows to Africa, since the prevalence rate of HIV/AIDS is the highest on this continent.

### **3.4 Determinants of foreign direct investment**

There has been substantial research on the determinants of FDI. Traditional determinants of FDI may have become less important in recent years, due to economic globalisation (Nunnenkamp, 2001:3). The lack of consensus between different studies on the most important FDI determinants may be due to the different types of FDI being affected by diverse factors. Another explanation may be the difficulties in obtaining accurate data on all the determinants, particularly for developing countries (Lim, 2001:14). This makes it difficult to summarise the determinants of FDI in a standardised way.

According to the 2005 FDI confidence index survey, the most important factors currently influencing an investor's choice in location are lower costs, higher quality labour, the protection of intellectual-property rights, reliable educational systems, and sophisticated information technology infrastructure (GBPC, 2005:9). There are many different variables claimed to determine FDI. This section examines these determinants, initially with the Eclectic Ownership Location Internalisation (OLI) paradigm of Dunning (1980; 1993). Thereafter, the Investment Compass indicators (UNCTAD, 2007d) are discussed. Lastly, additional determinants, those not included by Dunning (1980; 1993) or UNCTAD (2007d), are detailed.

### **3.4.1 The Eclectic Ownership Location Internalisation paradigm**

Dunning (1993; 1980:10; see also UNCTAD, 1999:12) evolved a theory known as the Eclectic OLI paradigm that states that FDI will take place when three sets of determinant factors exist simultaneously. The three sets of determinants are:

- (i) O – for ownership-specific advantages present in a firm (such as a legally protected rights, a commercial monopoly, or exclusive control over particular market outlets);
- (ii) L – for location-specific variables of the host country (such as larger markets, lower resource costs, and advanced infrastructure); and
- (iii) I – for internalisation advantages of a firm.

The ownership-specific (O) and internalisation (I) advantages are firm-specific determinants of FDI, while the location-specific (L) advantages have an important influence on FDI inflows to the host country. A firm would rely on exports, licensing, or the sale of patents to service the host country's market, should only ownership-specific (O) advantages exist. Should internalisation (I) advantages also exist, a firm would engage in FDI to service the host country's market, but only if location-specific (L) advantages exist as well. These location-specific (L) advantages can also refer to a country's economic and policy conditions, such as the size of the domestic market, input prices, and the quality and productivity of the labour market (UNCTAD, 1999:12-13). These location-specific factors of a country can be influenced by the government of the host country (Nunnenkamp, 2001:8).

The importance of certain location-specific (L) advantages will depend on the type of FDI the home country seeks to engage in. For example, export-oriented FDI is less likely to be influenced by the market size of the host country, while investment in R&D facilities would require superior human and physical infrastructure (Dunning, 1998:50). The relative importance of these different advantages is also likely to change over time, due to economic globalisation. Nunnenkamp (2001:9-10) classifies the location-specific (L) advantages of a country into three main categories: overall policy framework,<sup>19</sup>

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<sup>19</sup> Including economic and political stability, rules regarding the entry and operations of TNCs, bi- and multilateral agreements on FDI, and privatisation policy (Nunnenkamp, 2001:10).

business facilitation,<sup>20</sup> and economic determinants. The latter is the only category of variables that will vary depending on the type of FDI to be engaged in.

Table 3.1 lists several of the economic variables perceived to have influenced the different types of FDI during the 1990s, as described in Dunning (1998:53) integrated with a number of Nunnenkamp's (2001:10) variables. It should be noted that this is by no means an exhaustive list of variables, since it is not the aim of this research project to seek a finite list of determinant variables. Only those determinants of FDI directly related to HIV/AIDS are mentioned in Table 3.1.

**Table 3.1: Specific variables that influenced foreign direct investment by transnational corporations during the 1990s**

Type of FDI	Determinants during the 1990s
Resource-seeking	<ul style="list-style-type: none"> <li>• The availability, quality, and cost of skilled labour;</li> <li>• Low-cost, unskilled labour.</li> </ul>
Market-seeking	<ul style="list-style-type: none"> <li>• Growing host and neighbouring country market size and growth;</li> <li>• Availability and price of skilled and professional labour.</li> </ul>
Efficiency-seeking	<ul style="list-style-type: none"> <li>• Production costs of firms;</li> <li>• Availability of skilled and professional labour (especially for knowledge intensive and integrated TNC activities);</li> <li>• Productivity-adjusted labour cost;</li> <li>• Increased role of governments in facilitating the upgrade of human capital by suitable educational and training programmes.</li> </ul>
Asset-seeking	<ul style="list-style-type: none"> <li>• Availability of knowledge-related assets and the geographical dispersion of them.</li> </ul>

*Source: Dunning (1998:53; 2006:206) and Nunnenkamp (2001:10).*

No differentiation is made between the different types of FDI (according to motive) in the data. It is important to remember that, depending on the major type of FDI made in a host country, the determinants determining FDI in that country will differ from another.

Next, the Investment Compass of UNCTAD (2007d) is discussed to sketch the background and all the possible determinants of FDI. Some additional determinants of FDI, not included in the Investment Compass, and elaborations of some of the determinants included in the Investment Compass are also discussed.

### 3.4.2 The Investment Compass indicators

UNCTAD (2007d) designed the Investment Compass, which uses a few key indicators considered to have an influence on the investment environment, in order to provide comparative measures to

<sup>20</sup> Including administrative procedures, FDI promotion, and FDI incentives (Nunnenkamp, 2001:10).

benchmark FDI. The Investment Compass was developed to make comparisons on a horizontal and vertical basis. Horizontal comparisons can be made between one country and another, or between regions, while vertical comparisons are made between indicators for a given country.

The Investment Compass plots a country's FDI benchmark as a hexagon, organised around six major areas, namely:

- (i) resource assets;
- (ii) infrastructure;
- (iii) operating costs;
- (iv) economic performance and governance;
- (v) taxation and incentives; and
- (vi) regulatory framework.

These six major areas are discussed individually, in the sections that follow. The areas of the Investment Compass are assessed in this specific order, following the order in which policy makers can induce changes, from lowest policy action (resource assets) to highest policy action (regulatory framework). Each of these areas consists of different variables that are further classed into different key indicators. These variables and key indicators show normalised scores that range between 1 (the least competitive level) and 100 (the most competitive level). An example of this is given in Figure 3.7.

#### **3.4.2.1 Resource assets**

This area consists of variables that reflect the quantity and quality of human capital (for example, the illiteracy rate), the availability of raw materials (for example, the production of minerals), and the market size (for example, the per capita income).

In section 2.4, the economic influences of HIV/AIDS on a country were discussed. Section 2.4.4.2 summarises the effects that HIV/AIDS may have on economic growth, through physical capital accumulation, human capital accumulation, macroeconomic policy, and social capital, and the feedback effect. The overall consensus is that the epidemic has a negative influence on human capital, by decreasing life expectancy, deteriorating overall health, lowering the level of experience, and increasing the number of orphaned children. Therefore, HIV/AIDS may influence a country's human capital rating of the Investment Compass.

As discussed in section 2.4.2, HIV/AIDS may have a negative influence on agricultural productivity in countries dependent on agriculture. The same would be true for productivity in the mining industries, *should the production of minerals in a country be more labour intensive than capital intensive*. Thus, while HIV/AIDS may not have an influence on the energy reserves of a country, it may influence the

exploitation of these reserves. In summary, the epidemic may have a negative influence on the availability of raw materials.

HIV/AIDS is likely to decrease total output, GDP, as discussed in section 2.4.2 and 2.4.4.2.1. The influence on per capita income may be either positive or negative, depending on whether the population has increased or decreased, and to what degree. The effective market size of an economy may also be influenced negatively by HIV/AIDS, as some households' income may decrease (as discussed in section 2.4.1.2) from above US\$ 1 000 to below US\$ 1 000 per year. The total population is likely to be negatively affected by HIV/AIDS, but depends on several factors. It can be concluded that HIV/AIDS may have an overall negative influence on the market size of a country. Thus, the influence of HIV/AIDS on resource assets, through human capital, the availability of raw materials, and market size, may be negative.

### **3.4.2.2 Infrastructure**

This area consists of variables that are indicators of the overall infrastructure of a host country, including the information and communications technology (ICT; for example, the telephone main lines per 1,000 people), and the basic infrastructure (for example, the roads network and electricity production).

There is no definite relationship between HIV/AIDS and a country's infrastructure. HIV/AIDS may decrease public and private savings (as summarised in section 2.4.4.2.1), therefore decreasing funds available for investment (including investment in infrastructure). Governments may also choose to spend more on health and less on the maintenance of infrastructure. Theoretically, it may thus be postulated that HIV/AIDS may have an influence on this area.

### **3.4.2.3 Operating costs**

This area reflects the costs associated with labour (for example, the monthly wage for skilled and unskilled labour) and businesses (for example, rental office costs, and telecommunications charge) in a host country.

The influence that HIV/AIDS may have on the determinants in the area of operation costs may be indirect, although it was argued, in section 2.4.2, that HIV/AIDS may result in extra costs for businesses. HIV/AIDS may therefore influence the score of the business costs variable negatively. This type of extra cost due to HIV/AIDS is not included as a key indicator for business costs. Theoretically, it can thus also be postulated that HIV/AIDS may have a negative influence on this area.

#### **3.4.2.4 Economic performance and governance**

This area consists of indicators that reflect the macroeconomic performance (for example, government surplus/deficit as a percentage of GDP, the economic growth rate, the inflation rate, and the unemployment rate), as well as the governance of a country (for example, the HDI ranking,<sup>21</sup> the rule of law, and voice and accountability).

HIV/AIDS may have an impact on the macroeconomic performance of a country, by influencing real economic growth, as discussed in section 2.4.4. The epidemic influences growth mainly through the four channels, as depicted in figure 2.4 in chapter 2. As mentioned in section 2.4.4.2.3, HIV/AIDS may also influence the macroeconomic performance of a country by placing pressure on the government's finances, and therefore the government surplus or deficit. The epidemic may also influence the governance of a country by decreasing the country's HDI ranking. Theoretically, it may thus be postulated that HIV/AIDS may have an influence on FDI through economic performance and governance.

#### **3.4.2.5 Taxation and incentives**

This area includes the indirect and direct taxes applicable to businesses, ICT, tourism, and manufacturing.

An indirect connotation between HIV/AIDS and the tax system of a country may exist, as governments may want to increase business and individual taxes to cover increased government spending. However, few African countries' tax information is available and the effect of HIV/AIDS on this area would thus be difficult to test empirically in the African context (UNCTAD, 2007d).

#### **3.4.2.6 Regulatory framework**

This area consists of the variables that measure the ease of entry into a country (for example, the openness of the main sectors of FDI), operation in a country (for example, labour market regulations, and foreign exchange regulation on current operations), and protection and exit out of a country (for example, the number of double taxation treaties and bilateral investment treaties signed).

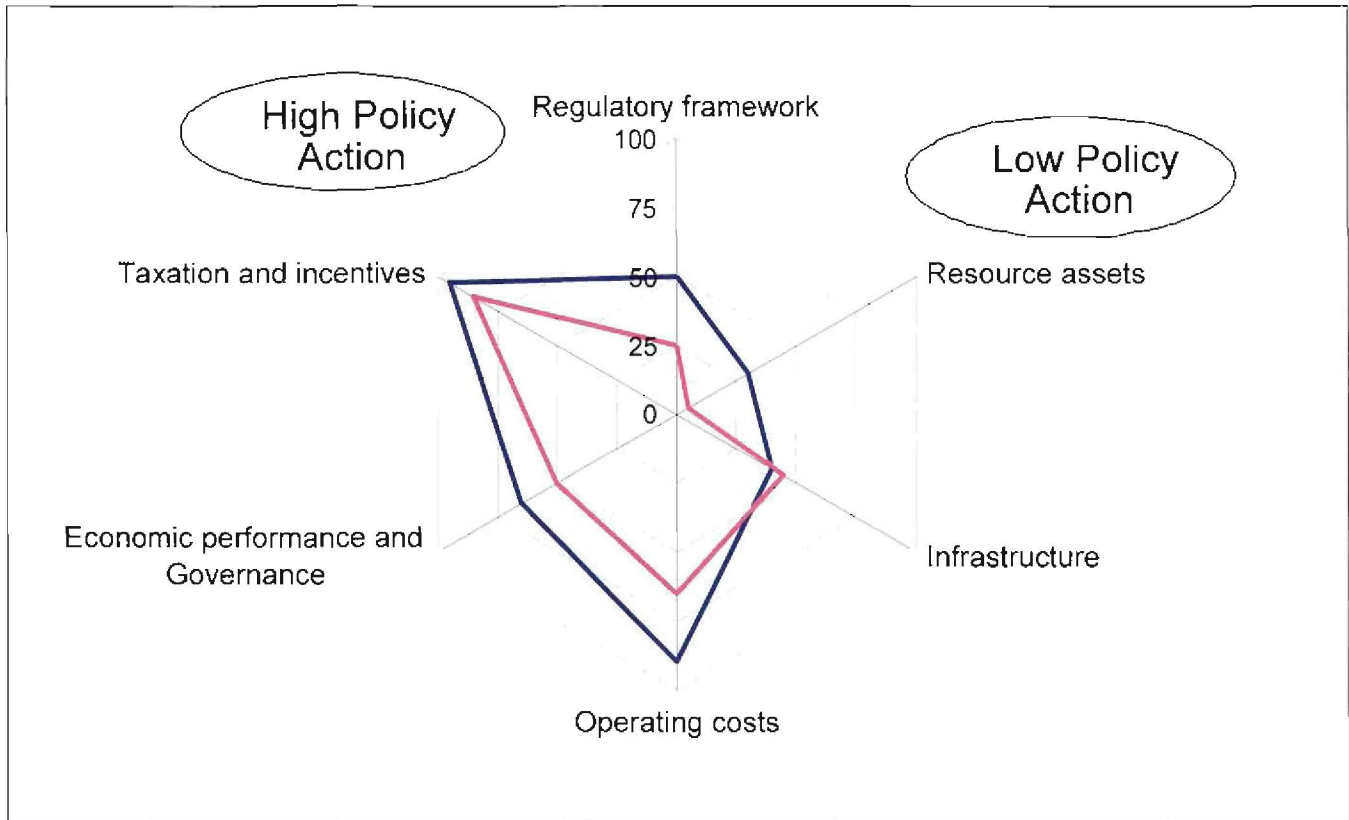
While HIV/AIDS does not influence any of the key determinants listed in the regulatory framework area, some of these indicators are included in the model to control for specification bias.

Therefore, it can be concluded that HIV/AIDS influences nearly all six areas of the Investment Compass, which is evidence for the negative influence of HIV/AIDS on growth in Africa.

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<sup>21</sup> Refer to section 2.4.4.3

**Figure 3.7: Example of a country's foreign direct investment benchmark compared to that of another country, using the Investment Compass**



Source: UNCTAD (2007d).

### 3.4.3 Additional determinants from different empirical studies

Various extra determinants, not included in the above sections, and elaborations of determinants discussed already, are considered in the following sections.

#### 3.4.3.1 Geography

Blonigen, Davies, Waddell and Naughton (2007) investigate the influence of FDI in proximate countries on the FDI inflows to a host country and find that the estimated relationships of traditional determinants of FDI are surprisingly robust to the inclusion of the terms (to capture spatial interdependence), even though such interdependence is estimated to be significant. Nevertheless, they find that both traditional determinants of FDI and the estimated spatial interdependence are responsive to the sample of countries under examination.

Asiedu (2002:108) argues that sub-Sahara African countries received less FDI than countries in other regions, due to the geographical location of these countries. Gallup, Sachs and Mellinger (1999) noted that tropical countries tend to be poor and that landlocked countries also tend to be poorer than coastal economies. As many countries in Africa have both these disadvantages, this may have an influence on

the FDI inflows to African countries. In contrast, Naudé and Krugell's (2007) study, investigating the geography of Africa as a determinant for foreign direct investment, geography does not seem to have a direct influence on FDI flows to Africa.

#### **3.4.3.2 Human capital regarding skills and education**

Nunnenkamp (2002) addresses the issue of globalisation-induced changes to the determinants of FDI. *A priori*, one might argue that increasing global competition is changing the relative importance of some traditional variables as determinants of FDI. After performing a correlation analysis with both FDI stocks and FDI flows, Nunnenkamp (2002:24-37) finds that the traditional market-related variables are still important, and that the availability of local skills is gaining tremendous importance as a determinant for FDI. This emphasises the importance (particularly for developing countries) to improve education and training facilities, in order to enhance the economic growth effects of FDI on these countries and to encourage higher FDI inflows. Nunnenkamp (2002:16-18) uses the average years of schooling (also Barro & Lee, 2002) as a determinant to assess the availability of sufficiently qualified labour, which is likely to have a positive influence on FDI. He also raises the issue that the determinants of FDI are likely to differ between the different motives for FDI, but also acknowledges that there are data constraints in exploring FDI in its different categories.

Miyamoto (2003) determines the importance of human capital formation on the FDI attraction of developing countries. Cross-country studies based on datasets covering the period between the 1960s and 1980s, as summarised by Miyamoto (2003:22), find that the demand for higher-educated labour appears to be less crucial for attracting FDI. This is in contrast to cross-country studies using datasets covering the period between the 1980s and mid-1990s, which indicate that human capital is a significant determinant for inward FDI (Miyamoto, 2003:22-24). This may be due to FDI shifting towards higher value-added manufacturing. Efficiency-seeking FDI necessitates a skilful workforce as one of its vital inputs, while it appears that higher human capital does not influence resource- or market-seeking FDI directly. It can however affect FDI indirectly, by improving social independence and health, and decreasing crime rates. The average years of education of the total population aged fifteen years and older, as well as secondary school enrolment, are alternative measures for human capital.

#### **3.4.3.3 Effect of health on foreign direct investment**

According to the 2004 FDI confidence index survey, a foreign investor also considers the quality of life in a host country, when comparing it to other countries' FDI potential (GBPC, 2004:4). The health of the population has an important influence on the quality of life, as well as the quality of labour. People living with HIV/AIDS have a lower quality of life than healthy people and are of a lower value to a firm than a healthy person. This has a negative influence on a countries' attractiveness for investment.

According to Alsan, Bloom and Canning (2004:1), health is a form of human capital that enhances the economic performance of a country, both directly and indirectly. Directly, health has an effect on workers' productivity, and therefore also their earnings. This is because healthy workers are usually both physically and mentally stronger than sick workers. In addition, they are less likely to be absent from work (Alsan *et al.*, 2004:1). Lower wages, may lower health and nutrition and create a poverty trap (Alsan, Bloom and Canning, 2006:615).

Indirectly, health can affect economic performance, for example, through improved health, the return to other forms of human capital (such as education and worker experience) can be increased. This is because students in good health have enhanced cognitive utility and better school attendance, allowing them to be better educated and to become higher-earning adults (Bhargava, 2001; cited by Alsan *et al.*, 2004:1). Another way, through which the return to human capital can be increased, is through healthier workers who can attain more job experience by lower rates of absenteeism and longer life expectancies (Alsan *et al.*, 2004:1).

Lower life expectancies are common in developing countries and therefore the prospects for a retirement are slim. When health increases, life expectancies and the chance of a retirement increases, and therefore the propensity to save may increase, setting off a savings and investment boom (Bloom, Canning & Graham, 2003; cited by Alsan *et al.*, 2006:615).

Alsan *et al.* (2004:1-2) reports on several studies showing health as a definite influence on growth in per capita income, with the degree to which a country benefits differing. Bhargava *et al.* (2001; cited by Alsan *et al.*, 2004:2) conclude that the positive influence of an overall improvement in health is greater in developing countries.

Health is almost certain to affect the FDI inflows to a country. Firstly, bad health decreases the productivity of the workforce, as suggested earlier (Alsan *et al.*, 2004:2). High rates of absenteeism may raise production costs and this could deter FDI (Alsan *et al.*, 2006:613). Secondly, foreign investors may decide against investing in a country that could negatively affect their own and their workers' health, particularly if a country's access to health care is restricted (Alsan *et al.*, 2004:2). In areas where health care infrastructure is limited, the firm wanting to invest may have to develop or significantly subsidise a health care system for their employees. This will increase health-related costs for the firm, negatively influencing the profitability of the firm. Sick leave, funeral costs, as well as low employee morale may also be an additional burden on the prospective firm (Alsan *et al.*, 2006:615). There is however less empirical evidence of a link between health and FDI. This may be because FDI inflows have continued to rise as a percentage of net resource flows to developing countries, despite an increase in the prevalence of HIV/AIDS (Alsan *et al.*, 2004:2-3; Miyamoto, 2003:12).

Alsan *et al.* (2004:5) uses the life expectancy at birth as a proxy for health, but it must be noted that life expectancy must not be included twice, as the HDI already contains this variable (refer to section 1.2). The empirical study performed by Alsan *et al.* (2004:11) shows that for every additional year of life expectancy, the gross FDI flows to low- and middle-income countries will increase by approximately 9 per cent.

According to Bloom *et al.* (2003; cited by Alsan *et al.*, 2006:616), half of all business leaders in low-income countries believe that HIV/AIDS affects their countries attractiveness for FDI. The reason why it is believed that HIV/AIDS negatively influence a countries attractiveness for FDI, is because diseases like HIV/AIDS and malaria may have longer-term effects on FDI than other diseases, as it takes longer to bring an outbreak under control (Alsan *et al.*, 2004:2). As for HIV/AIDS, the question remains whether it will ever be brought under control. Alsan *et al.* (2006:625) also suggest that diseases that target the working-age population (such as HIV/AIDS) or are easily transmittable (such as TB), may negatively influence FDI more severely than other chronic, non-transmittable diseases. Naudé and Krugell (2003) also emphasise that HIV/AIDS may have a negative influence on FDI, because it influences human resources that are important for FDI growth. They argue that HIV/AIDS may make creating jobs more expensive, and render investment in human capital more risky. This is because the investment through training and efficiency wages may be wasted, due to AIDS-related deaths of trained staff. Therefore, it is of great importance to measure the influence that HIV/AIDS may have on FDI.

#### **3.4.4 Conclusion: Determinants of foreign direct investment**

It was argued in this section that there is a myriad of possible determinants of FDI. A broad overview of the possible determinants was discussed by referring to the OLI paradigm of Dunning (1998) and the Investment Compass. It was concluded that HIV/AIDS may have an influence on all of the six areas of the compass:

- (i) resource assets;
- (ii) infrastructure;
- (iii) operating costs;
- (iv) economic performance and governance;
- (v) taxation and incentives; and
- (vi) regulatory framework.

Additional determinants were also discussed, namely geography, human capital regarding skills and education, as well as the effect that health may have on FDI. From the review of these determinants it was concluded that health (and in this case HIV/AIDS) may have an overall negative influence on FDI. All the relevant determinants to be used in this research project will be detailed in chapter 4.

### **3.5 Foreign direct investment and economic growth**

The relationship between FDI and economic growth are controversial subject, with many studies contradicting one other on whether a relationship exists. White (1992; cited by Jansen, 1995:197) concludes that a majority of the studies were effected by statistical and theoretical problems, which led to unreliable results.

One approach to the influence of FDI on growth is to differentiate FDI from other capital inflows (such as aid and governmental loans). Foreign direct investments are usually made in the private sector of the host country, in contrast to aid and loans, which are given to the public sector of the host country. The influence of private sector investment on growth is perceived to be bigger than public sector investments. Foreign direct investment is also particularly made in the traded goods sector, whereas aid or loans are awarded to finance investment in non-traded goods sectors, such as physical and social infrastructure. This may lead to the conjecture that FDI may have a bigger influence on growth than other capital inflows (Jansen, 1995:197).

For empirical analysis, Jansen (1995:197) states that mainly two approaches are used to study the link between FDI and economic growth. The first approach analyses the relationship between FDI and growth in a cross-country comparative analysis, by linking the rate of growth to both the level of FDI inflows and the value of the accumulated FDI stock. Studies using this approach were criticised on theoretical grounds and failure in leading to regular results. The second approach analyses the relationship between FDI and growth through a growth equation that is derived from the production function and tested on time-series data for a group of countries (panel data). Many of the studies using this approach divide capital inflows into categories, of which FDI is one. Should FDI inflows cause an increase in competitiveness and efficiency of the host country markets, the investment efficiency will be likely to increase.

Therefore, the question should rather be whether an increase in capital flows would increase the level of investment and economic growth at all. According to Jansen (1995:197) the majority of cross-country studies have found an increase in growth. A brief review of the different schools of thought on whether FDI influences growth or not, and whether growth may influence FDI in return, are discussed below. Thereafter, the two channels through which FDI are claimed to influence growth are detailed.

#### **3.5.1 Controversial views on the relationship between foreign direct investment and growth**

According to Lim (2001:9) there tends to be a positive correlation between FDI and economic growth, as deduced from recent empirical work conducted at an economy-wide level. However, it is argued that the host country must have obtained a certain level of development to be able to absorb the new technology,

as it is evident that higher-income developing countries experience the most significant positive influence on economic growth.

Li and Liu (2005:404) conclude that an endogenous relationship between FDI and economic growth exists, which has been evident since the mid-1980s for developing and developed countries. Upon inclusion of FDI directly in the growth model, they find FDI significant, and two interactive terms of FDI, FDI with human capital<sup>22</sup> and FDI with the technology gap,<sup>23</sup> also proved significant (Li and Liu, 2005:404). The first interactive term was significant and positively related to growth, while the second interactive term demonstrated a significant negative influence on growth. Hansen and Rand (2006) also confirm a strong causal link between FDI to GDP for thirty-one developing countries. This positive link is also relevant over the long term, where the fixed-effects model with country-specific time trends are used.

UNCTAD (2005c:4) also find that there is an overall stable and positive relationship between GDP growth and FDI flows, and that the availability of investment capital (generated by corporate profits of loans) affect FDI on the supply side. This is in turn affected by the local economic conditions, including economic growth. On the demand side, it is argued that expanding foreign markets lead TNCs to invest more, and gloomy markets, on the other hand, inhibit TNCs.

According to Chowdhury and Mavrotas (2006), a bi-directional causality between FDI and growth for Malaysia and Thailand can be found. Their findings for Chile however confirmed that the direction of causality runs from economic growth to FDI, and not, as conventional views hold, from FDI to economic growth. This must be considered in developing policies to enhance FDI, in order to increase economic growth. Economic growth is a crucial determinant of FDI (as discussed in section 3.4).

### **3.5.2 Two channels through which foreign direct investment influences growth**

Foreign direct investment's contribution to economic growth mainly takes place through two channels: directly through an increase in capital stock and the subsequent capital flows, and indirectly through its spill-over effect (Lensink & Morrissey, 2006:479). The direct channel is discussed below, after which the indirect channel is discussed.

#### **3.5.2.1 Direct influence on capital stock**

The influence of FDI on investment has already been briefly discussed in section 1.2.1.2.2. The relation between investment and economic growth are summarised by Jansen (1995:197). He states that an

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<sup>22</sup> The level of secondary school attainment is used as a proxy for human capital (Li & Liu, 2005:396).

<sup>23</sup> The technology gap:  $GAP_{i,t} = (y_{max} - y_{i,t}) / y_{i,t}$ , where  $y_{max}$  is the GDP per capita of the United States and  $y_{i,t}$  is the various countries' GDP per capita (Li & Liu, 2005:396).

increase in FDI inflows is likely to have a positive effect on growth. The perceived positive relationship between capital inflows, investment, and growth is the central tenet behind the two-gap (or three-gap) models. The traditional two-gap model states that all capital inflows will be used to finance investment, but Griffin (1970; cited by Jansen, 1995:197) argues that not all capital inflows will be used to finance investment, and that some part of it will be consumed (decreasing domestic savings). The net effect will be an increase in investment of less than the increase in capital inflows.

### **3.5.2.2 Indirect influence through spill-over effects**

There are a number of ways in which spill-overs through FDI can occur. Firstly, spill-overs can occur when a local firm copies the new technology brought to the country through a TNC (imitation channel; Lensink & Morrissey, 2006:479). Secondly, a spill-over may occur when local firms have to use their current technology and resources more efficiently, or obtain more effective techniques, in order to respond to greater competitive pressures coming from a TNC (competition channel; Lensink & Morrissey, 2006:479). However, according to Harrison (1996, cited in Lim, 2001:4), FDI may have an adverse effect in the short run by decreasing the market share of local firms, but with a chance for positive spill-over effects in the long run. Thirdly, spill-overs can take place when a person starts their own firm or takes employment elsewhere in the country, after receiving training by an affiliate in a new technique or technology (labour spin-offs and turnover channel; Miyamoto, 2003:34). Fourthly, the linkages between a TNC affiliate and its local suppliers and customers are an important channel for spill-overs (vertical linkages channel; Miyamoto, 2003:34). Local firms' productivity may be improved through TNCs (Lim, 2001:3):

- (i) assisting potential suppliers in setting up their production facilities;
- (ii) setting high standards for their potential suppliers to achieve, but also ensuring potential suppliers have the means to do so;
- (iii) training these suppliers also on managerial and organisational skills; and
- (iv) assisting suppliers in expanding their clientele basis, including other foreign affiliates.

Increased capital inflows may also affect the growth efficiency of an investment, because FDI usually consists of a package of capital, technology, management skills, marketing channels, and others. This type of capital flow promotes the transfer of technologies and may increase productivity, although these effects may be difficult to measure (Jansen, 1995:197).

In a study based on a Colombian manufacturing census, Kugler (2006) finds evidence of limited intra-industry spill-overs, but widespread inter-industry spill-overs from FDI. These results match recent empirical findings. The reason for this may be that TNCs looking for profit-optimisation, limit the leakage of technical information to competitors. Therefore, host-country firms within the same industry as the TNC would not experience productivity gains from spill-overs. The reason firms in other industries may

benefit from TNCs, is that TNCs may transfer knowledge to local downstream consumers, or outsource to local upstream suppliers.

Lee (2006) conducted an empirical study, using data on sixteen Organisation for Economic Co-Operation and Development (OECD) member countries for the period of 1981 to 2000, in order to evaluate the effectiveness of the various channels for international knowledge spill-overs that increase productivity. One of these channels is through inward and outward FDI. It was concluded that the spill-overs were strong and significant via inward FDI, but insignificant via outward FDI.

### **3.5.3 Conclusion: Foreign direct investment and economic growth**

After briefly discussing contrasting views on whether FDI influences economic growth, and whether growth may influence FDI in return, it was concluded that FDI generally exerts a positive influence on growth, and that in some cases a bi-directional influence exists between FDI and growth. It was also concluded that FDI's contribution to growth mainly occurs through two channels; directly through an increase in capital stock and the subsequent capital flows, and indirectly through its spill-over effect.

The following section provides a summary on the chapter.

## **3.6 Summary**

In this chapter, distinction was made between the different types of FDI, according to three different aspects, the broad definition, the motives for investment, and the various types of transactions. Thus, FDI is broadly defined as vertical or horizontal, and based on motivation is classed into resource-seeking, market-seeking, efficiency-seeking, and asset-seeking. FDI can occur in through Greenfield investment, M&A, and collective investment funds. In this section, it was concluded that foreign investors engage in different types of FDI according to their needs. The characteristics of a host country and its people, whether it is a product or service the firm wants to deliver, whether import controls exist or not, and whether the firm wants to keep a patent or trade secret to themselves will determine if the firm will engage in FDI, and if so, what type of FDI.

After defining the FDI types the recent distribution of FDI between developed, developing and transition economies was examined, with reference to the FDI flows to Africa, in general, and to the top five African recipient countries, in particular. The conclusion was that African countries fare the worst in terms of FDI inflows. Foreign direct investment flows to sub-Saharan Africa are currently greater than FDI flows to the rest of the continent, but Northern Africa are increasingly scoring higher the ranks on the Inward FDI Performance Index (based on the value of FDI inflows).

Thereafter, the determinants of FDI were detailed in terms of the OLI paradigm and the Investment Compass, which has six areas upon which HIV/AIDS can have an effect:

- (vii) resource assets;
- (viii) infrastructure;
- (ix) operating costs;
- (x) economic performance and governance;
- (xi) taxation and incentives; and
- (xii) regulatory framework.

The additional determinants geography, human capital regarding skills and education, and health were also investigated. The latter determinant was found especially important for FDI flows to Africa, since the prevalence rate of HIV/AIDS is the highest on this continent. Thus, it was concluded that health (particularly HIV/AIDS) may have an overall negative influence on FDI.

Lastly, the relationship between FDI and economic growth was discussed, considering of studies presenting conflicting arguments on the existence of such a relationship. In previous study reviews, it was found that many of the studies had statistical and theoretical problems that had led to unreliable results. Rather, whether an increase in capital flows would increase the level of investment and growth at all, should rather be investigated. Cross-country studies have indeed found an increase in growth. The contribution of FDI to growth occurs, in the main, through two channels, directly through an increase in capital stock and the subsequent capital flows, and indirectly through its spill-over effect.

The effect of health on FDI emphasises that HIV/AIDS may have a negative influence on FDI, because it influences human resources that are important for FDI inflows. HIV/AIDS may bring more risk to investment in human capital, through increasing the expensive of creating jobs, due to the loss of investment in training and efficiency wages with the AIDS-related deaths of employees. Therefore, it is of great importance to measure the influence that HIV/AIDS may have on FDI.

Chapter 4 describes the empirical study on the influence of HIV/AIDS on FDI inflows to Africa.

## Chapter 4 – The Empirical Analysis

### 4.1 Introduction

As stated in chapter one, the aim of this research project is to examine the possible influence that HIV/AIDS may exert on FDI flows to African countries. In chapter two, the relevant literature on HIV/AIDS was examined, and in chapter three, FDI was defined and analysed, and the possible determinants for FDI were discussed. One of these determinants, the overall health of a country's citizens, proved to be important as a possible determinant of FDI, and consequently it was postulated that HIV/AIDS may have an influence on FDI, and on economic growth, overall. This chapter reports on the empirical analysis that sought to quantify this possible influence. All the variables tested for inclusion are listed, but only the data that was used in the final models is discussed.

As mentioned in section 3.4.3.3, health is a form of human capital, enhancing the economic performance of a country and is thus an important determinant for FDI. In this section, it was also stated that HIV/AIDS has a longer-term negative effect on health (Alsan *et al.*, 2004:1-2), and therefore on human capital. This effect is determined by the estimation of the human capital indicator, followed by the estimation of the effect of the human capital indicator on FDI. Section 4.2, commences the chapter with a detailed discussion of the data. Thereafter, the research methods and results are reported in section 4.3.

### 4.2 Discussion of the data

In section 3.4, the possible determinants of FDI were discussed. Although there is substantial research on these determinants, it is not the aim of this research project to test the validity of each of these determinants. Also, due to data limitations for African countries, the FDI model, which is used to determine the influence that HIV/AIDS may have on FDI, are relatively basic. The annual data for 39 African countries for the period of 1999 to 2005, listed in Table 4.1, were collected from the sources listed in Table 4.2. The countries selected were chosen based on data availability.

**Table 4.1: The thirty-nine African countries used in this research project**

Algeria	Equatorial Guinea	Mali	South Africa
Benin	Ethiopia	Mauritania	Sudan
Botswana	Gabon	Mauritius	Swaziland
Burundi	Gambia, The	Morocco	Tanzania
Cameroon	Ghana	Mozambique	Togo
Chad	Guinea-Bissau	Niger	Tunisia
Congo, Dem. Rep.	Kenya	Nigeria	Uganda
Congo, Rep.	Lesotho	Rwanda	Zambia
Cote d'Ivoire	Madagascar	Senegal	Zimbabwe
Egypt, Arab Rep.	Malawi	Sierra Leone	

#### 4.2.1 The potential variables for all the models

Following Asiedu (2002:110), the ratio of net FDI inflows to GDP is the first dependent variable that was used in the FDI model. The ratio of FDI flows to a country to total flows to Africa is the second dependent variable that was used in the FDI model. The reason for the second dependent variable is explained in section 4.2.1.1. After considering the vast variety of determinants that are claimed to determine FDI, as well as the influence that HIV/AIDS may have on these, independent variables were selected for initial inclusion in the FDI model. These variables are summarised, along with their abbreviations (for easy text reference) and sources in Table 4.2, below. The variables are categorised into the following classes:

- (i) policy framework variables;
- (ii) business-related variables;
- (iii) economic variables;
- (iv) human capital variables;
- (v) geographic and demographic variables; and
- (vi) natural resource variables.

**Table 4.2: The variables tested in the initial models**

Abbreviation	Variables	Source of the data
	<b>DEPENDENT VARIABLE</b>	
	<i><b>FDI model:</b></i>	
LFDI	Net FDI inflows as % of GDP	World Bank (2008b)
LFDIFLOWS	FDI inflows as % of total FDI inflows to Africa	UNCTAD (2007a)
	<b>INDEPENDENT VARIABLES</b>	
	<i><b>Policy framework:</b></i>	
LEXPORT	Exports of goods & services as % of GDP (1 <sup>st</sup> proxy for openness)	World Bank (2008b)
LTRADE	Net trade as % of GDP (2 <sup>nd</sup> proxy for openness)	World Bank (2008b)
RULE	Rule of Law	World Bank (2008c)
VOICE	Voice and accountability	World Bank (2008c)
	<i><b>Business-related:</b></i>	
LINFRAT	Telephones per 1,000 people (1 <sup>st</sup> proxy for infrastructure)	World Bank (2008b)
LFIXCAP	Fixed capital formation as % of GDP (2 <sup>nd</sup> proxy for infrastructure)	World Bank (2008b)
LINFRARL	Ratio of roads (km) to land area (km <sup>2</sup> ; 3 <sup>rd</sup> proxy for infrastructure)	World Bank (2008b)
LCBSP	Cost of business start-up procedures as % of gross national income (GNI) per capita.	World Bank (2008b)
LEODB	Ease of doing business index (1 = most business friendly regulations)	World Bank (2008b)
LPROC_WARE	Procedures to build a warehouse (number)	World Bank (2008b)

<b>LPROC_CONTR</b>	Procedures to enforce a contract (number)	World Bank (2008b)
<b>LPROC_PROP</b>	Procedures to register property (number)	World Bank (2008b)
<b>LTIME_BUS</b>	Time required to start a business (days)	World Bank (2008b)
	<b>Economic:</b>	
<b>LGDPCCG</b>	GDP per capita growth (annual %)	World Bank (2008b)
<b>LGOVCON</b>	Government consumption as % of GDP (proxy for size of the government)	World Bank (2008b)
<b>LINFL</b>	Inflation rate (consumer prices)	World Bank (2008b)
<b>LUNEMPL</b>	Unemployment rate	World Bank (2008b)
	<b>Human capital:</b>	
<b>LSECSCH</b>	Secondary school enrolment (% net)	World Bank (2008b)
<b>LPRIMSCH</b>	Primary school completion rate	World Bank (2008b)
<b>LLITR</b>	Literacy rate (as % of people aged 15 and older)	World Bank (2008b)
<b>LHDI</b>	HDI value	UNDP (2007:234-237)
<b>LHIVAIDS</b>	Prevalence of HIV/AIDS (% of population aged 15 – 49)	World Bank (2008b)
	<b>Geographic and demographic:</b>	
<b>LPOPG</b>	Population growth rate	World Bank (2008b)
<b>SSA</b>	Sub-Saharan Africa dummy	Self-constructed
	<b>Natural resource:</b>	
<b>LAGRI</b>	Agriculture, value-added (% of GDP)	World Bank (2008b)
<b>LFUELEXP</b>	Fuel exports (% of merchandise exports)	World Bank (2008b)
<b>LOMEXP</b>	Ores and metals exports (% of merchandise exports)	World Bank (2008b)

#### 4.2.2 The variables used in the final models

Those variables that were used in the final models are listed in Table 4.3, on the next page. Some of the initial variables were omitted because of data constraints, and in some cases, a number of variables were highly correlated since they measure the same aspect. The variables reflected in Table 4.3 are thus those that showed the most significant results and are believed to be the most accurate proxies of each category.

**Table 4.3: The variables used in the final models**

Abbreviation	Variables	Source of the data
	<b>DEPENDENT VARIABLE</b>	
	<b>FDI model:</b>	
<b>LFDI</b>	Net FDI inflows as % of GDP	World Bank (2008b)
<b>LFDIFLOWS</b>	FDI inflows as % of total FDI inflows to Africa	UNCTAD (2007a)

<b>INDEPENDENT VARIABLES</b>		
	<b><i>Policy framework:</i></b>	
<b>LEXPORT</b>	Exports of goods & services as % of GDP (1 <sup>st</sup> proxy for openness)	World Bank (2008b)
<b>LTRADE</b>	Net trade as % of GDP (2 <sup>nd</sup> proxy for openness)	World Bank (2008b)
<b>VOICE</b>	Voice and accountability	World Bank (2008c)
	<b><i>Business-related:</i></b>	
<b>LFIXCAP</b>	Fixed capital formation as % of GDP (2 <sup>nd</sup> proxy for infrastructure)	World Bank (2008b)
<b>LCBSP</b>	Cost of business start-up procedures as % of gross national income (GNI) per capita.	World Bank (2008b)
<b>LTIME_BUS</b>	Time required to start a business (days)	World Bank (2008b)
	<b><i>Economic:</i></b>	
<b>LGDPPCG</b>	GDP per capita growth (annual %)	World Bank (2008b)
<b>LGOVCON</b>	Government consumption as % of GDP (proxy for size of the government)	World Bank (2008b)
<b>LUNEMPL</b>	Unemployment rate	World Bank (2008b)
	<b><i>Human capital:</i></b>	
<b>LSECSCH</b>	Secondary school enrolment (% net)	World Bank (2008b)
<b>LLITR</b>	Literacy rate (as % of people aged 15 and older)	World Bank (2008b)
<b>LHIVAIDS</b>	Prevalence of HIV/AIDS (% of population aged 15 – 49)	World Bank (2008b)
	<b><i>Geographic and demographic:</i></b>	
<b>LPOPG</b>	Population growth rate	World Bank (2008b)
	<b><i>Natural resource:</i></b>	
<b>LFUELEXP</b>	Fuel exports (% of merchandise exports)	World Bank (2008b)

Only the variables listed in Table 4.3 are discussed in the following section. First, the dependent variables are detailed, and thereafter, the independent variables, which were used in the FDI model, are discussed.

#### **4.2.2.1 The dependent variables**

In the FDI model, both the ratio of net FDI inflows to GDP (LFDI) and the ratio of FDI inflows to total FDI inflows to Africa (LFDIFLOWS) were tested as the dependent variable. The reason for this is that the first measure for FDI (LFDI) may create a skewed representation of real FDI distribution. FDI proportionately to a country's GDP may appear large, even though it is actually small in comparison to FDI flows to the rest of the continent. The FDI inflows proportionate to the rest of Africa may thus show a more accurate

representation of the distribution of FDI in Africa. Figure 4.1 and 4.2 illustrate the difference between these two measures for the period of 1999 to 2003, and of 2001 to 2005. For both these periods, Equatorial Guinea received the most FDI, proportionate to their GDP, but South Africa actually received the largest portion of FDI inflows to Africa. This is in accordance with the data presented in Figure 3.3.

The definition of the data obtained from the World Bank (2008a) identifies FDI as the net flows of investment, in order to acquire a lasting management interest (10 per cent or more of the voting stock) in an enterprise, operating in an economy other than that of the investor. In this case, it is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the country's balance of payments.

#### **4.2.2.2 The independent variables**

Many of the independent variables are traditional determinants of FDI. Some non-traditional policy and business-related variables were added after reviewing the UNCTAD's Investment Compass (2007d) with its six areas. The variables listed in Table 4.2 are discussed in the subsequent paragraphs.

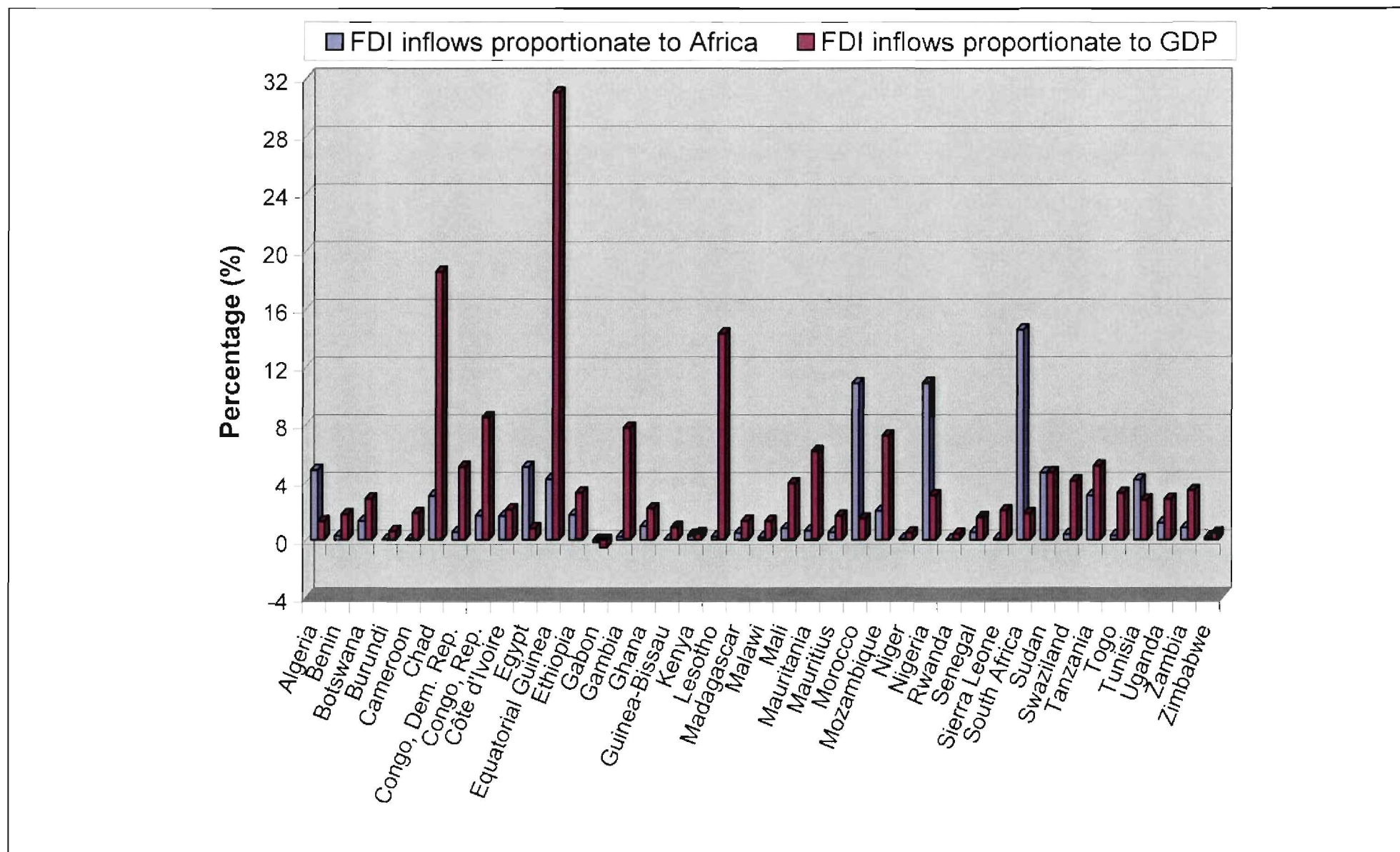
##### **4.2.2.2.1 Policy framework variables**

The first category of independent variables is the policy framework variables under which proxies for the openness of an economy, and the quality of governance in a country are included. The first proxy for the openness of an economy to the rest of the world is the exports of goods and services, expressed as a percentage of GDP. The second proxy is the sum of exports and imports, expressed as a percentage of GDP. The proxy used to measure the quality of governance in a country is the voice and accountability variable.

As previously mentioned in section 3.2.2, in the case of resource- and efficiency-seeking FDI, the more open an economy is, the larger the possibilities for FDI flows to a country. This is because products that are manufactured using the host country's resources are usually exported (Dunning, 1993:57) and in the case of efficiency-seeking FDI, the focus is on inter-regional non-barrier trade (Dunning, 1993:59).

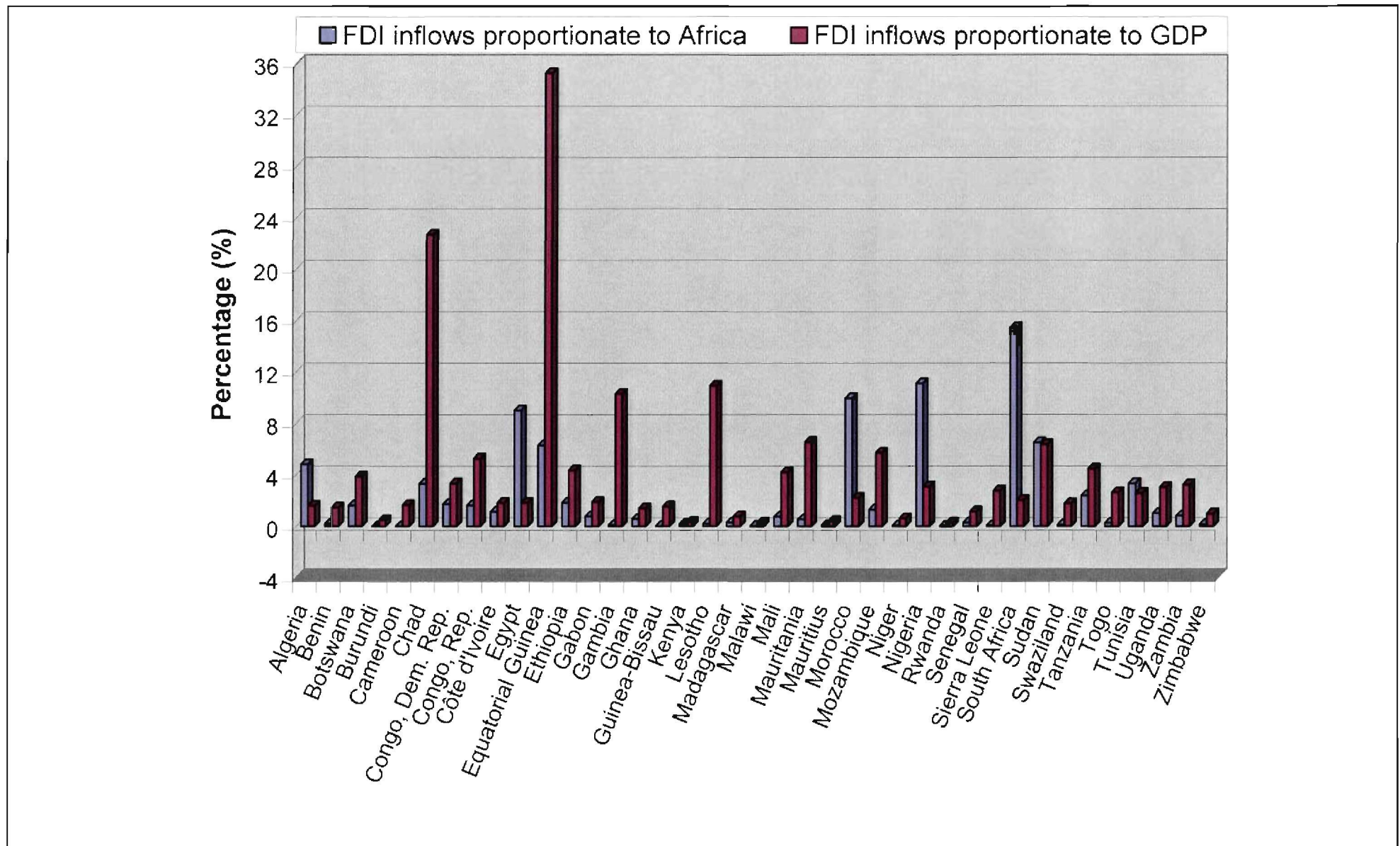
The opposite is true for market-seeking FDI, as stated in section 3.2.2. Should a market that was previously served by exports, impose import tariffs and other cost-raising barriers, home countries may decide to rather opt for FDI in that country (Salvatore, 1995:374). Therefore, the net effect of the openness of a country on FDI (and eventually economic growth) may be positive or negative, depending on the type of FDI that it mainly attracts.

Figure 4.1: LFDIFLOWS versus LFDI, 1999 – 2003



Source: World Bank (2008b); UNCTAD (2007a).

Figure 4.2: LFDIFLOWS versus LFDI, 2001 – 2005



Source: World Bank (2008b); UNCTAD (2007a).

The voice and accountability of a country are introduced as an indicator of the quality of governance in a country, in section 3.4.2. According to the World Bank (2007:262) and UNCTAD (2007d), voice and accountability measure the extent to which a country's citizens are able to participate in electing their government, as well as the independence of the media, freedom of expression, and freedom of association. The voice and accountability of a country are rated and allocated a score between -2.5 (worst) and 2.5 (best). *A priori*, it is expected that an increase in the voice and accountability score of a country may have a positive influence on FDI flows to that country.

#### **4.2.2.2.2 Business-related variables**

The second category of independent variables is comprised of business-related variables that may influence a country's investment climate. The variables included are:

- (i) the fixed capital formation expressed as a percentage of GDP (the second proxy for infrastructure);
- (ii) the cost of business start-up procedures (measured as a percentage of GNI per capita); and
- (iii) the time (measured in days) required to start a business.

The business-related variables are important for all types of FDI. In section 3.4.2, the infrastructure of a country was recognised as an important determinant for FDI. UNCTAD's (2007d) Investment Compass uses various measures as proxies for the state of the infrastructure in a country, such as the telephone mainlines per 1,000 people. This variable was not significant and was thus not used in the final FDI models. Instead, the gross fixed capital formation as a percentage of GDP was used as a proxy for infrastructure.

Gross fixed capital formation consists of outlays on the additions to the fixed assets of the economy, including the net changes in the level of inventories. Fixed assets include improvements in infrastructural components, such as roads, railways, fences, ditches, drains, schools, and hospitals (World Bank, 2008a). *A priori*, an increase in fixed capital formation as percentage of GDP is an indication of improved infrastructure and therefore is expected to have a positive influence on FDI flows.

In section 3.4.2, operating costs associated with labour and businesses were also identified as an important determinant of FDI. The cost of business start-up procedures (as a percentage of GNI per capita) was used as a proxy for operating costs. An increase in the cost of business start-up procedures are expected to have a negative influence on FDI.

The ease of entry into, the operation in, protection by and exit out of a country were identified as other important determinants of FDI under the regulatory framework of a country (refer to section 3.4.2). The time (measured as the number of days) required to start a business was the only available and complete measure to proxy the regulatory framework of a country. *A priori*, it is expected that an increase in the time required to start a business will have a negative influence on FDI flows to a country, depending on

the type of FDI and the way in which the investment is made. It may not have an influence when M&As are made, but in the case of Greenfield investments, the influence is expected to be negative (refer to section 3.2.3.1 and 3.2.3.2).

#### **4.2.2.2.3 Economic variables**

The third category of independent variables is economic variables, which consists of the growth in GDP expressed in percentage terms, government consumption<sup>24</sup> as a percentage of GDP (used as proxy for the size of the government), the inflation rate (based on consumer prices), and the adult unemployment rate.

All of these variables are important for all motives of FDI, although some may be more important than others, for certain types of FDI. This is so, because all these variables reflect the macroeconomic performance of a country. However, the size of government (proxied by government consumption as a percentage of GDP) may have a more important influence in the case of resource-seeking FDI (refer to section 3.2.2.1.) The reason for this is that investments in natural resource-based industries are usually capital-intensive and are predominantly negotiated directly with the host government (Perkins *et al.*, 2006:418).

*A priori*, it may be argued that an increase in the growth of GDP and the ratio of government consumption to GDP may have a positive influence on FDI. In contrast, an increase in the inflation rate and the unemployment rate may negatively influence FDI flows.

#### **4.2.2.2.4 Human capital variables**

The fourth category of independent variables includes those variables that influence the human capital of a country. The quality of labour plays an increasingly important role in a country's attractiveness for all kinds of FDI (as discussed in section 3.4). A human capital indicator was constructed (refer to section 4.3.1.3) using the following data:

- (i) the net secondary school enrolment rate (measured as the ratio of the number of children of official school age enrolled in school to the number of children of official school age in the population);
- (ii) the literacy rate (measured as the percentage of people aged 15 and older that are literate); and
- (iii) the prevalence of HIV/AIDS in people between the ages of 15 and 49.

The way in which the human capital indicator were constructed will be discussed in greater detail in section 4.3.1.3.

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<sup>24</sup> According to the World Bank's (2008a) definitions, general government consumption expenditure includes all government current expenditures for the purchase of goods and services, including the compensation of government employees. It only excludes military expenditures.

In section 3.4.2.1, it was argued that HIV/AIDS may have a negative influence on the human capital of a country by decreasing life expectancy, deteriorating overall health, lowering the level of experience, and increasing the number of orphaned children. Therefore, it is expected that the higher the prevalence of HIV/AIDS is, the lower human capital will be. In contrast, should the literacy rate of a country or secondary school enrolment increase, the human capital will also increase.

It should be noted that it was suggested in section 2.3, that the estimated number of people in need of ARV therapy could be a substitute measure to proxy the prevalence of HIV/AIDS. Due to the lack of available data, this option could not be exercised.

#### **4.2.2.2.5 Geographic and demographic variables**

The fifth category of independent variables is the geographic and demographic characteristics of a country. A sub-Saharan Africa dummy variable was constructed to control for, amongst others, the high prevalence of HIV/AIDS in this region of Africa. A score of 1 was given to a country that was part of sub-Saharan Africa and a score of 0 was given to those countries that are part of North-Africa. Under this category, only the population growth rate (LPOPG) was included in the final model for FDI, because the dummy variable was insignificant in all the models.

On the one hand, it may be argued that a higher population growth rate will increase market-seeking FDI, as this type of investment seeks to invest in countries with a growing market size (as discussed in section 3.2.2.2). On the other hand, a higher population growth rate may have a negative influence on FDI, via its negative influence on economic growth.<sup>25</sup> Therefore, the net effect of population growth on FDI is difficult to predict.

#### **4.2.2.2.6 Natural resource variables**

The last category of independent variables is those variables relating to the availability of natural resources in a country, particularly for exports to the rest of the world (UNCTAD, 1993; cited in Noorbakhsh, Paloni & Youssef, 2001:1595). The availability of natural resources is especially important for resource-seeking FDI. The fuel exports as a percentage of merchandise exports were used to represent the physical resources that FDI may seek. According to the World Bank (2008a), the fuels mentioned are those included in the Standard International Trade Classification (SITC), which are comprised of mineral fuels. Therefore, an increase in the proportion of fuel exports to merchandise exports may have a positive influence of FDI, and thus growth.

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<sup>25</sup> Refer to Sorensen and Whitta-Jacobsen (2005:191-192) for Malthus's hypothesis.

### 4.2.3 Summary statistics of the variables in the final models

Table 4.4 reports the number of observations, the mean value, the standard deviation, and the minimum and the maximum values of the variables that were used in the final models.

**Table 4.4: Summary statistics of the variables used in the final models**

Variable	Period	Obs.	Mean	Std. dev.	Min	Max
FDI	1999 – 2003	39	4.145	5.787	-0.522	31.009
FDI	2001 – 2005	39	4.237	6.484	0.297	35.252
FDIFLOWS	1999 – 2003	39	2.105	3.320	-0.154	14.561
FDIFLOWS	2001 – 2005	39	2.259	3.610	-0.003	15.468
EXPORT	1999 – 2003	39	29.683	1.358	7.519	84.980
EXPORT	2001 – 2005	39	31.319	18.234	5.631	81.789
TRADE	1999 – 2003	39	65.123	32.743	20.241	145.050
TRADE	2001 – 2005	39	65.323	31.602	28.400	155.441
VOICE	1999 – 2003	39	-0.700	0.727	-1.837	1.043
VOICE	2001 – 2005	39	-0.688	0.699	-1.780	0.825
FIXCAP	1999 – 2003	38	20.139	7.774	6.587	43.020
FIXCAP	2001 – 2005	39	21.958	8.509	9.937	48.674
CBSP	1999 – 2003	36	179.319	248.605	9.400	1 291.300
CBSP	2001 – 2005	39	175.092	190.159	1.700	835.400
TIME_BUS	1999 – 2003	39	63.017	46.381	11.000	233.000
TIME_BUS	2001 – 2005	39	54.920	38.745	11.000	155.000
GDPPCG	1999 – 2003	39	1.742	4.534	-4.884	24.707
GDPPCG	2001 – 2005	39	2.612	4.327	-4.234	23.359
GOVCON	1999 – 2003	39	12.644	4.709	4.384	22.620
GOVCON	2001 – 2005	39	13.327	5.291	3.004	24.022
UNEMPL	1999 – 2003	25	12.703	10.036	0.500	39.300
UNEMPL	2001 – 2005	20	12.168	8.133	0.500	28.975
SECSCH	1999 – 2003	27	31.259	21.637	3.445	79.299
SECSCH	2001 – 2005	28	32.100	21.802	4.772	80.528
LITR	1999 – 2003	37	61.757	18.707	19.450	89.360
LITR	2001 – 2005	37	62.109	18.798	24.000	89.362
HIVAIDS	1999 – 2003	39	6.640	7.960	0.100	32.427
HIVAIDS	2001 – 2005	39	6.598	8.071	0.100	33.385
POPG	1999 – 2003	39	2.383	0.866	0.541	4.930
POPG	2001 – 2005	39	2.242	0.916	0.107	4.069
FUELEXP	1999 – 2003	32	18.660	29.192	0.017	98.034
FUELEXP	2001 – 2005	31	17.789	29.136	0.017	97.197

### 4.3 Research method and results

This section presents the research method, as well as the results of estimation using ordinary least squares (OLS). The regressions were performed using Eviews version 5 and tests were carried out for normality, multicollinearity, and heteroscedasticity (prevalent in cross-sectional data) in the models. Only those models that met the classical linear regression model (CLRM) assumptions are reported in this section. In the case of heteroscedasticity, models were re-estimated by making use of heteroscedasticity-consistent errors (White correction).

After data collection, it became evident that the prevalence rate of HIV/AIDS was only available for the years 2003 and 2005 for most African countries. Because of an overall lack of data for some African countries, the five-year averages for each variable used were calculated for the two periods running from 1999 to 2003, and 2001 to 2005. For variables (such as LCBSP, LTIME\_BUS, LUNEMPL, and LLITR) that lacked a data point in the specified period, the latest or closest data point to that period was taken as a proxy. Two cross-sectional regressions were performed using these two data sets.

Because the variables used in the regressions are measured in different units, a logarithmic transformation standardises the data by decreasing variability, and is useful for measuring the elasticity of the dependent variable with respect to the independent variables. Thus, it represents the percentage change in the dependent variable for a given (small) percentage change in the independent variable. A log-linear model (where both the dependent and independent variables are log transformed) assumes that constant elasticity exists between the dependent and independent variable (Gujarati, 2003:176).

### **4.3.1 The human capital indicator**

In this section, the methods and the results of the two different human capital regressions are discussed.

#### **4.3.1.1 Method**

In the literature review, it was shown that HIV/AIDS influences an economy through four channels: physical capital accumulation, human capital accumulation, macroeconomic policy and social capital, and the feedback effect (refer to section 2.4). The effect of HIV/AIDS on human capital accumulation is especially important as it weakens the mechanisms that generate human capital and gives rise to a less-educated generation. Gries (2005) examines the role that FDI plays in South Africa's development process and suggests that FDI, human capital and technological spill-over effects are important factors in drawing level with industrialised countries, in terms of GDP growth. Gries (2005) found that human capital is the critical factor for technological progress and the absorption of FDI.

A lack of data prompted the calculation of a human capital indicator (to be explained in section 4.3.1.3), as the greatest impact of HIV/AIDS is assumed to be through the channel of human capital accumulation (refer to section 2.4.4.2). Two separate human capital indicators, namely HUMANCAP1 and HUMANCAP2, were computed from the two regressions for each period. In section 3.4.2, the illiteracy rate was identified as a proxy for the quality of human capital, but a complete dataset for the illiteracy rate of African countries prompted the use of another measure. Miyamoto (2003:24) suggests that secondary school enrolment may be used as an alternative proxy for human capital. The net secondary school enrolment rate (LSECSCHE) was therefore used as the independent variable in both regressions. The regression results are summarised in Table 4.5, on the following page.

To test the influence that HIV/AIDS and other factors have on secondary school enrolment, the prevalence rate of HIV/AIDS (LHIVAIDS) and the adult literacy rate (LLITR) were used as explanatory variables in the first regression. These variables were selected as the prevalence of HIV/AIDS is expected to have a negative influence on the human capital of a country, and the literacy rate is hypothesised to have a positive influence, as an increase in adult literacy will promote higher secondary school enrolment in a country.

In the second regression, the prevalence rate of HIV/AIDS (LHIVAIDS) and the population growth rate (LPOPG) were used as explanatory variables. *A priori*, as mentioned above, the prevalence of HIV/AIDS is expected to have a negative influence on the secondary school enrolment ratio. According to Anker (1978:61), there exists a two-way inverse relationship between a child's education and fertility. The higher the fertility rate, the lower the high educational attainment per child. In other words, the more children couples have, the less they will be able to educate each of them to a high level. The opposite causality is true; should school enrolment rates tend to increase, parents may increasingly choose to limit their fertility. The higher the fertility rate, the higher the population growth rate will be, *ceteris paribus*. Therefore, *a priori*, it can be assumed that an increase in the population growth rate will negatively influence secondary school enrolment.

#### 4.3.1.2 Results

The results of the estimation of the two human capital indicators (HUMANCAP1 and 2) are discussed for each of the two periods in the following sections. Table 4.5 summarises the estimation results.

**Table 4.5: Regression results for the human capital indicator**

	LSECSCH							
	HUMANCAP 1				HUMANCAP 2			
	1999 – 2003		2001 – 2005		1999 – 2003		2001 – 2005	
<b>C</b>	-4.0360	**	-2.6582	**	4.6916	***	4.5572	***
<b>LHIVAIDS</b>	-0.1768	**	-0.1352	**	-0.1462	*	-0.1646	**
<b>LLITR</b>	1.8115	***	1.4856	***				
<b>LPOPG</b>					-61.0645	***	-55.3445	***
<b>Obs.</b>	25		26		27		28	
<b>R<sup>2</sup></b>	0.5287		0.5399		0.4294		0.4872	
<b>Adjusted R<sup>2</sup></b>	0.4858		0.4998		0.3819		0.4462	

\*\*\* Significant at the 1% level, \*\* Significant at the 5% level, \* Significant at the 10% level.

##### 4.3.1.2.1 Human capital models for the period 1999 – 2003

For the 1999 – 2003 period, the human capital equation 1 (HUMANCAP1) is as follows:

$$LSECSCH_i = -4.0360 - 0.1768LHIVAIDS_i + 1.8115LLITR_i \quad (4.1)$$

The overall goodness-of-fit is 0.53 and the adjusted R-squared is 0.49 for twenty-five observations. Both the independent variables are significant at the 5 per cent level (LHIVAIDS) and 1 per cent level (LLITR) respectively. For a 0.18 percentage decrease in the prevalence rate of HIV/AIDS or a 1.81 percentage increase in the literacy rate, the secondary school enrolment will increase by 1 per cent.

For the 1999 – 2003 period, the human capital equation 2 (HUMANCAP2) is as follows:

$$LSECSCCH_i = 4.6916 - 0.1462LHIVAIDS_i - 61.0645LPOPG_i \quad (4.2)$$

The overall goodness-of-fit is 0.43 and the adjusted R-squared is 0.38 for 27 observations. Both the independent variables are significant at the 10 per cent level (LHIVAIDS) and the 1 per cent level (LPOPG), respectively. For a 0.15 per cent decrease in the prevalence rate of HIV/AIDS or a 61.06 per cent increase in the population growth rate, the secondary school enrolment will increase by 1 per cent.

#### 4.3.1.2.2 Human capital models for the period 2001 – 2005

For the 2001 – 2005 period, the human capital equation 1 (HUMANCAP1) is as follows:

$$LSECSCCH_i = -2.6582 - 0.1352LHIVAIDS_i + 1.4856LLITR_i \quad (4.3)$$

The overall goodness-of-fit is 0.54 and the adjusted R-squared is 0.50 for 26 observations. The significance of the two independent variables is the same as for the period of 1999 to 2003. For a 0.14 per cent decrease in the prevalence of HIV/AIDS or a 1.49 per cent increase in the literacy rate, the secondary school enrolment will increase by 1 per cent.

For the 2001 – 2005 period the human capital equation 2 (HUMANCAP2) is as follows:

$$LSECSCCH_i = 4.5572 - 0.1646LHIVAIDS_i - 55.3445LPOPG_i \quad (4.4)$$

The overall goodness-of-fit is 0.49 and the adjusted R-squared is 0.45 for 28 observations. The significance of the population growth rate variable (LPOPG) is the same as for the period of 1999 to 2003, but the HIV/AIDS variable (LHIVAIDS) is now significant at the 5 per cent level. For a 0.16 per cent decrease in the prevalence of HIV/AIDS or a 55.34 per cent decrease in the population growth rate, the secondary school enrolment will increase by 1 per cent.

#### 4.3.1.3 Calculation of the Human Capital Indicators

The human capital indicators (HUMANCAP1 & 2) for each of the two periods were constructed using the estimation results from the regressions in section 4.3.1.2. For example, for the period running from 1999 to 2003, HUMANCAP1 values were constructed according to equation 4.1. In Eviews version 5 a new series were generated according to the following equation to find new estimates for the human capital indicator:

$$HUMANCAP1_i = -4.0360 - 0.1768LHIVAIDS_i + 1.8115LLITR_i$$

The same process were followed for the construction of HUMANCAP2 for the period of 1999 to 2003 and both the human capital indicators (HUMANCAP1 & 2) for the period of 2001 to 2005.

### 4.3.2 The foreign direct investment model

In this section, the method and the results of the FDI regressions are discussed. Two types of FDI models, one with LFDI as the dependent variable and the other with LFDIFLOWS as the dependent variable, were regressed for each period.

#### 4.3.2.1 Method

Since it is hypothesised that HIV/AIDS influences FDI through human capital (see section 2.4), the two human capital indicators (HUMANCAP1 and HUMANCAP2) were introduced to determine the influence of HIV/AIDS on FDI. It should be noted that HIV/AIDS was introduced separately in the FDI model, but did not deliver any significant results. As HIV/AIDS negatively influences human capital accumulation by decreasing the life expectancy of people, and because the life expectancy is included in the HDI (refer to section 2.4.4.3), the HDI value was also tested in the FDI model as a health proxy. However, it was found not significant in any model.

An FDI model in which the determinants of FDI are tested, typically contains variables such as a proxy for infrastructure quality, market size, labour costs, openness and political instability, real GDP per capita, the inflation rate, and taxes and tariffs (Asiedu, 2002:110; Naudé & Krugell, 2003:10). As this research project does not aim to test each of the exhaustive determinants of FDI, a simple model is regressed to focus on the influence of HIV/AIDS through the human capital indicators on FDI.

For the first equations, the two human capital indicators were introduced separately into the equations, where the net FDI inflows as a percentage of GDP (LFDI) were the dependent variable. The type 1 equations were as follows:

$$LFDI_i = c + HUMANCAP1or2_i + CONTROL_i + e_i^{26} \quad (4.5)$$

Then, they were introduced separately in the equations, where the FDI inflows proportionately to the rest of Africa (LFDIFLOWS) were the dependent variable. The type 2 equations were as follows:

$$LFDIFLOWS_i = c + HUMANCAP1or2_i + CONTROL_i + e_i^{27} \quad (4.6)$$

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<sup>26</sup> Where  $e_i$  is the white noise error term, which is independently and identically distributed.

<sup>27</sup> Where  $e_i$  is the white noise error term, which is independently and identically distributed.

### 4.3.2.2 Results

In this section, the results for the period of 1999 to 2003 are presented first, and thereafter the results for the period of 2001 to 2005 are detailed.

#### 4.3.2.2.1 Foreign direct investment models for the period 1999 – 2003

The best models for both types of equations and for both periods are selected for comparison in this section. Table 4.6 and 4.7 report the results of the type 1 equations with LFDI as the dependent variable, for the period 1999 to 2003. In both cases, equation (e) was the best model with the second highest R-squared and adjusted R-squared, with the most variables that were significant. The type 2 equations for the period of 1999 to 2003 are not reported here, since no significant results were found and the assumptions of the CLRM were violated.

In equation (e) Table 4.6, the adjusted R-squared is 0.53 and five variables, namely HUMANCAP1, LGDPPCG, LEXPORT, LCBSP and the intercept (C), are significant. HUMANCAP1 and LGDPPCG are significant at the 5 per cent level, and the intercept (C), LEXPORT and LCBSP are significant at the 1 per cent level.

Equation (e) Table 4.7, has an adjusted R-squared of 0.39 and four variables, namely LCBSP, the intercept (C), LGDPPCG and LEXPORT, are significant. LCBSP is significant at the 10 per cent level, the intercept (C) and LGDPPCG are significant at the 5 per cent level, and LEXPORT is significant at the 1 per cent level.

**Table 4.6: Summary of models for 1999 – 2003, LFDI and HUMANCAP1**

	LFDI											
	HUMANCAP1											
	(a)		(b)		(c)		(d)		(e)		(f)	
C	-5.5249	***	-6.5528	***	-3.6106	**	-3.8959	**	-3.8962	***	-4.8888	***
HUMANCAP1	-1.3147	*	-1.0931		-3.0849	***	-2.9699	***	-1.6079	**	-1.1052	
HUMANCAP2												
LTRADE	0.6431						0.1950				0.9522	***
LEXPORT			0.3727		0.1281				0.7719	***		
VOICE	-0.3939	*	-0.3886	**	-0.0869		-0.1150					
LTIME_BUS			0.6264	**	0.2288		0.2257					
LCBSP									0.4182	***	0.3966	***
LFIXCAP	0.8702		0.9066	*								
LGDPPCG	6.9381		10.2601		15.1775		15.9106		7.5705	**	7.5633	**
LPOPG									-31.1898		-29.3724	
LUNEMPL					0.4186	**	0.4050	**				
Obs.	33		33		23		23		32		32	
R <sup>2</sup>	0.4101		0.5354		0.6100		0.6138		0.6026		0.6276	
Adjusted R <sup>2</sup>	0.3008		0.4281		0.4638		0.4690		0.5261		0.5559	

\*\*\* Significant at the 1% level, \*\* Significant at the 5% level, \* Significant at the 10% level.

**Table 4.7: Summary of models for 1999 – 2003, LFDI and HUMANCAP2**

	LFDI											
	HUMANCAP2											
	(a)		(b)		(c)		(d)		(e)		(f)	
C	-3.7255	**	-4.3359	**	-1.5046		-2.4991		-3.4281	**	-5.2614	***
HUMANCAP1												
HUMANCAP2	-0.2948		-0.3501		-0.4226		-0.3990		0.0894		0.1645	
LTRADE	0.6305	*					0.4205				1.0434	***
LEXPORT			0.4665	*	0.1869				0.8118	***		
VOICE	-0.3389	*	-0.3232	*	-0.1228		-0.1998					
LTIME_BUS			0.4300		0.5629		0.5236					
LCBSP									0.2937	*	0.2845	*
LFIXCAP	0.8865		0.9326	*								
LGDPGCG	8.7053	*	11.1553	**	23.9234	**	25.0760	**	6.8973	**	7.2465	**
LPOPG									‡		‡	
LUNEMPL					0.2019		0.1626					
Obs.	37		37		24		24		36		36	
R <sup>2</sup>	0.3538		0.4236		0.3854		0.4089		0.4579		0.4939	
Adjusted R <sup>2</sup>	0.2496		0.3084		0.1684		0.2002		0.3879		0.4286	

\*\*\* Significant at the 1% level, \*\* Significant at the 5% level, \* Significant at the 10% level, ‡ LPOPG is omitted in these equations because it is already included in the human capital indicator (HUMANCAP2).

The results are summarised in reference to the variables used and the category under which the variable falls. The following variables are significant in the FDI models for the period of 1999 to 2003:

#### 4.3.2.2.1.1 Policy framework variables

The openness of a country was estimated by exports of goods and services as a percentage of GDP (LEXPORTS), as well as net trade as a percentage of GDP (LTRADE). The first proxy's (LEXPORTS) influence on LFDI was estimated to range between 0.7719 and 0.8818. The second proxy's (LTRADE) coefficient was estimated to range between 0.9522 and 1.0434. Both these variables have a positive influence on LFDI as expected.

The voice and accountability of a country (VOICE) is the proxy for reflecting the quality of governance in a country and its coefficient ranged between -0.3232 and -0.3939. The sign of this coefficient is in contrast with expectations. A reason for this may be the fact that Africa mainly attracts resource-seeking FDI (refer to section 3.3.3). Therefore, it may be assumed that the voice and accountability of a country is less important for FDI decision making when deciding to invest in resource-based industries in resource-rich countries.

#### 4.3.2.2.1.2 Business-related variables

The time required to start a business (LTIME\_BUS) was the first business-related variable used in the FDI model. This variable is only significant in one model and has a coefficient of 0.6264. It was expected to have a negative influence on LFDI, but has a positive influence according to Table 4.6

equation (b). A possible reason for its insignificance may be due to the time required to start a business only being important if a greenfield investment is being made, but of much less importance if M&As are the main form in which FDIs are made (refer to sections 3.2.3.1 and 3.2.3.2).

The cost of business start-up procedures as a percentage of GNI per capita (LCBSP) is the second variable in this category, used in the FDI models for this period. Its coefficients were estimated to range between 0.2845 and 0.4182, and its sign is in contrast to expectations. It may be speculated that a reason for the positive significance may be that countries with higher business start-up costs are considered to have more advanced industries. These businesses will usually need higher-priced technologies and equipment to be competitive.

Fixed capital formation as a percentage of GDP (LFXCAP) was one of the proxies for the infrastructure in a country. Its sign is as expected and the coefficient ranges between 0.9066 and 0.9326.

#### **4.3.2.2.1.3 Economic variables**

Gross domestic product growth per capita (LGDPPCG) and the unemployment rate (LUNEMPL) are the two variables that are significant in this category of variables. The former variable has a positive influence on LFDI as expected, with its coefficient ranging between 6.8973 and 25.0760. The latter variable has a positive influence in contrast with *a priori* expectations and ranges between 0.4050 and 0.4186. A possible explanation for this unexpected positive influence may be that according to Phillips (1958), higher unemployment is inversely related to wages. Therefore, when unemployment is high, wages tend to be lower, and lower wages in a country make investment in that country more appealing. Thus, higher unemployment may have a positive influence on FDI.

#### **4.3.2.2.1.4 Human capital variables**

Under this category of variables, two different human capital indicators (HUMANCAP1 and 2) were calculated. The expected influence of these indicators was positive, but the sign of the coefficients are negative. The explanation for these results may be traced back to Miyamoto's (2003:22) remark on efficiency-seeking FDI that necessitates a skilful workforce, in contrast to resource- and market-seeking FDI that is not directly influenced by the level of human capital (refer to section 3.4.3.2). It is possible that African countries attract mainly resource- and market-seeking FDI, and fail to attract sufficient efficiency-seeking FDI because of the lower quality of human capital in these countries. The coefficient of HUMANCAP1 ranges between -1.1052 and -3.8962, while the coefficient of HUMANCAP2 ranges between -3.4281 and -5.2614.

#### **4.3.2.2.1.5 Geographic and demographic variables**

The population growth rate (LPOPG) is the only variable in this category that was used in the FDI models for this period. LPOPG has a negative sign and the reason for this may be that the negative influence that population growth has on economic growth is also true for FDI, since there is a two-way causality between FDI and growth (refer to section 3.5.1). Another reason for this negative sign may also refer back to the assumption that the population growth rate is inversely related to the secondary school enrolment. However, this was not found significant.

#### **4.3.2.2.2 FDI models for the period 2001 to 2005**

Tables 4.8 and 4.9 summarise the results of the type 1 equations with LFDI as the dependent variable, for the period of 2001 to 2005. Tables 4.10 and 4.11 summarise the results of the type 2 equations with LFDIFLOWS as the dependent variable, for the period of 2001 to 2005. In order to compare equations of this period with the period of 1999 to 2003, equations (a) to (f) are the same as in the previous period. Equations (g) and (h) were added, because individually they were the second best models for the type 1 equations, and the best models for the type 2 equations.

For the type 1 equations, equation (b) is the model with the highest adjusted R-squared in both cases. Equation (b) Table 4.8 has an adjusted R-squared of 0.5727 and five variables, namely LGDPPCG, the intercept (C), HUMANCAP1, VOICE and LFIXCAP, are significant. LGDPPCG is significant at the 10 per cent level, while the intercept (C), HUMANCAP1 and VOICE are significant at the 5 per cent level. LFIXCAP is the only variable significant at the 1 per cent level. Equation (b) Table 4.9 has an adjusted R-squared of 0.5001 and three variables, namely VOICE, the intercept (C) and LFIXCAP, are significant. VOICE is significant at the 5 per cent level, and the intercept (C) and LFIXCAP are significant at the 1 per cent level.

For the type 2 equations, equation (h) is the model with the highest adjusted R-squared in both cases. In equation (h) Table 4.10 the adjusted R-squared is 0.33, and five variables, namely LCBSP, LGOVCON, LGDPPCG, LFUELEXP and the intercept (C), are significant. LCBSP is significant at the 10 per cent level, while LGOVCON, LGDPPCG, and LFUELEXP are significant at the 5 per cent level. The intercept (C) is the only variable significant at the 1 per cent level. In equation (h) Table 4.11 the adjusted R-squared is 0.45, and six variables, namely LCBSP, LGOVCON, HUMANCAP2, the intercept (C), LGDPPCG and LFUELEXP, are significant. LCBSP and LGOVCON are significant at the 10 per cent level, and HUMANCAP2 was significant at the 5 per cent level. The intercept (C), LGDPPCG and LFUELEXP are significant at the 1 per cent level.

**Table 4.8: Summary of models for 2001 – 2005, LFDI and HUMANCAP1**

	LFDI															
	HUMANCAP1															
	(a)		(b)		(c)		(d)		(e)		(f)		(g)		(h)	
<b>C</b>	-3.3795	**	-3.5545	**	2.0188		1.9152		0.2967		-0.7032		-3.0489		0.3079	
<b>HUMANCAP1</b>	-0.5625	**	-0.5943	**	-0.7954	***	-0.7099	*	-0.5307		-0.4604		-0.5806	**	-0.2189	
<b>HUMANCAP2</b>																
<b>LTRADE</b>	0.3183						0.0953				0.5731		0.0853			
<b>LEXPOR</b>			0.3571		0.3208				0.5196	*						
<b>VOICE</b>	-0.5227	***	-0.4914	**	-0.4338	*	-0.4145						-0.4896	**		
<b>LTIME_BUS</b>			0.1778		-0.1617		-0.0781						0.2538			
<b>LCBSP</b>									0.0928		0.1348					0.1910
<b>LFIXCAP</b>	1.3679	***	1.2886	***									1.3566	***		
<b>LGOVCON</b>																-0.1421
<b>LGDPGCG</b>	7.0408	*	6.6308	*	18.0129	**	20.7372	**	13.1220	***	13.4331	***	7.4169	**	19.3152	**
<b>LPOPG</b>									-11.8981		-14.1203		-10.9763			
<b>LUNEMPL</b>					0.0766		0.1408									
<b>LFUELEXP</b>																0.0623
<b>Obs.</b>	37		37		20		20		37		37		37		30	
<b>R<sup>2</sup></b>	0.6079		0.6439		0.6875		0.6755		0.4780		0.4614		0.6264		0.3454	
<b>Adjusted R<sup>2</sup></b>	0.5447		0.5727		0.5433		0.5257		0.3938		0.3745		0.5362		0.2090	

\*\*\* Significant at the 1% level, \*\* Significant at the 5% level, \* Significant at the 10% level.

**Table 4.9: Summary of models for 2001-2005, LFDI and HUMANCAP2**

C	LFDI														
	HUMANCAP2														
	(a)		(b)		(c)		(d)		(e)		(f)		(g)		(h)
C	-4.0021	**	-4.2434	***	1.2458		0.5792		-0.9864		-2.0807		-4.4919	***	-0.0918
HUMANCAP1															
HUMANCAP2	-0.4894	*	-0.4383		-0.6957		-0.7126		-0.2461		-0.1735		-0.3719		0.0505
LTRADE	0.2927						0.5044				0.6301	*	0.1452		
LEXPORT			0.3181		0.4410				0.5735	**					
VOICE	-0.4405	**	-0.4910	**	-0.4998	*	-0.5223	*					-0.4057	**	
LTIME_BUS			0.1684		-0.2337		-0.2339						0.2231		
LCBSP									0.0859		0.1233				0.2186
LFIXCAP	1.5620	***	1.4349	***									1.5290	***	
LGOVCON															-0.3288
LGDPPCG	5.4420		5.2827		23.2985	**	24.3891	**	12.1335	***	12.7145	***	5.4686		18.4388
LPOPG									‡		‡		‡		
LUNEMPL					0.1239		0.1823								
LFUELEXP															0.0229
Obs.	39		39		20		20		39		39		39		31
R <sup>2</sup>	0.5497		0.5791		0.6162		0.6142		0.4213		0.3983		0.5617		0.2811
Adjusted R <sup>2</sup>	0.4815		0.5001		0.4390		0.4361		0.3533		0.3276		0.4795		0.1373

\*\*\* Significant at the 1% level, \*\* Significant at the 5% level, \* Significant at the 10% level, ‡ LPOPG is omitted in these equations, because it is already included in the human capital indicator (HUMANCAP2).

**Table 4.10: Summary of models for 2001-2005, LFDIFLOWS and HUMANCAP1**

	LFDIFLOWS									
	HUMANCAP1									
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)		
<b>C</b>	-5.0946	-4.9070	0.5876	-0.1665	-3.4767	-1.4263	-2.9116	-8.4363	***	
<b>HUMANCAP1</b>	0.5176	0.1587	-0.3468	-0.2801	0.2752	0.3604	0.2860	0.2400		
<b>HUMANCAP2</b>										
<b>LTRADE</b>	-0.5018			0.4662		-0.2092	-0.4768			
<b>LEXPORT</b>		0.6418	0.4471		0.3973					
<b>VOICE</b>	-0.2326	-0.3691	-0.4545	-0.4679			-0.3209			
<b>LTIME_BUS</b>		-0.4908	-0.8428	-0.8256			-0.1864			
<b>LCBSP</b>					0.3492	0.3601		0.4346	*	
<b>LFIXCAP</b>	1.5757	1.1060					1.4384			
<b>LGOVCON</b>								1.6776	**	
<b>LGDPGCG</b>	5.8935	5.9808	25.9483	27.2697	11.3057	13.1675	7.3719	38.1077	**	*
<b>LPOPG</b>					-42.8478	-54.6557	-23.4846			
<b>LUNEMPL</b>			0.6163	0.6406						
<b>LFUELEXP</b>								0.3585	**	
<b>Obs.</b>	36	36	19	19	36	36	36	29		
<b>R<sup>2</sup></b>	0.1709	0.2013	0.3403	0.3399	0.2165	0.2065	0.1852	0.4532		
<b>Adjusted R<sup>2</sup></b>	0.0327	0.0361	0.0104	0.0099	0.0859	0.0742	-0.0185	0.3344		

\*\*\* Significant at the 1% level, \*\* Significant at the 5% level, \* Significant at the 10% level.

**Table 4.11: Summary of models for 2001-2005, LFDIFLOWS and HUMANCAP2**

	LFDIFLOWS															
	HUMANCAP2															
	(a)		(b)		(c)		(d)		(e)		(f)		(g)		(h)	
<b>C</b>	-5.2192		-6.4385	*	3.5126		1.7975		-8.1539	***	-5.9728	*	-5.3931		-11.8263	***
<b>HUMANCAP1</b>																
<b>HUMANCAP2</b>	1.0849	*	0.7788		-1.5179		-1.7551		1.4671	**	1.6618	**	1.1289		1.2560	**
<b>LTRADE</b>	-0.7789						1.8829				-0.4179		-0.8350			
<b>LEXPORT</b>			0.4078		1.3775				0.3336							
<b>VOICE</b>	-0.3127		-0.3528		-0.5972		-0.6883						-0.2999			
<b>LTIME_BUS</b>			-0.2691		-1.5042		-1.6897						0.0838			
<b>LCBSP</b>									0.3517	*	0.3473				0.5241	*
<b>LFIXCAP</b>	1.3260		0.8748										1.3114			
<b>LGOVCON</b>															1.5723	*
<b>LGDPCCG</b>	10.4059		10.5117		19.5725		18.7981		14.4777	**	16.1892	**	10.4192		35.6322	***
<b>LPOPG</b>									‡		‡		‡			
<b>LUNEMPL</b>					0.7541		0.8441									
<b>LFUELEXP</b>															0.3696	***
<b>Obs.</b>	38		38		19		19		38		38		38		30	
<b>R<sup>2</sup></b>	0.2599		0.2467		0.3973		0.4128		0.2828		0.2825		0.2605		0.5483	
<b>Adjusted R<sup>2</sup></b>	0.1443		0.1009		0.0960		0.1192		0.1959		0.1955		0.1174		0.4542	

\*\*\* Significant at the 1% level, \*\* Significant at the 5% level, \* Significant at the 10% level, ‡ LPOPG is omitted in these equations, because it is already included in the human capital indicator (HUMANCAP2).

The results are summarised in reference to the variables used and the category under which the variable falls. The following variables are significant in both the type 1 and 2 FDI models for the period of 2001 to 2005:

#### **4.3.2.2.1 Policy framework variables**

The first proxy for openness of a country, LEXPORTS, is only significant in the type 1 models and its coefficient ranges between 0.5196 and 0.5735. The second proxy, LTRADE, is also significant in only the type 1 models and the coefficient is 0.6301 for the equation in which it is significant. Both these variables have a positive influence on LFDI as expected.

The voice and accountability of a country (VOICE), which is the proxy for reflecting the quality of governance in a country, is only significant in the type 1 models. Its coefficient ranges between -0.4057 and -0.5227. The sign of this coefficient is again in contrast with expectations. The same reason discussed in section 4.3.2.2.1.1 may apply here.

#### **4.3.2.2.2 Business-related variables**

The time required to start a business (LTIME\_BUS) was the first business-related variable used in the FDI model. It is not significant in either the type 1 or 2 models.

The cost of business start-up procedures as a percentage of GNI per capita (LCBSP) is the second variable in this category used in the FDI models for this period. It is significant in the type 1 and type 2 models. For the type 1 models, its coefficient is 0.2186 for the equation in which it is significant. For the type 2 models, its coefficient ranges between 0.3517 and 0.5241. The same reason, as mentioned in section 4.3.2.2.1, may be true for the sign of the coefficient for this period.

Fixed capital formation as a percentage of GDP (LFIXCAP), which was one of the proxies for the infrastructure in a country, is only significant in the type 1 models. Its sign is as expected and the coefficient ranges between 1.2886 and 1.5620.

#### **4.3.2.2.3 Economic variables**

The size of the government (proxied by government consumption as a percentage of GDP, LGOVCON), GDP growth per capita (LGDPPCG), and the unemployment rate (LUNEMPL) were the three variables used in the FDI models for this period.

LGOVCON is only significant in type 2 models and its coefficient ranges between 1.5723 and 1.6776. Its sign is as expected. LGDPPCG is significant in type 1 and 2 models and its sign is positive (as expected) in all the equations. For the type 1 models, its coefficient ranges between 5.4686 and

24.3891. For the type 2 models, its coefficient ranges between 10.4192 and 38.1077. LUNEMPL is not significant in any of the type 1 and 2 models.

#### **4.3.2.2.4 Human capital variables**

Under this category of variables, two different human capital indicators (HUMANCAP1 and 2) were calculated. HUMANCAP1 is only significant in the type 1 models and its coefficient ranges between -0.5307 and -0.7954. HUMANCAP2 is significant in type 1 and 2 models and its coefficient ranges between -0.4894 and 1.6618. It is interesting to note that the only equation in which the influence is negative is a type 1 model. In the type 2 models, the influence is positive.

It was expected that the human capital indicators would have a positive influence on LFDI and LFDIFLOWS. In this case, it only has a positive influence on LFDIFLOWS, but a negative influence on LFDI. As mentioned in section 4.3.2.1, the influence that human capital has on FDI is more important in the case of efficiency-seeking FDI, in contrast with market- and resource-seeking FDI. Therefore, the results from the type 1 models concurs with this finding that human capital may not be an important determinant of FDI when choosing to invest in Africa, since few efficiency-seeking investors come to Africa. A reason that the human capital indicators have a positive influence on LFDIFLOWS may be that human capital is a definite determinant and has a positive influence on the FDI decision for foreign investors who choose between the different African countries as an investment destination,.

#### **4.3.2.2.5 Geographic and demographic variables**

The population growth rate is the only variable in this category that was used in the FDI models for this period. It has a negative sign, but is not significant in any of the models.

#### **4.3.2.2.6 Natural resource variables**

Fuel exports as a percentage of merchandise exports (LFUELEXP) is the only variable in this category that was used in the FDI models for this period. It is only significant in the type 2 models and its coefficient ranges between 0.3585 and 0.3696. Its sign is positive and as expected. Again, the reason for this may be that the fuel exports of a country only matter when investors have to choose between the different African countries to invest in.

#### **4.3.2.3 Conclusion: The foreign direct investment model**

Two types of FDI equations were regressed. The first had LFDI as the dependent variable, and the second had LFDIFLOWS as the dependent variable. Two human capital indicators were calculated and tested separately in the FDI model, in order to determine the influence of HIV/AIDS through human capital accumulation. Both these indicators have a negative sign, in contrast to expectations. A possible

reason for this is that Africa might mainly attract resource- and market-seeking FDI, for which human capital is not so important. In order for Africa to attract efficiency-seeking FDI, the quality of human capital should be improved, as it is an important determinant for that motive of FDI. Although a diverse set of results were obtained for the two separate periods, it may be concluded that the latest period of 2001 to 2005 delivered the most conclusive results in line with *a priori* expectations. The following variables are significant in the FDI models with the expected sign: (i) exports of goods and services as percentage of GDP, (ii) net trade as percentage of GDP, (iii) fixed capital formation as percentage of GDP, (iv) government consumption as percentage of GDP, (v) GDP per capita growth and (vii) fuel exports as percentage of merchandise exports. The following variables are significant, but with a sign in contrast with expectations: the (i) voice and accountability, (ii) time required to start a business, (iii) cost of business start-up procedures as percentage of GNI per capita and (iv) unemployment rate.

#### **4.4 Summary**

This chapter has reported on the results of the empirical study, which sought to determine the influence that HIV/AIDS has on FDI. Firstly, two human capital indicators were constructed from the regressed equation, where the secondary school enrolment was the proxy for human capital (and therefore the dependent variable). HIV/AIDS has a significant negative influence on human capital, but when these human capital indicators were introduced in the two types of FDI models, their influence was significant, but mostly negative.

It was argued that the influence that human capital has on LFDI is more important, in the case of efficiency-seeking FDI, in contrast with market- and resource-seeking FDI. Therefore, the results from the type 1 models concur with the finding that human capital may not be an important determinant of FDI when choosing to invest in Africa, since few efficiency-seeking investors come to Africa.

In the type 2 FDI models for the period of 2001 to 2005, however, the human capital indicators have a positive influence on LFDIFLOWS. A possible reason for this is that the human capital may only play an important role in an investor's choice between the different African countries as an investment destination, but not in the initial choice to invest in Africa.

Mankiw, Romer and Weil (1992) realised the importance of human, as well as physical capital as determinants of economic growth and augmented the Solow model by introducing the accumulation of human capital. It is therefore postulated that eventually HIV/AIDS will have a negative influence on economic growth, because of its significant influence on human capital.

## Chapter 5 – Conclusion and Recommendations

### 5.1 Introduction

HIV/AIDS kills millions of people annually and deteriorates the standard of living for those infected. The full influence of this epidemic in the long-term is difficult to predict, but is hypothesised to be negative. Much research has been conducted, seeking to determine the influence of HIV/AIDS on an economy in general. The most recent studies include Arndt (2006), Bell *et al.* (2006), Corrigan *et al.* (2005), UNAIDS and WHO (2006), Masanjala (2007), Naidu and Harris (2005), and Veenstra and Whiteside (2005). The consensus is that HIV/AIDS influences an economy negatively, and the full impact of the HIV/AIDS epidemic on the economy will only be realised over the longer term.

African countries are especially hard hit by the epidemic and in 2006, 2.1 million of the 2.9 million people who died of AIDS were situated in Africa. As discussed in section 2.3, the reason that the prevalence of HIV/AIDS in African countries is so much higher may be attributed to Africans being more vulnerable to the disease, due to sexual behaviours and tradition. As mentioned in section 1.2 foreign investors take the degree of HIV/AIDS in a country into consideration when deciding to invest in a country. After examination of the trends in FDI distribution to this continent, compared to other developing countries, it was suggested that the high prevalence rate of HIV/AIDS may be one of the reasons for Africa's low share (10.6 per cent) in FDI flows to developing countries.

The influence of HIV/AIDS on FDI is important, since FDI has a number of potential advantages that may be beneficial, especially to developing countries. These advantages include the following:

- (i) generating employment (both directly and indirectly), which may lead to higher growth, and increasing the skills of local workers through training and learning through practice;
- (ii) closing the gap between domestic savings and investment requirements;
- (iii) contributing to the integration of the host economy into the world economy;
- (iv) transferring modern technology;
- (v) increasing the efficiency of firms, in order to keep pace with increased competition; and
- (vi) exerting a significant influence on the balance of payments of a country.

Alsan *et al.* (2004; 2006) confirm that population health has an overall negative influence on FDI. Poor health decreases workers' productivity, and therefore also their earnings. Thus, savings are decreased to compensate for lower earnings. High rates of absenteeism may also increase production costs, negatively affecting FDI attraction. Alsan *et al.* (2004) could not substantiate their hypothesis empirically, but argue that diseases like HIV/AIDS and malaria may have longer term effects on FDI than other diseases, as it takes longer to bring an outbreak under control. Naudé and Krugell (2003) also noted that the negative influence of HIV/AIDS may influence FDI growth through the human capital of a country. Their finding motivated the further investigation of this research project, which sought to

determine the influence that HIV/AIDS may have on FDI inflows to African countries in particular, since these are the countries most exposed to the HI-Virus.

Therefore, the main aim of this research project was to determine the influence of HIV/AIDS on FDI flows into Africa. This was accomplished by, firstly, exploring HIV/AIDS and its effect on the economy, secondly, investigating FDI, its determinants, and the link between HIV/AIDS, FDI and economic growth; and, thirdly, testing the influence of HIV/AIDS on FDI inflows to Africa through regression analysis. Each of these steps were detailed in separate chapters.

In chapter 2, HIV/AIDS and how it functions, were closely examined, in order to understand the possible influence that HIV/AIDS may have on an economy in general and on FDI, in particular. After the introduction of the importance of FDI for a country in chapter 1, FDI was defined in chapter 3. The possible determinants of FDI were also analysed in chapter 3 and the effect of human capital, and health specifically, on FDI was discussed. The link between FDI and growth were also briefly discussed, as FDI is often viewed as an engine for growth and it is postulated that the effect of HIV/AIDS will be most visible on the economic growth rate of a country. Chapter 4 detailed the empirical analysis, in which the influence of HIV/AIDS on human capital and FDI were measured quantitatively.

This chapter commences with a brief summary of the conclusions on HIV/AIDS and its influence on an economy, in section 5.2. Thereafter, conclusions on FDI, determinants of FDI, and the link between FDI and economic growth are detailed in section 5.3. Next, the results of the empirical analysis are presented in section 5.4. Lastly, recommendations for future research are made in section 5.5.

## **5.2 Conclusions on HIV/AIDS and its economic influence**

Chapter 2 explored the characteristics of HIV/AIDS, the current trends and statistics of HIV/AIDS, and its effect on the economy as a whole. Firstly, the characteristics of HIV/AIDS can be summarised as follows. In 1983, the HI-Virus was identified as the virus that causes AIDS, which is a disease destroying the body's immune system. It is incurable, but different treatments subsequently developed can suppress the virus. The use of these treatments has various side effects, such as nausea, fatigue and more serious conditions such as bone density loss, high cholesterol levels, nerve damage, and metabolic changes. It has also become evident that the virus is slowly becoming resistant to highly active antiretroviral therapy (HAART) and is constantly mutating, in reaction to treatment.

Secondly, regarding the current trends in HIV/AIDS, the following was found. According to UNAIDS and WHO (2006b; 2006d) the adult HIV/AIDS prevalence rate is estimated to be the highest in Africa, and in particular sub-Saharan Africa. South Africa, Nigeria, and Mozambique had the highest prevalence rate in 2005. Arndt and Lewis (2000:858-859) state that HIV/AIDS tends to strike especially young adults and moves very slowly, and that infection rates differ by skills class. Consequently, the disease affects

the working population particularly, and makes early detection even more difficult. A lack of reliable HIV/AIDS data in these countries makes it difficult to assess the full impact of the epidemic on their economies.

Lastly, to understand the influence of HIV/AIDS on the economy many of studies were analysed and it was concluded that HIV/AIDS influences the three main participants in an economy, namely households, the private sector, and the public sector. In turn, these participants influence economic growth through four main channels:

- (i) physical capital accumulation;
- (ii) human capital accumulation;
- (iii) macroeconomic policy and social capital; and
- (iv) the feedback effect.

The influence on the three main participants and the influence through the four main channels is subsequently reviewed in order to conclude the effects of HIV/AIDS on the economy.

### **5.2.1 Influence of HIV/AIDS on the three main participants in an economy**

As mentioned above, HIV/AIDS influences the three main participants of an economy, namely households, the private sector, and the public sector.

From the literature review, it can be concluded that the negative effects of HIV/AIDS are largely experienced by household, as family members die and children are left orphaned. Women in particular are biologically and socially more susceptible to the disease than men, thus damaging the foundation of a traditional household. When children are orphaned, they become more vulnerable to abuse and are less likely to attend school. Households are directly affected by increased expenditures on treatments and funerals, and children may be taken out of school to generate income or to help with chores at home, and caring for sick family members. Households are also indirectly affected by declining earnings due to job losses. Together these direct and indirect effects of HIV/AIDS decrease the saving rate. Other systematic effects on households include reduced morale and productivity of co-workers, changes in sexual behaviour, the negative influence of stigma and discrimination, and the loss of quality of life. Poverty and inequality on the household-level are also increased by HIV/AIDS, fuelling the further spread of the disease.

It can be concluded that the effect of HIV/AIDS on the private sector is mainly through loss in productivity. The contraction of HIV/AIDS by a worker is negative for the private sector, because should workers become ill they become less productive and absenteeism increases. Workers can also become morbid about their situation, making them less productive and less able to cope with work stress. A skill shortage may occur as highly skilled workers die, and in order for firms to cope with these losses of labour and productivity, insurance and training expenditures increase. The loss of productivity and

labour therefore lead to increased production costs, and may cause a decrease in output, and thus their profit and savings. All of these effects reduce investment in the accumulation of human and physical capital, and will eventually influence economic growth.

From the literature review, it can also be concluded that HIV/AIDS influences the public sector mainly through budget allocations and tax income declines. It was found that HIV/AIDS influences the public sector by decreasing government income from taxes, through the change in household income and the private sector's production structure. Difficult decisions on the effective allocation of that income to public sector services, also need to be made. The public sector is especially influenced by the health and education sectors, as these provide social services to citizens.

The influence that households, the private, and public sector have on economic growth through the four channels is reviewed in the next section.

### **5.2.2 Influence of HIV/AIDS through the four main economic growth channels**

This dissertation has indicated that HIV/AIDS firstly influences economic growth through the channel of physical capital accumulation in the following way: the decrease in income for households, the private, and public sector, as well as the increase in their expenditures, will reduce investment in the accumulation of physical capital. It was especially this channel of influence on HIV/AIDS on the economy that was further explored in this research project in terms of the influence of HIV/AIDS on FDI.

Secondly, HIV/AIDS affects economic growth through the channel of human capital accumulation by decreasing life expectancy, deteriorating overall health, decreasing the level of experience, and increasing the number of orphaned children. As human capital is a determinant of FDI, the influence of HIV/AIDS on human capital was explored further and was thus included in the empirical analysis.

Thirdly, HIV/AIDS influences economic growth through the channel of macroeconomic policy and social capital by reducing current institutions and governments' capacity to provide basic social services and regulation. The weakened tax base may also negatively influence macroeconomic policy outcomes by worsening fiscal deficits. This channel was not further explored in this research project.

Finally, HIV/AIDS influences economic growth by means of the feedback effect. The long-term influence of the disease is carried over from one generation to another and a vicious circle emerges that could eventually cause a collapse of economic productivity. It was thus postulated that overall, HIV/AIDS has a negative influence on FDI and growth, but that through the feedback effect, the magnitude of the epidemic's influence may only be realised in the long term.

### **5.3 Conclusions on foreign direct investment, its determinants and the relationship to economic growth**

In chapter 3, the concept, distribution and determinants of FDI; in addition to the link between HIV/AIDS, FDI and economic growth, were investigated. This entailed an investigation into the effect of human capital, and health in particular, on FDI.

In the literature, FDI was defined as an investment abroad, usually where the foreign corporation controls the company being invested in (Investopedia, 2000). It can be broadly defined as either horizontal or vertical, and can also be classified into four types according to the various motives for investment: resource-, market-, efficiency- and asset-seeking FDI. Foreign direct investment may also be conducted in various ways, three of these ways are Greenfield investment, M&As, and collective investment funds.

In examining the distribution of FDI, it was concluded that although Africa is endowed with mineral wealth, FDI flows to this continent are still the smallest. Factors such as high business costs, weak governance, and poor economic growth; as well as unfavourable tax regimes, the sluggish reform of the public sector, and corruption were identified as potentially discouraging factors for foreign investors. Although the HIV/AIDS prevalence is the highest in sub-Saharan Africa, it was noted that FDI flows to this part of Africa are currently greater than FDI flows to the rest of the continent, but with Northern Africa ranking increasingly higher on the Inward FDI Performance Index (based on the value of FDI inflows).

The determinants of FDI, were explored first through the eclectic OLI paradigm which has three sets of determinants: ownership-specific advantages, location-specific advantages, and internalisation advantages. The first and last set of determinants are firm-specific, while the location-specific advantages are country-specific. As HIV/AIDS is a location-specific determinant of FDI, the remainder of the research focussed on this determinant. It was also argued that the importance of these determinants will depend on the type of FDI, but because of the lack of available data, no distinction was made between the different types of FDI. The conclusions reached concerning the determinants of FDI are subsequently reviewed.

#### **5.3.1 Influence of HIV/AIDS on the determinants of foreign direct investment**

According to UNCTAD's Investment Compass, there are six major areas of determinants, namely resource assets, infrastructure, operating costs, economic performance and governance, taxation and incentives, and regulatory framework. The subsequent paragraphs conclude the influence of HIV/AIDS on each of these areas.

Under the first area (resource assets), it was hypothesized that HIV/AIDS may exert an influence on a country's human capital, the exploitation of natural resources, and the market size of a country.

Under the second area (infrastructure), it was hypothesized that HIV/AIDS may indirectly influence the development of infrastructure by decreasing government income, and private and public savings.

Under the third area (operating costs), it was hypothesized that HIV/AIDS may increase extra costs for businesses.

Under the fourth area (economic performance and governance), it was hypothesized that HIV/AIDS may negatively influence the macroeconomic performance of a country by placing pressure on government's finances and the governance of a country, by causing a decrease in the country's HDI ranking.

Under the fifth area (taxation and incentives), it was hypothesized that an indirect relation may exist between HIV/AIDS and the tax system of a country, as governments may want to increase business and individual taxes to cover increased government spending.

Under the last area (regulatory framework), no direct or indirect influence of HIV/AIDS on this area was suggested.

Additional determinants of FDI were identified and some of the previously mentioned determinants were discussed in more detail, such as the effect of geography, human capital in terms of skills and education, and health, on FDI. As described in section 5.1, the effect of poor health (and therefore HIV/AIDS) on FDI may be negative. Naudé and Krugell (2003) agree that the negative influence of HIV/AIDS on FDI may be through the human capital accumulation channel.

### **5.3.2 The influence of foreign direct investment on economic growth**

The controversial arguments circulating around the link between FDI and economic growth were reviewed as it is postulated that FDI leads to growth and that the effect of HIV/AIDS on the economy will be felt most severely in the economic growth rate of the country. The majority of studies find a definite positive relationship between FDI and growth, although this relationship may be bi-directional. In this research project, it was concluded that the two channels through which FDI influences growth are directly through an increase in capital stock and the subsequent capital flows, and indirectly through spill-over effects.

#### **5.4 Results from the empirical analysis**

Chapter 4 reported the results of the empirical analysis, which tested the influence that HIV/AIDS has on human capital and FDI via regression analysis. Data (mainly obtained from the World Bank Development Indicators) from thirty-nine African countries was used and two cross-sections were compiled – one for the period of 1999 to 2003, and the other for the period of 2001 to 2005.

First, the influence of HIV/AIDS on human capital was estimated using the secondary school enrolment as the dependent variable for the human capital equation. The results showed that HIV/AIDS has a significant negative influence on human capital in African countries.

Second, two human capital indicators were constructed from the regressed equation. These human capital indicators were introduced in the two types of FDI models. The results showed that the influence of these human capital indicators is negative, although significant. This negative sign of the human capital indicators is in contrast to the expected influence that human capital has on FDI and growth, but it was reasoned that Africa FDI mainly attract resource- and market-seeking FDI that do not require high quality human capital. Conversely, efficiency-seeking FDI requires a higher quality human capital for investment and it is possible to believe that investors do not seek African countries as a destination for efficiency-seeking FDI.

When the dependent variable is the fraction of FDI that a country receives relative to other African countries, the sign of the human capital variable is positive and in many cases, it is significant. This may be an indication that although human capital may not be so important when choosing to invest in Africa, it becomes important when choosing between various African countries.

It should be noted that when introducing HIV/AIDS prevalence on its own in the FDI regression equations, it is not significant. The same can be said about the HDI, which can be seen as a proxy for health. Therefore, this research project concludes that the main channel through which HIV/AIDS influences FDI is human capital. This conclusion corroborates the notion put forward by Naudé and Krugell (2003).

#### **5.5 Recommendations for future research**

Based on the results of this research project, the following recommendations are made. Firstly, it was concluded that HIV/AIDS influences the human capital of a country negatively. Accordingly, more could be done in order to restrict the spread of the disease and treat people with HIV/AIDS in order for human capital to be preserved in Africa.

Secondly, the notion that human capital is important for efficiency-seeking investors, but not for resource- and market-seeking investors was reinforced. Yet, it was concluded that although human capital is not important for an investor's initial decision to invest in Africa, it is important for an investor's choice between the different African countries. In order for Africa to compete with other developing regions worldwide, it should be able to attract all forms of FDI, including efficiency-seeking FDI. If not, it will always lag behind other developing regions in terms of FDI growth and eventually also economic growth. Therefore, it is recommended that African countries focus more efforts on developing human capital on the continent, and promote a more positive image of human capital, as HIV/AIDS influences FDI particularly through the channel of human capital accumulation.

In terms of policy recommendations, human capital could be promoted through government initiatives to improve skills, child educational support, and better access to improve secondary school enrolment for African countries, in order to compete with the rest of the world for FDI. Government campaigns to inhibit the proliferation of HIV/AIDS and improve overall health of citizens could be reinforced and enough funds could be dedicated to the research and development of treatments, and possibly a cure for this epidemic.

For further studies on the influence of HIV/AIDS on FDI, a cross-sectional study including all the developing nations, and not just Africa, is recommended. Other developing countries attract a greater proportion of FDI flows than Africa and are more likely to attract efficiency-seeking FDI, compared to Africa. The results of such a study could be used to confirm the results of current research. Future research on the effect of HIV/AIDS on the economy could also be conducted, taking into consideration that the disease not only influences human capital accumulation, but also the health and productivity of workers and the attraction of investment for physical capital accumulation.

A constraint identified in this research project, is the reliability and accuracy of the HIV/AIDS data in African countries. African governments could establish more efficient ways of gathering data on HIV/AIDS prevalence, and more importantly, the stigma surrounding the disease could be addressed, in order to encourage people to come forward and have themselves tested. For this to happen, people need to be educated about the disease and accept the reality of HIV infection and the economic and social results of living with and dying from AIDS.

## **5.6 Summary**

This research aimed to investigate the influence of HIV/AIDS on FDI flows to African countries in specific. It was concluded that the HIV/AIDS epidemic kills millions of people and deteriorates the standard of living for those infected. African countries have the highest HIV/AIDS prevalence rates. It was confirmed that bad population health has a negative influence on FDI, and after examining the

trends in FDI distribution to Africa, it was suggested that the high prevalence rate may be one of the reasons for Africa's low share of FDI flows.

The reason why the study of the influence of HIV/AIDS on FDI is important is because of the benefits that FDI hold for a country. In order for this research to reach its aim, the following objectives were set: (i) to explore the characteristics of HIV/AIDS, the current trends and statistics of the epidemic, and its effect on the economy in whole; (ii) to investigate the concept, distribution, and determinants of FDI, as well as the link between HIV/AIDS, FDI and economic growth, (iii) to test the influence of HIV/AIDS on FDI inflows to Africa through regression analysis.

The conclusions of this research may be summarised as follows:

- (i) HIV/AIDS has a definite negative influence on human capital, as was established through the regression of the human capital indicators.
- (ii) Africa attracts mainly resource- and market-seeking FDI, that do not require a high quality of human capital. This justifies the negative, but statistically insignificant, human capital indicator, when FDI inflows as proportion of that country's GDP is the dependent variable.
- (iii) Human capital becomes important when choosing between the various African countries, although it is not important for the initial choice to invest in Africa. This justifies the positive and statistically significant human capital indicator, when FDI inflows to a country proportionately to FDI inflows to Africa is the dependent variable.

Some recommendations for future research on the influence of HIV/AIDS on FDI, include

- (i) a cross-sectional study on all developing nations. The reason for this is that other developing countries attract the greatest proportion of FDI flows to developing countries. The results of such a study could confirm the results of this research; and
- (ii) further research on the effect of HIV/AIDS on the economy, taking into consideration that the disease not only influence human capital accumulation, but also the health and productivity of workers, and the attraction of investment for physical capital accumulation.

## Appendix

**Table A1: HUMANCAP1 regression results for the period 1999 to 2003**

Dependent Variable: LSECSCCH				
Method: Least Squares				
Date: 04/14/08 Time: 10:48				
Sample: 1 39				
Included observations: 25				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-4.03599	1.537266	-2.62544	0.0154
LHIV_AIDS	-0.17676	0.072615	-2.43416	0.0235
LLITR	1.811478	0.37717	4.802814	0.0001
R-squared	0.528674	Mean dependent var		3.211667
Adjusted R-squared	0.485826	S.D. dependent var		0.784693
S.E. of regression	0.562671	Akaike info criterion		1.799923
Sum squared resid	6.965167	Schwarz criterion		1.946188
Log likelihood	-19.499	F-statistic		0.000255

**Table A2: HUMANCAP1 regression results for the period 2001 to 2005**

Dependent Variable: LSECSCCH				
Method: Least Squares				
Date: 04/14/08 Time: 11:21				
Sample: 1 39				
Included observations: 26				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.65822	1.187823	-2.23789	0.0352
LHIV_AIDS	-0.13521	0.064758	-2.08796	0.0481
LLITR	1.485579	0.292972	5.070716	0
R-squared	0.53985	Mean dependent var		3.250604
Adjusted R-squared	0.499837	S.D. dependent var		0.737084
S.E. of regression	0.521283	Akaike info criterion		1.643118
Sum squared resid	6.249916	Schwarz criterion		1.788283
Log likelihood	-18.3605	F-statistic		0.000133

**Table A3: HUMANCAP2 regression results for the period 1999 to 2003**

Dependent Variable: LSECSCCH				
Method: Least Squares				
Date: 04/15/08 Time: 08:48				
Sample: 1 39				
Included observations: 27				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.691613	0.374031	12.54337	0
LHIV_AIDS	-0.14624	0.07794	-1.87631	0.0728
LPOPG	-61.0645	14.99415	-4.07256	0.0004

R-squared	0.429436	Mean dependent var	3.184734
Adjusted R-squared	0.381889	S.D. dependent var	0.783438
S.E. of regression	0.615939	Akaike info criterion	1.973102
Sum squared resid	9.105143	Schwarz criterion	2.117084
Log likelihood	-23.6369	F-statistic	0.00119

**Table A4: HUMANCAP2 regression results for the period 2001 to 2005**

Dependent Variable: LSECSCCH				
Method: Least Squares				
Date: 04/15/08 Time: 08:34				
Sample: 1 39				
Included observations: 28				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.557206	0.292419	15.58452	0
LHIV_AIDS	-0.16465	0.06998	-2.35276	0.0268
LPOPG	-55.3445	11.67551	-4.74022	0.0001
R-squared	0.487211	Mean dependent var		3.228008
Adjusted R-squared	0.446188	S.D. dependent var		0.744301
S.E. of regression	0.553898	Akaike info criterion		1.757285
Sum squared resid	7.670076	Schwarz criterion		1.900021
Log likelihood	-21.602	F-statistic		0.000237

**Table A5: Regression results for equation (a) type 1 FDI models (including HUMANCAP1) for the period 1999 to 2003**

Dependent Variable: LFDI				
Method: Least Squares				
Date: 04/16/08 Time: 13:13				
Sample: 1 39				
Included observations: 33				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-5.524876	1.651502	-3.345364	0.0024
HUMANCAP1	-1.314697	0.70932	-1.853462	0.0748
LFIXCAP	0.870204	0.619909	1.403761	0.1718
LGDPFCG	6.938076	10.86469	0.638589	0.5285
VOICE	-0.393859	0.218178	-1.805218	0.0822
LTRADE	0.64313	0.379038	1.696743	0.1012
R-squared	0.410054	Mean dependent var		0.88505
Adjusted R-squared	0.300805	S.D. dependent var		0.91919
S.E. of regression	0.768607	Akaike info criterion		2.47449
Sum squared resid	15.95042	Schwarz criterion		2.74658
Log likelihood	-34.8291	F-statistic		3.75339
Durbin-Watson stat	1.594306	Prob(F-statistic)		0.01041

**Table A6: Regression results for equation (b) type 1 FDI models (including HUMANCAP1) for the period 1999 to 2003**

Dependent Variable: LFDI				
Method: Least Squares				
Date: 04/16/08 Time: 12:42				
Sample: 1 39				
Included observations: 33				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-6.552828	1.527656	-4.28947	0.0002
HUMANCAP1	-1.093126	0.736332	-1.48456	0.1497
LEXPORT	0.3727	0.295638	1.260661	0.2186
LGDPPCG	10.26006	9.178607	1.117823	0.2739
LTIME_BUS	0.626354	0.25252	2.480419	0.0199
LFIXCAP	0.906567	0.505392	1.793791	0.0845
VOICE	-0.388635	0.187442	-2.07336	0.0482
R-squared	0.535357	Mean dependent var		0.885
Adjusted R-squared	0.428132	S.D. dependent var		0.9192
S.E. of regression	0.695109	Akaike info criterion		2.2963
Sum squared resid	12.5626	Schwarz criterion		2.6138
Log likelihood	-30.88954	F-statistic		4.9928
Durbin-Watson stat	1.522927	Prob(F-statistic)		0.0016

**Table A7: Regression results for equation (c) type 1 FDI models (including HUMANCAP1) for the period 1999 to 2003**

Dependent Variable: LFDI				
Method: Least Squares				
Date: 04/16/08 Time: 12:55				
Sample: 1 39				
Included observations: 23				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-3.610577	1.677523	-2.15233	0.047
HUMANCAP1	-3.084889	0.993906	-3.1038	0.0068
LEXPORT	0.128122	0.35569	0.360206	0.7234
LGDPPCG	15.17754	9.068493	1.673656	0.1136
LTIME_BUS	0.228835	0.350034	0.653751	0.5226
LUNEMPL	0.41863	0.179381	2.333752	0.033
VOICE	-0.08686	0.24222	-0.3586	0.7246
R-squared	0.610004	Mean dependent var		0.7783
Adjusted R-squared	0.463756	S.D. dependent var		0.935
S.E. of regression	0.684704	Akaike info criterion		2.3261
Sum squared resid	7.501118	Schwarz criterion		2.6717
Log likelihood	-19.7505	F-statistic		4.171
Durbin-Watson stat	1.956089	Prob(F-statistic)		0.0103

**Table A8: Regression results for equation (d) type 1 FDI models (including HUMANCAP1) for the period 1999 to 2003**

Dependent Variable: LFDI				
Method: Least Squares				
Date: 04/16/08 Time: 12:45				
Sample: 1 39				
Included observations: 23				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-3.895919	1.80307	-2.16071	0.0462
HUMANCAP1	-2.969865	0.969504	-3.06328	0.0074
LTRADE	0.194969	0.363268	0.53671	0.5989
LGDPPCG	15.91064	9.133878	1.741937	0.1007
LTIME_BUS	0.225661	0.347434	0.649507	0.5252
VOICE	-0.115035	0.251275	-0.45781	0.6532
LUNEMPL	0.405037	0.177283	2.284685	0.0363
R-squared	0.613795	Mean dependent var		0.7783
Adjusted R-squared	0.468968	S.D. dependent var		0.935
S.E. of regression	0.681369	Akaike info criterion		2.3164
Sum squared resid	7.428212	Schwarz criterion		2.6619
Log likelihood	-19.63818	F-statistic		4.2381
Durbin-Watson stat	1.995616	Prob(F-statistic)		0.0096

**Table A9: Regression results for equation (e) type 1 FDI models (including HUMANCAP1) for the period 1999 to 2003**

Dependent Variable: LFDI				
Method: Least Squares				
Date: 04/16/08 Time: 13:16				
Sample: 1 39				
Included observations: 32				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-3.89617	1.179998	-3.30184	0.0028
HUMANCAP1	-1.607879	0.736563	-2.18295	0.0383
LEXPORT	0.771866	0.255447	3.021628	0.0056
LGDPPCG	7.570536	2.867823	2.63982	0.0138
LCBSP	0.418155	0.13545	3.087164	0.0048
LPOPG	-31.18976	18.7505	-1.66341	0.1082
R-squared	0.602552	Mean dependent var		0.9529
Adjusted R-squared	0.526119	S.D. dependent var		1.0269
S.E. of regression	0.706879	Akaike info criterion		2.3114
Sum squared resid	12.99163	Schwarz criterion		2.5863
Log likelihood	-30.98315	F-statistic		7.8835
Durbin-Watson stat	1.813864	Prob(F-statistic)		0.0001

**Table A10: Regression results for equation (f) type 1 FDI models (including HUMANCAP1) for the period 1999 to 2003**

Dependent Variable: LFDI				
Method: Least Squares				
Date: 04/16/08 Time: 13:19				
Sample: 1 39				
Included observations: 32				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-4.888791	1.330561	-3.67423	0.0011
HUMANCAP1	-1.105197	0.694992	-1.59023	0.1239
LTRADE	0.952165	0.28092	3.389458	0.0022
LGDPCCG	7.563285	2.756366	2.743934	0.0109
LCBSP	0.396591	0.131495	3.016017	0.0057
LPOPG	-29.37242	18.19679	-1.61415	0.1186
R-squared	0.627553	Mean dependent var		0.9529
Adjusted R-squared	0.555929	S.D. dependent var		1.0269
S.E. of regression	0.684285	Akaike info criterion		2.2465
Sum squared resid	12.1744	Schwarz criterion		2.5213
Log likelihood	-29.94362	F-statistic		8.7617
Durbin-Watson stat	1.543981	Prob(F-statistic)		6E-05

**Table A11: Regression results for equation (a) type 1 FDI models (including HUMANCAP2) for the period 1999 to 2003**

Dependent Variable: LFDI				
Method: Least Squares				
Date: 04/16/08 Time: 13:14				
Sample: 1 39				
Included observations: 37				
White Heteroskedasticity-Consistent Standard Errors & Covariance				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-3.7255	1.663356	-2.23975	0.0324
HUMANCAP2	-0.29481	0.381686	-0.77238	0.4457
LFIXCAP	0.88648	0.562742	1.575287	0.1253
LGDPCCG	8.705274	4.322851	2.013781	0.0528
VOICE	-0.33895	0.175711	-1.929	0.0629
LTRADE	0.630486	0.357323	1.76447	0.0875
R-squared	0.353832	Mean dependent var		0.839339
Adjusted R-squared	0.249611	S.D. dependent var		0.945045
S.E. of regression	0.818645	Akaike info criterion		2.585062
Sum squared resid	20.77558	Schwarz criterion		2.846292
Log likelihood	-41.8236	F-statistic		3.395027
Durbin-Watson stat	1.651396	Prob(F-statistic)		0.014642

**Table A12: Regression results for equation (b) type 1 FDI models (including HUMANCAP2) for the period 1999 to 2003**

Dependent Variable: LFDI				
Method: Least Squares				
Date: 04/16/08 Time: 12:43				
Sample: 1 39				
Included observations: 37				
White Heteroskedasticity-Consistent Standard Errors & Covariance				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-4.33588	1.748575	-2.47966	0.019
HUMANCAP2	-0.35011	0.306759	-1.14132	0.2628
LEXPORT	0.466503	0.24532	1.901608	0.0669
LGDPCCG	11.15532	5.334419	2.091196	0.0451
LTIME_BUS	0.429956	0.304678	1.411181	0.1685
LFIXCAP	0.932598	0.498094	1.872332	0.0709
VOICE	-0.32321	0.174435	-1.85287	0.0738
R-squared	0.423628	Mean dependent var		0.839339
Adjusted R-squared	0.308353	S.D. dependent var		0.945045
S.E. of regression	0.78595	Akaike info criterion		2.52481
Sum squared resid	18.53151	Schwarz criterion		2.829578
Log likelihood	-39.709	F-statistic		3.674947
Durbin-Watson stat	1.782976	Prob(F-statistic)		0.007435

**Table A13: Regression results for equation (c) type 1 FDI models (including HUMANCAP2) for the period 1999 to 2003**

Dependent Variable: LFDI				
Method: Least Squares				
Date: 04/16/08 Time: 12:56				
Sample: 1 39				
Included observations: 24				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.50456	2.275015	-0.66134	0.5173
HUMANCAP2	-0.42261	0.384642	-1.09871	0.2872
LEXPORT	0.186909	0.441977	0.422893	0.6777
LGDPCCG	23.92338	11.22379	2.13149	0.0479
LTIME_BUS	0.562905	0.423117	1.330377	0.201
LUNEMPL	0.201881	0.223429	0.903557	0.3789
VOICE	-0.12277	0.314025	-0.39095	0.7007
R-squared	0.38536	Mean dependent var		0.713556
Adjusted R-squared	0.168429	S.D. dependent var		0.967951
S.E. of regression	0.88268	Akaike info criterion		2.826784
Sum squared resid	13.2451	Schwarz criterion		3.170383
Log likelihood	-26.9214	F-statistic		1.776414
Durbin-Watson stat	2.712104	Prob(F-statistic)		0.164022

**Table A14: Regression results for equation (d) type 1 FDI models (including HUMANCAP2) for the period 1999 to 2003**

Dependent Variable: LFDI				
Method: Least Squares				
Date: 04/16/08 Time: 12:52				
Sample: 1 39				
Included observations: 24				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.49909	2.529258	-0.98807	0.337
HUMANCAP2	-0.39897	0.369555	-1.07959	0.2954
LTRADE	0.420537	0.45297	0.928399	0.3662
LGDPCCG	25.07603	11.06054	2.26716	0.0367
LTIME_BUS	0.523605	0.417671	1.253629	0.2269
VOICE	-0.19984	0.321021	-0.6225	0.5419
LUNEMPL	0.162598	0.215804	0.753452	0.4615
R-squared	0.408866	Mean dependent var		0.713556
Adjusted R-squared	0.20023	S.D. dependent var		0.967951
S.E. of regression	0.865637	Akaike info criterion		2.787791
Sum squared resid	12.73857	Schwarz criterion		3.13139
Log likelihood	-26.4535	F-statistic		1.959713
Durbin-Watson stat	2.489349	Prob(F-statistic)		0.128681

**Table A15: Regression results for equation (e) type 1 FDI models (including HUMANCAP2) for the period 1999 to 2003**

Dependent Variable: LFDI				
Method: Least Squares				
Date: 04/16/08 Time: 10:42				
Sample: 1 39				
Included observations: 36				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-3.42815	1.58474	-2.16322	0.0384
HUMANCAP2	0.089375	0.318117	0.280951	0.7806
LEXPORT	0.811772	0.265919	3.052702	0.0046
LGDPCCG	6.897299	3.194719	2.158969	0.0387
LCBSP	0.293654	0.145231	2.021976	0.0519
R-squared	0.45789	Mean dependent var		0.898405
Adjusted R-squared	0.38794	S.D. dependent var		1.042261
S.E. of regression	0.815405	Akaike info criterion		2.557983
Sum squared resid	20.61146	Schwarz criterion		2.777916
Log likelihood	-41.0437	F-statistic		6.545988
Durbin-Watson stat	2.12535	Prob(F-statistic)		0.000612

**Table A16: Regression results for equation (f) type 1 FDI models (including HUMANCAP2) for the period 1999 to 2003**

Dependent Variable: LFDI				
Method: Least Squares				
Date: 04/16/08 Time: 13:21				
Sample: 1 39				
Included observations: 36				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-5.26141	1.782771	-2.95126	0.006
HUMANCAP2	0.164481	0.303483	0.541976	0.5917
LTRADE	1.043392	0.298909	3.490674	0.0015
LGDPPCG	7.246458	3.037447	2.385707	0.0233
LCBSP	0.2845	0.140137	2.030155	0.051
R-squared	0.493865	Mean dependent var		0.898405
Adjusted R-squared	0.428557	S.D. dependent var		1.042261
S.E. of regression	0.787885	Akaike info criterion		2.489317
Sum squared resid	19.24365	Schwarz criterion		2.70925
Log likelihood	-39.8077	F-statistic		7.562125
Durbin-Watson stat	1.566366	Prob(F-statistic)		0.000226

**Table A17: Regression results for equation (a) type 1 FDI models (including HUMANCAP1) for the period 2001 to 2005**

Dependent Variable: LFDI				
Method: Least Squares				
Date: 04/16/08 Time: 10:10				
Sample: 1 39				
Included observations: 37				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-3.37954	1.472765	-2.29469	0.0287
HUMANCAP1	-0.56251	0.24586	-2.28794	0.0291
LFIXCAP	1.367884	0.45944	2.977286	0.0056
LGDPPCG	7.040828	3.534119	1.992244	0.0552
VOICE	-0.5227	0.181357	-2.88216	0.0071
LTRADE	0.318284	0.324903	0.97963	0.3349
R-squared	0.607893	Mean dependent var		0.795756
Adjusted R-squared	0.54465	S.D. dependent var		1.093486
S.E. of regression	0.73788	Akaike info criterion		2.377323
Sum squared resid	16.87848	Schwarz criterion		2.638553
Log likelihood	-37.9805	F-statistic		9.612006
Durbin-Watson stat	1.955021	Prob(F-statistic)		0.000013

**Table A18: Regression results for equation (b) type 1 FDI models (including HUMANCAP1) for the period 2001 to 2005**

Dependent Variable: LFDI				
Method: Least Squares				
Date: 04/16/08 Time: 09:56				
Sample: 1 39				
Included observations: 37				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-3.55454	1.462138	-2.43106	0.0212
HUMANCAP1	-0.59429	0.248968	-2.387	0.0235
LEXPORT	0.35712	0.247783	1.441262	0.1599
LGDPPCG	6.630819	3.424335	1.936381	0.0623
LTIME_BUS	0.177809	0.198682	0.894942	0.3779
LFIXCAP	1.288646	0.430827	2.991101	0.0055
VOICE	-0.49138	0.180148	-2.72763	0.0106
R-squared	0.643933	Mean dependent var		0.795756
Adjusted R-squared	0.572719	S.D. dependent var		1.093486
S.E. of regression	0.714776	Akaike info criterion		2.334962
Sum squared resid	15.32713	Schwarz criterion		2.63973
Log likelihood	-36.1968	F-statistic		9.042282
Durbin-Watson stat	2.024958	Prob(F-statistic)		0.000011

**Table A19: Regression results for equation (c) type 1 FDI models (including HUMANCAP1) for the period 2001 to 2005**

Dependent Variable: LFDI				
Method: Least Squares				
Date: 04/16/08 Time: 09:59				
Sample: 1 39				
Included observations: 20				
White Heteroskedasticity-Consistent Standard Errors & Covariance				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.018794	1.419531	1.422156	0.1785
HUMANCAP1	-0.79544	0.258431	-3.07795	0.0088
LEXPORT	0.320784	0.432428	0.74182	0.4714
LGDPPCG	18.0129	6.500897	2.770833	0.0159
LTIME_BUS	-0.16167	0.278745	-0.58	0.5718
LUNEMPL	0.076612	0.199356	0.384296	0.707
VOICE	-0.43376	0.208671	-2.0787	0.058
R-squared	0.68751	Mean dependent var		0.659338
Adjusted R-squared	0.543284	S.D. dependent var		0.967405
S.E. of regression	0.653779	Akaike info criterion		2.257123
Sum squared resid	5.556556	Schwarz criterion		2.60563
Log likelihood	-15.5712	F-statistic		4.766893
Durbin-Watson stat	0.875123	Prob(F-statistic)		0.008844

**Table A20: Regression results for equation (d) type 1 FDI models (including HUMANCAP1) for the period 2001 to 2005**

Dependent Variable: LFDI				
Method: Least Squares				
Date: 04/16/08 Time: 09:04				
Sample: 1 39				
Included observations: 20				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.915236	2.240862	0.854688	0.4082
HUMANCAP1	-0.70988	0.348372	-2.03771	0.0625
LTRADE	0.095315	0.485735	0.196228	0.8475
LGDPPCG	20.73718	7.747727	2.676551	0.019
LTIME_BUS	-0.07808	0.300474	-0.25984	0.7991
VOICE	-0.41452	0.239187	-1.73305	0.1067
LUNEMPL	0.14083	0.169519	0.830764	0.4211
R-squared	0.675507	Mean dependent var		0.659338
Adjusted R-squared	0.52574	S.D. dependent var		0.967405
S.E. of regression	0.666218	Akaike info criterion		2.294817
Sum squared resid	5.77	Schwarz criterion		2.643323
Log likelihood	-15.9482	F-statistic		4.510407
Durbin-Watson stat	1.08443	Prob(F-statistic)		0.010982

**Table A21: Regression results for equation (e) type 1 FDI models (including HUMANCAP1) for the period 2001 to 2005**

Dependent Variable: LFDI				
Method: Least Squares				
Date: 04/16/08 Time: 10:46				
Sample: 1 39				
Included observations: 37				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.296721	1.538459	0.192869	0.8483
HUMANCAP1	-0.53069	0.315873	-1.68006	0.103
LEXPORT	0.519563	0.27826	1.867184	0.0714
LGDPPCG	13.12198	3.475836	3.7752	0.0007
LCBSP	0.092834	0.104981	0.884292	0.3833
LPOPG	-11.8981	20.39915	-0.58327	0.5639
R-squared	0.477955	Mean dependent var		0.795756
Adjusted R-squared	0.393754	S.D. dependent var		1.093486
S.E. of regression	0.851408	Akaike info criterion		2.663542
Sum squared resid	22.47175	Schwarz criterion		2.924772
Log likelihood	-43.2755	F-statistic		5.676361
Durbin-Watson stat	2.334197	Prob(F-statistic)		0.000791

**Table A22: Regression results for equation (f) type 1 FDI models (including HUMANCAP1) for the period 2001 to 2005**

Dependent Variable: LFDI				
Method: Least Squares				
Date: 04/16/08 Time: 12:24				
Sample: 1 39				
Included observations: 37				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.70324	2.094672	-0.33573	0.7393
HUMANCAP1	-0.46044	0.317675	-1.44941	0.1573
LTRADE	0.573142	0.36815	1.556819	0.1297
LGDPPCG	13.43307	3.529121	3.806351	0.0006
LCBSP	0.13484	0.105381	1.279543	0.2102
LPOPG	-14.1203	20.68129	-0.68276	0.4998
R-squared	0.461356	Mean dependent var		0.795756
Adjusted R-squared	0.374478	S.D. dependent var		1.093486
S.E. of regression	0.864837	Akaike info criterion		2.694842
Sum squared resid	23.18623	Schwarz criterion		2.956072
Log likelihood	-43.8546	F-statistic		5.310393
Durbin-Watson stat	2.285207	Prob(F-statistic)		0.001226

**Table A23: Regression results for equation (g) type 1 FDI models (including HUMANCAP1) for the period 2001 to 2005**

Dependent Variable: LFDI				
Method: Least Squares				
Date: 04/16/08 Time: 10:12				
Sample: 1 39				
Included observations: 37				
White Heteroskedasticity-Consistent Standard Errors & Covariance				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-3.04892	1.856748	-1.64208	0.1114
HUMANCAP1	-0.58061	0.222259	-2.6123	0.0141
LTRADE	0.085256	0.34556	0.246717	0.8069
LGDPPCG	7.416887	2.888904	2.567371	0.0157
LTIME_BUS	0.253826	0.185652	1.367216	0.1821
VOICE	-0.48965	0.204194	-2.39794	0.0231
LPOPG	-10.9763	14.45431	-0.75938	0.4538
LFIXCAP	1.356605	0.430029	3.154686	0.0037
R-squared	0.626372	Mean dependent var		0.795756
Adjusted R-squared	0.536186	S.D. dependent var		1.093486
S.E. of regression	0.744706	Akaike info criterion		2.437157
Sum squared resid	16.08304	Schwarz criterion		2.785463
Log likelihood	-37.0874	F-statistic		6.94533
Durbin-Watson stat	1.838129	Prob(F-statistic)		0.000069

**Table A24: Regression results for equation (h) type 1 FDI models (including HUMANCAP1) for the period 2001 to 2005**

Dependent Variable: LFDI				
Method: Least Squares				
Date: 05/14/08 Time: 14:03				
Sample: 1 39				
Included observations: 30				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.307934	1.429994	0.215339	0.8313
HUMANCAP1	-0.21894	0.32523	-0.67319	0.5073
LCBSP	0.190972	0.112856	1.692171	0.1036
LGOVCON	-0.14206	0.355607	-0.39949	0.6931
LGDPCCG	19.31519	7.205897	2.680469	0.0131
LFUELEXP	0.062266	0.068584	0.907873	0.373
R-squared	0.345418	Mean dependent var		0.486846
Adjusted R-squared	0.209046	S.D. dependent var		0.87961
S.E. of regression	0.782286	Akaike info criterion		2.523664
Sum squared resid	14.68732	Schwarz criterion		2.803904
Log likelihood	-31.855	F-statistic		2.532921
Durbin-Watson stat	1.304747	Prob(F-statistic)		0.05616

**Table A25: Regression results for equation (a) type 1 FDI models (including HUMANCAP2) for the period 2001 to 2005**

Dependent Variable: LFDI				
Method: Least Squares				
Date: 04/16/08 Time: 10:00				
Sample: 1 39				
Included observations: 39				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-4.00206	1.53541	-2.60651	0.0136
HUMANCAP2	-0.48939	0.281425	-1.73898	0.0914
LFIXCAP	1.562016	0.49627	3.147513	0.0035
LGDPCCG	5.442036	3.797691	1.432985	0.1613
VOICE	-0.44049	0.190686	-2.31002	0.0273
LTRADE	0.292744	0.333183	0.878627	0.386
R-squared	0.549702	Mean dependent var		0.825679
Adjusted R-squared	0.481475	S.D. dependent var		1.094295
S.E. of regression	0.787987	Akaike info criterion		2.501968
Sum squared resid	20.49047	Schwarz criterion		2.7579
Log likelihood	-42.7884	F-statistic		8.056971
Durbin-Watson stat	2.261633	Prob(F-statistic)		0.000047

**Table A26: Regression results for equation (b) type 1 FDI models (including HUMANCAP2) for the period 2001 to 2005**

Dependent Variable: LFDI				
Method: Least Squares				
Date: 04/16/08 Time: 10:08				
Sample: 1 39				
Included observations: 39				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-4.24338	1.545221	-2.74613	0.0098
HUMANCAP2	-0.43827	0.299433	-1.46368	0.153
LEXPORT	0.318101	0.261567	1.216137	0.2328
LGDPPCG	5.28267	3.726925	1.417434	0.166
LTIME_BUS	0.168391	0.224955	0.748553	0.4596
LFIXCAP	1.434937	0.484106	2.964096	0.0057
VOICE	-0.40978	0.190043	-2.15625	0.0387
R-squared	0.579054	Mean dependent var		0.825679
Adjusted R-squared	0.500126	S.D. dependent var		1.094295
S.E. of regression	0.773686	Akaike info criterion		2.485846
Sum squared resid	19.15486	Schwarz criterion		2.784434
Log likelihood	-41.474	F-statistic		7.336534
Durbin-Watson stat	2.515122	Prob(F-statistic)		0.000054

**Table A27: Regression results for equation (c) type 1 FDI models (including HUMANCAP2) for the period 2001 to 2005**

Dependent Variable: LFDI				
Method: Least Squares				
Date: 04/16/08 Time: 10:09				
Sample: 1 39				
Included observations: 20				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.245761	2.288551	0.544345	0.5954
HUMANCAP2	-0.69569	0.561991	-1.2379	0.2376
LEXPORT	0.441004	0.593193	0.743442	0.4704
LGDPPCG	23.29847	8.843902	2.634411	0.0206
LTIME_BUS	-0.23367	0.43069	-0.54254	0.5966
LUNEMPL	0.123862	0.209759	0.590496	0.565
VOICE	-0.49976	0.256913	-1.94526	0.0737
R-squared	0.616177	Mean dependent var		0.659338
Adjusted R-squared	0.439028	S.D. dependent var		0.967405
S.E. of regression	0.724567	Akaike info criterion		2.462733
Sum squared resid	6.824973	Schwarz criterion		2.811239
Log likelihood	-17.6273	F-statistic		3.478296
Durbin-Watson stat	0.886398	Prob(F-statistic)		0.028246

**Table A28: Regression results for equation (d) type 1 FDI models (including HUMANCAP2) for the period 2001 to 2005**

Dependent Variable: LFDI				
Method: Least Squares				
Date: 04/16/08 Time: 10:09				
Sample: 1 39				
Included observations: 20				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.579162	2.267833	0.255381	0.8024
HUMANCAP2	-0.71255	0.596756	-1.194041	0.2538
LTRADE	0.504424	0.726258	0.694553	0.4996
LGDPFCG	24.38913	8.196068	2.975711	0.0107
LTIME_BUS	-0.23392	0.445002	-0.525655	0.608
VOICE	-0.52233	0.270146	-1.933506	0.0752
LUNEMPL	0.18231	0.197444	0.923349	0.3726
R-squared	0.614176	Mean dependent var		0.659338
Adjusted R-squared	0.436103	S.D. dependent var		0.967405
S.E. of regression	0.726454	Akaike info criterion		2.467934
Sum squared resid	6.860561	Schwarz criterion		2.81644
Log likelihood	-17.6793	F-statistic		3.449014
Durbin-Watson stat	1.183396	Prob(F-statistic)		0.029068

**Table A29: Regression results for equation (e) type 1 FDI models (including HUMANCAP2) for the period 2001 to 2005**

Dependent Variable: LFDI				
Method: Least Squares				
Date: 04/16/08 Time: 10:47				
Sample: 1 39				
Included observations: 39				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.98644	1.345588	-0.7331	0.4685
HUMANCAP2	-0.24613	0.332114	-0.74111	0.4637
LEXPORT	0.573493	0.266176	2.154563	0.0384
LGDPFCG	12.13348	3.420052	3.547748	0.0012
LCBSP	0.08588	0.106205	0.808625	0.4244
R-squared	0.421344	Mean dependent var		0.825679
Adjusted R-squared	0.353267	S.D. dependent var		1.094295
S.E. of regression	0.880029	Akaike info criterion		2.701485
Sum squared resid	26.33133	Schwarz criterion		2.914762
Log likelihood	-47.679	F-statistic		6.189207
Durbin-Watson stat	2.558782	Prob(F-statistic)		0.000746

**Table A30: Regression results for equation (f) type 1 FDI models (including HUMANCAP2) for the period 2001 to 2005**

Dependent Variable: LFDI				
Method: Least Squares				
Date: 04/16/08 Time: 12:28				
Sample: 1 39				
Included observations: 39				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.08067	1.744609	-1.19263	0.2413
HUMANCAP2	-0.17355	0.332666	-0.52168	0.6053
LTRADE	0.630093	0.354179	1.779022	0.0842
LGDPPCG	12.71446	3.450063	3.685284	0.0008
LCBSP	0.123295	0.107718	1.144608	0.2604
R-squared	0.398344	Mean dependent var		0.825679
Adjusted R-squared	0.32756	S.D. dependent var		1.094295
S.E. of regression	0.897348	Akaike info criterion		2.740463
Sum squared resid	27.37794	Schwarz criterion		2.953741
Log likelihood	-48.439	F-statistic		5.627663
Durbin-Watson stat	2.335341	Prob(F-statistic)		0.001379

**Table A31: Regression results for equation (g) type 1 FDI models (including HUMANCAP2) for the period 2001 to 2005**

Dependent Variable: LFDI				
Method: Least Squares				
Date: 04/16/08 Time: 10:44				
Sample: 1 39				
Included observations: 39				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-4.49194	1.624763	-2.764672	0.0094
HUMANCAP2	-0.37189	0.3086	-1.205097	0.237
LTRADE	0.145185	0.369116	0.393331	0.6967
LGDPPCG	5.468637	3.804881	1.437269	0.1603
LTIME_BUS	0.223053	0.238149	0.936608	0.356
VOICE	-0.40574	0.194612	-2.084843	0.0451
LFIXCAP	1.528996	0.498444	3.067538	0.0044
R-squared	0.561717	Mean dependent var		0.825679
Adjusted R-squared	0.479539	S.D. dependent var		1.094295
S.E. of regression	0.789457	Akaike info criterion		2.526205
Sum squared resid	19.94374	Schwarz criterion		2.824793
Log likelihood	-42.261	F-statistic		6.83537
Durbin-Watson stat	2.348018	Prob(F-statistic)		0.000098

**Table A32: Regression results for equation (h) type 1 FDI models (including HUMANCAP2) for the period 2001 to 2005**

Dependent Variable: LFDI				
Method: Least Squares				
Date: 05/14/08 Time: 14:04				
Sample: 1 39				
Included observations: 31				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.09181	1.659791	-0.05532	0.9563
HUMANCAP2	0.050463	0.359841	0.140237	0.8896
LCBSP	0.218572	0.123215	1.773914	0.0883
LGOVCON	-0.32877	0.371455	-0.88508	0.3845
LGDPPCG	18.43882	7.986457	2.308761	0.0295
LFUELEXP	0.022888	0.072037	0.317727	0.7533
R-squared	0.281108	Mean dependent var		0.546344
Adjusted R-squared	0.13733	S.D. dependent var		0.926101
S.E. of regression	0.860162	Akaike info criterion		2.708595
Sum squared resid	18.49699	Schwarz criterion		2.98614
Log likelihood	-35.9832	F-statistic		1.955152
Durbin-Watson stat	1.438607	Prob(F-statistic)		0.120693

**Table A33: Regression results for equation (a) type 2 FDI models (including HUMANCAP1) for the period 2001 to 2005**

Dependent Variable: LFDIFLOWS				
Method: Least Squares				
Date: 04/16/08 Time: 10:29				
Sample: 1 39				
Included observations: 36				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-5.09463	3.666994	-1.38932	0.175
HUMANCAP1	0.517638	0.58944	0.878186	0.3868
LFIXCAP	1.575654	1.129493	1.39501	0.1733
LGDPPCG	5.893464	8.469094	0.695879	0.4919
VOICE	-0.23256	0.434446	-0.53531	0.5964
LTRADE	-0.50185	0.781332	-0.6423	0.5256
R-squared	0.170874	Mean dependent var		-0.33523
Adjusted R-squared	0.032687	S.D. dependent var		1.796064
S.E. of regression	1.766466	Akaike info criterion		4.126851
Sum squared resid	93.61206	Schwarz criterion		4.390771
Log likelihood	-68.2833	F-statistic		1.23654
Durbin-Watson stat	2.2305	Prob(F-statistic)		0.316771

**Table A34: Regression results for equation (b) type 2 FDI models (including HUMANCAP1) for the period 2001 to 2005**

Dependent Variable: LFDIFLOWS				
Method: Least Squares				
Date: 04/16/08 Time: 10:23				
Sample: 1 39				
Included observations: 36				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-4.90696	3.693764	-1.32844	0.1944
HUMANCAP1	0.158686	0.61958	0.256118	0.7997
LEXPORT	0.641811	0.635522	1.009896	0.3209
LGDPPCG	5.980815	8.460882	0.706878	0.4853
LTIME_BUS	-0.49083	0.493005	-0.99558	0.3277
LFIXCAP	1.106023	1.084303	1.020031	0.3161
VOICE	-0.3691	0.444437	-0.83049	0.413
R-squared	0.201303	Mean dependent var		-0.33523
Adjusted R-squared	0.036055	S.D. dependent var		1.796064
S.E. of regression	1.763388	Akaike info criterion		4.145017
Sum squared resid	90.17656	Schwarz criterion		4.452923
Log likelihood	-67.6103	F-statistic		1.218188
Durbin-Watson stat	2.445505	Prob(F-statistic)		0.325507

**Table A35: Regression results for equation (c) type 2 FDI models (including HUMANCAP1) for the period 2001 to 2005**

Dependent Variable: LFDIFLOWS				
Method: Least Squares				
Date: 04/16/08 Time: 10:26				
Sample: 1 39				
Included observations: 19				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.587604	5.894555	0.099686	0.9222
HUMANCAP1	-0.34676	0.992763	-0.34929	0.7329
LEXPORT	0.447069	1.226829	0.36441	0.7219
LGDPPCG	25.94826	25.02268	1.03699	0.3202
LTIME_BUS	-0.8428	0.864173	-0.97527	0.3487
LUNEMPL	0.616344	0.644393	0.956473	0.3577
VOICE	-0.45453	0.645841	-0.70379	0.495
R-squared	0.340282	Mean dependent var		0.184323
Adjusted R-squared	0.010423	S.D. dependent var		1.806344
S.E. of regression	1.796906	Akaike info criterion		4.287319
Sum squared resid	38.74645	Schwarz criterion		4.63527
Log likelihood	-33.7295	F-statistic		1.031598
Durbin-Watson stat	2.967931	Prob(F-statistic)		0.451233

**Table A36: Regression results for equation (d) type 2 FDI models (including HUMANCAP1) for the period 2001 to 2005**

Dependent Variable: LFDIFLOWS				
Method: Least Squares				
Date: 04/16/08 Time: 10:24				
Sample: 1 39				
Included observations: 19				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.16654	6.610573	-0.02519	0.9803
HUMANCAP1	-0.28008	0.94224	-0.29725	0.7714
LTRADE	0.46618	1.310861	0.355629	0.7283
LGDPFCG	27.26966	23.88414	1.141748	0.2758
LTIME_BUS	-0.82561	0.848895	-0.97257	0.35
VOICE	-0.46794	0.656937	-0.71231	0.4899
LUNEMPL	0.640634	0.628424	1.019428	0.3281
R-squared	0.339938	Mean dependent var		0.184323
Adjusted R-squared	0.009907	S.D. dependent var		1.806344
S.E. of regression	1.797374	Akaike info criterion		4.287841
Sum squared resid	38.76665	Schwarz criterion		4.635792
Log likelihood	-33.7345	F-statistic		1.030019
Durbin-Watson stat	3.157339	Prob(F-statistic)		0.452069

**Table A37: Regression results for equation (e) type 2 FDI models (including HUMANCAP1) for the period 2001 to 2005**

Dependent Variable: LFDIFLOWS				
Method: Least Squares				
Date: 04/16/08 Time: 10:47				
Sample: 1 39				
Included observations: 36				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-3.47667	3.117516	-1.1152	0.2736
HUMANCAP1	0.275239	0.643573	0.427674	0.6719
LEXPORT	0.397309	0.583802	0.680554	0.5014
LGDPFCG	11.30572	7.028205	1.608622	0.1182
LCBSP	0.349212	0.214267	1.629803	0.1136
LPOPG	-42.8478	41.63133	-1.02922	0.3116
R-squared	0.216477	Mean dependent var		-0.33523
Adjusted R-squared	0.08589	S.D. dependent var		1.796064
S.E. of regression	1.717201	Akaike info criterion		4.07028
Sum squared resid	88.46334	Schwarz criterion		4.3342
Log likelihood	-67.265	F-statistic		1.657719
Durbin-Watson stat	2.581525	Prob(F-statistic)		0.175363

**Table A38: Regression results for equation (f) type 2 FDI models (including HUMANCAP1) for the period 2001 to 2005**

Dependent Variable: LFDIFLOWS				
Method: Least Squares				
Date: 04/16/08 Time: 12:25				
Sample: 1 39				
Included observations: 36				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.42627	4.205757	-0.33912	0.7369
HUMANCAP1	0.360431	0.638332	0.564645	0.5765
LTRADE	-0.20916	0.74728	-0.2799	0.7815
LGDPGCG	13.16753	7.087798	1.857775	0.073
LCBSP	0.36013	0.215187	1.673571	0.1046
LPOPG	-54.6557	42.04836	-1.29983	0.2036
R-squared	0.206453	Mean dependent var		-0.33523
Adjusted R-squared	0.074195	S.D. dependent var		1.796064
S.E. of regression	1.72815	Akaike info criterion		4.082992
Sum squared resid	89.5951	Schwarz criterion		4.346912
Log likelihood	-67.4939	F-statistic		1.560987
Durbin-Watson stat	2.518842	Prob(F-statistic)		0.201251

**Table A39: Regression results for equation (g) type 2 FDI models (including HUMANCAP1) for the period 2001 to 2005**

Dependent Variable: LFDIFLOWS				
Method: Least Squares				
Date: 04/16/08 Time: 10:27				
Sample: 1 39				
Included observations: 36				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.91161	5.060585	-0.57535	0.5696
HUMANCAP1	0.28599	0.696515	0.410602	0.6845
LTRADE	-0.47679	0.934248	-0.51035	0.6138
LGDPGCG	7.371892	9.023138	0.816999	0.4208
LTIME_BUS	-0.18638	0.543121	-0.34317	0.734
VOICE	-0.32094	0.465256	-0.68981	0.496
LPOPG	-23.4846	44.50887	-0.52764	0.6019
LFXCAP	1.438447	1.17747	1.221643	0.232
R-squared	0.185199	Mean dependent var		-0.33523
Adjusted R-squared	-0.0185	S.D. dependent var		1.796064
S.E. of regression	1.812602	Akaike info criterion		4.220534
Sum squared resid	91.99477	Schwarz criterion		4.572427
Log likelihood	-67.9696	F-statistic		0.909173
Durbin-Watson stat	2.238424	Prob(F-statistic)		0.513692

**Table A40: Regression results for equation (h) type 2 FDI models (including HUMANCAP1) for the period 2001 to 2005**

Dependent Variable: LFDIFLOWS				
Method: Least Squares				
Date: 04/16/08 Time: 10:14				
Sample: 1 39				
Included observations: 29				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-8.43635	2.785234	-3.02895	0.006
HUMANCAP1	0.240004	0.634399	0.378317	0.7087
LCBSP	0.434165	0.223519	1.942406	0.0644
LFUELEXP	0.35847	0.133932	2.676506	0.0135
LGDPPCG	38.10771	14.51804	2.624852	0.0151
LGOVCON	1.677638	0.701726	2.39073	0.0254
R-squared	0.453217	Mean dependent var		-0.38758
Adjusted R-squared	0.334352	S.D. dependent var		1.862214
S.E. of regression	1.51933	Akaike info criterion		3.856407
Sum squared resid	53.09235	Schwarz criterion		4.139296
Log likelihood	-49.9179	F-statistic		3.81285
Durbin-Watson stat	1.3198	Prob(F-statistic)		0.01161

**Table A41: Regression results for equation (a) type 2 FDI models (including HUMANCAP2) for the period 2001 to 2005**

Dependent Variable: LFDIFLOWS				
Method: Least Squares				
Date: 04/16/08 Time: 10:29				
Sample: 1 39				
Included observations: 38				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-5.21923	3.523384	-1.481313	0.1483
HUMANCAP2	1.084891	0.616276	1.760397	0.0879
LFIXCAP	1.326011	1.110054	1.194546	0.241
LGDPPCG	10.40588	8.321071	1.250546	0.2202
VOICE	-0.31274	0.41781	-0.748519	0.4596
LTRADE	-0.77892	0.732997	-1.062653	0.2959
R-squared	0.259928	Mean dependent var		-0.480268
Adjusted R-squared	0.144292	S.D. dependent var		1.864858
S.E. of regression	1.725077	Akaike info criterion		4.07236
Sum squared resid	95.22853	Schwarz criterion		4.330926
Log likelihood	-71.3748	F-statistic		2.247808
Durbin-Watson stat	2.035492	Prob(F-statistic)		0.073426

**Table A42: Regression results for equation (b) type 2 FDI models (including HUMANCAP2) for the period 2001 to 2005**

Dependent Variable: LFDIFLOWS				
Method: Least Squares				
Date: 04/16/08 Time: 10:23				
Sample: 1 39				
Included observations: 38				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-6.43847	3.642337	-1.767677	0.087
HUMANCAP2	0.7788	0.684881	1.137133	0.2642
LEXPORT	0.407843	0.617238	0.660754	0.5137
LGDPPCG	10.51166	8.530932	1.232182	0.2271
LTIME_BUS	-0.26909	0.516703	-0.520774	0.6062
LFIXCAP	0.8748	1.126198	0.776772	0.4432
VOICE	-0.3528	0.434537	-0.811894	0.423
R-squared	0.246672	Mean dependent var		-0.480268
Adjusted R-squared	0.100867	S.D. dependent var		1.864858
S.E. of regression	1.768307	Akaike info criterion		4.142744
Sum squared resid	96.93421	Schwarz criterion		4.444405
Log likelihood	-71.7121	F-statistic		1.691792
Durbin-Watson stat	2.244468	Prob(F-statistic)		0.156231

**Table A43: Regression results for equation (c) type 2 FDI models (including HUMANCAP2) for the period 2001 to 2005**

Dependent Variable: LFDIFLOWS				
Method: Least Squares				
Date: 04/16/08 Time: 10:27				
Sample: 1 39				
Included observations: 19				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.512571	5.803621	0.605238	0.5563
HUMANCAP2	-1.51788	1.347044	-1.126826	0.2818
LEXPORT	1.377468	1.456521	0.945725	0.3629
LGDPPCG	19.57248	22.26944	0.878894	0.3967
LTIME_BUS	-1.50421	1.023151	-1.470176	0.1672
LUNEMPL	0.754089	0.626666	1.203335	0.252
VOICE	-0.59717	0.628873	-0.949589	0.3611
R-squared	0.397343	Mean dependent var		0.184323
Adjusted R-squared	0.096014	S.D. dependent var		1.806344
S.E. of regression	1.717439	Akaike info criterion		4.196856
Sum squared resid	35.39517	Schwarz criterion		4.544807
Log likelihood	-32.8701	F-statistic		1.318635
Durbin-Watson stat	2.64129	Prob(F-statistic)		0.320973

**Table A44: Regression results for equation (d) type 2 FDI models (including HUMANCAP2) for the period 2001 to 2005**

Dependent Variable: LFDIFLOWS				
Method: Least Squares				
Date: 04/16/08 Time: 10:25				
Sample: 1 39				
Included observations: 19				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.797503	5.774078	0.311306	0.7609
HUMANCAP2	-1.75507	1.39266	-1.26023	0.2315
LTRADE	1.882946	1.695261	1.110712	0.2885
LGDPPCG	18.79806	21.67471	0.867281	0.4028
LTIME_BUS	-1.68968	1.062059	-1.59094	0.1376
VOICE	-0.68826	0.640379	-1.07477	0.3036
LUNEMPL	0.844091	0.615588	1.371193	0.1954
R-squared	0.412794	Mean dependent var		0.184323
Adjusted R-squared	0.11919	S.D. dependent var		1.806344
S.E. of regression	1.695281	Akaike info criterion		4.170883
Sum squared resid	34.48771	Schwarz criterion		4.518835
Log likelihood	-32.6234	F-statistic		1.405957
Durbin-Watson stat	2.924638	Prob(F-statistic)		0.289234

**Table A45: Regression results for equation (e) type 2 FDI models (including HUMANCAP2) for the period 2001 to 2005**

Dependent Variable: LFDIFLOWS				
Method: Least Squares				
Date: 04/16/08 Time: 10:48				
Sample: 1 39				
Included observations: 38				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-8.15387	2.73221	-2.98435	0.0053
HUMANCAP2	1.467054	0.636661	2.304295	0.0276
LEXPORT	0.333639	0.526612	0.633558	0.5307
LGDPPCG	14.47771	6.510529	2.223738	0.0331
LCBSP	0.351666	0.205055	1.714986	0.0957
R-squared	0.282825	Mean dependent var		-0.480268
Adjusted R-squared	0.195895	S.D. dependent var		1.864858
S.E. of regression	1.672253	Akaike info criterion		3.988301
Sum squared resid	92.28224	Schwarz criterion		4.203772
Log likelihood	-70.7777	F-statistic		3.253472
Durbin-Watson stat	2.403821	Prob(F-statistic)		0.023504

**Table A46: Regression results for equation (f) type 2 FDI models (including HUMANCAP2) for the period 2001 to 2005**

Dependent Variable: LFDIFLOWS				
Method: Least Squares				

Date: 04/16/08 Time: 12:28				
Sample: 1 39				
Included observations: 38				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-5.97278	3.447752	-1.732369	0.0925
HUMANCAP2	1.661777	0.629115	2.641452	0.0125
LTRADE	-0.41786	0.67403	-0.619942	0.5396
LGDPPCG	16.18922	6.456558	2.507407	0.0173
LCBSP	0.347273	0.205689	1.688339	0.1008
R-squared	0.282459	Mean dependent var		-0.480268
Adjusted R-squared	0.195484	S.D. dependent var		1.864858
S.E. of regression	1.672681	Akaike info criterion		3.988812
Sum squared resid	92.32942	Schwarz criterion		4.204284
Log likelihood	-70.7874	F-statistic		3.247594
Durbin-Watson stat	2.362096	Prob(F-statistic)		0.023677

**Table A47: Regression results for equation (g) type 2 FDI models (including HUMANCAP2) for the period 2001 to 2005**

Dependent Variable: LFDIFLOWS				
Method: Least Squares				
Date: 04/16/08 Time: 10:43				
Sample: 1 39				
Included observations: 38				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-5.3931	3.743266	-1.44075	0.1597
HUMANCAP2	1.128876	0.684852	1.64835	0.1094
LTRADE	-0.83503	0.824577	-1.01267	0.3191
LGDPPCG	10.41916	8.451221	1.232858	0.2269
LTIME_BUS	0.083763	0.529439	0.158211	0.8753
VOICE	-0.29985	0.432071	-0.69399	0.4929
LFIXCAP	1.311433	1.13112	1.159411	0.2551
R-squared	0.260525	Mean dependent var		-0.48027
Adjusted R-squared	0.117401	S.D. dependent var		1.864858
S.E. of regression	1.751973	Akaike info criterion		4.124184
Sum squared resid	95.1517	Schwarz criterion		4.425845
Log likelihood	-71.3595	F-statistic		1.820274
Durbin-Watson stat	2.023404	Prob(F-statistic)		0.127522

**Table A48: Regression results for equation (h) type 2 FDI models (including HUMANCAP2) for the period 2001 to 2005**

Dependent Variable: LFDIFLOWS				
Method: Least Squares				
Date: 04/16/08 Time: 10:00				
Sample: 1 39				
Included observations: 30				
White Heteroskedasticity-Consistent Standard Errors & Covariance				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-11.8263	2.923517	-4.045236	0.0005
HUMANCAP2	1.25599	0.531326	2.36388	0.0265
LCBSP	0.524099	0.267493	1.959304	0.0618
LFUELEXP	0.369613	0.103452	3.572793	0.0015
LGDPPCG	35.63222	12.0873	2.947907	0.007
LGOVCON	1.572253	0.861895	1.824182	0.0806
R-squared	0.548277	Mean dependent var		-0.449997
Adjusted R-squared	0.454168	S.D. dependent var		1.861488
S.E. of regression	1.375275	Akaike info criterion		3.652041
Sum squared resid	45.39317	Schwarz criterion		3.932281
Log likelihood	-48.7806	F-statistic		5.825982
Durbin-Watson stat	1.545258	Prob(F-statistic)		0.001167

## References

- ALSAN, M., BLOOM, D.E. & CANNING, D. 2004. The effect of population health on foreign direct investment. *National Bureau of Economic Research. Working paper*, 10596, Jun.  
<http://www.nber.org/papers/w10596> Date of access: 31 Mar. 2007.
- ALSAN, M., BLOOM, D.E. & CANNING, D. 2006. The effect of population health on foreign direct investment inflows to low- and middle-income countries. *World development*, 34(4):613-630.
- ANKER, R. 1978. An analysis of fertility differentials in developing countries. *Review of economics and statistics*, 60(1):58-69, Feb.
- ANON. 2006. SA's population by province. [http://www.southafrica.info/ess\\_info/sa\\_glance/demographics/popprov.htm](http://www.southafrica.info/ess_info/sa_glance/demographics/popprov.htm) Date of access: 20 Feb. 2007.
- ARNDT, C. 2006. HIV/AIDS, human capital, and economic growth prospects for Mozambique. *Journal of policy modelling*, 28(5):477-489, Jul.
- ARNDT, C. & LEWIS, J.D. 2000. The macro implications of HIV/AIDS in South Africa: A preliminary assessment. *South African journal of economics*, 68(5):856-887, Dec.
- ASIEDU, E. 2002. On the determinants of foreign direct investment to developing countries: Is Africa different? *World development*, 30(1):107-119.
- BARNETT, T. & WHITESIDE, A. 1999. HIV/AIDS and development: case studies and a conceptual framework. *The European journal of development research*, 11(2):200-234, Dec.
- BARNETT, T. & WHITESIDE, A. 2000. Guidelines for the studies of the social and economic impact of HIV/AIDS. Geneva: UNAIDS.
- BARNETT, T.; WHITESIDE, A.; KHODAKEVICH, L.; KRUGLOV, Y.; & STESHENKO, V. 2000. The HIV/AIDS epidemic in Ukraine: Its potential social and economic impact. *Social science & medicine*, 51(9):1387-1403, Nov.
- BECKMANN, S. & RAI, P. 2004. HIV/AIDS + work: HIV/AIDS, work and development in the United Republic of Tanzania. Geneva: International Labour Organization. 14 p.
- BELL, C., DEVARAJAN, S. & GERSBACH, H. 2006. The long-run economic costs of AIDS: A model with an application to South Africa. *World Bank economic review*, 20(1):55-89.

- BISWAS, R. 2002. Determinants of foreign direct investment. *Review of development economics*, 6(3):492-504.
- BLONIGEN, B.A. 2005. A review of the empirical literature on FDI determinants. *Atlantic economic journal*, (33):383-403.
- BLONIGEN, B.A., DAVIES, R.B., WADDELL, G.R. & NAUGHTON, H.T. 2007. FDI in space: Spatial autoregressive relationships in foreign direct investment. *European economic review*, 51:1303-1325.
- BLOOM, D.E., SACHS, J.D., COLLIER, P. & UDRY, C. 1998. Geography, demography, and economic growth in Africa. *Brookings papers on economic activity*, 1998(2):207-295.
- BONNEL, R. 2000. HIV/AIDS and economic growth: A global perspective. *South African journal of economics*, 68(5):820-855, Dec.
- BULLERS, A.C. 2001. Living with AIDS – 20 years later. [www.fda.gov/fdac/features/2001/601\\_aids.html](http://www.fda.gov/fdac/features/2001/601_aids.html) Date of access: 22 Mar. 2007.
- CHOWDHURY, A. & MAVROTAS, G. 2006. FDI and growth: What causes what? *World economy*, 29(1):9-19, Jan.
- CORRIGAN, P., GLOMM, G. & MENDEZ, F. 2005. AIDS, human capital and growth. <http://ssrn.com/abstract=767006> Date of access: 11 May 2007.
- CRENSHAW, E. 1991. Foreign investment as a dependent variable: Determinants of foreign direct investment and capital penetration in developing nations, 1967-1978. *Social forces*, 69(4):1169-1182, Jun.
- CUDDINGTON, J.T. 1993. Modelling the macroeconomic effects of AIDS with an application to Tanzania. *World Bank economic review*, 7(2):173-189.
- DE LA CROIX, D. & DOEPKE, M. 2003. Inequality and growth: Why differential fertility matters. *American economic review*, 93(4):1091-1113, Nov.
- DIXON, S., MCDONALD, S. & ROBERTS, J. 1999. The forgotten epidemic: Charting the economic and social consequences of HIV/AIDS. *New economy*, 6(3):173-178, Sept.
- DUNNING, J.H. 1980. Towards an eclectic theory of international production: Some empirical tests. *Journal of international business studies*, 11(1):9-31, Spring/Summer.

- DUNNING, J.H. 1993. *Multinational enterprises and the global economy*. Wokingham: Addison-Wesley. 687 p.
- DUNNING, J.H. 1998. Location and the multinational enterprise: A neglected factor? *Journal of international business studies*, 29(1):45-66, Mar.
- DUNNING, J.H. 2006. The determinants of international business activity: Revising and extending the OLI paradigm. *Transnational corporations*, 15(1):173-227, Apr.
- DUPASQUIER, C. & OSAKWE, P.N. 2006. Foreign direct investment in Africa: Performance, challenges, and responsibilities. *Journal of Asian economics*, 17:241-260.
- FREDLAND, R.A. 1998. AIDS and development: an inverse correlation? *Journal of modern African studies*, 36(4):547-568.
- FROOT, K.A. & STEIN, J.C. 1991. Exchange rates and foreign direct investment: An imperfect capital market approach. *Quarterly journal of economics*, 106(4):1191-1217, Nov.
- GALLUP, J.L., SACHS, J.D. & MELLINGER, A. 1999. Geography and economic development (working paper, no. 6849, Dec.). Cambridge, Mass.: National Bureau of Economic Research.  
<http://www.nber.org/papers/w6849> Date of access: 12 Jan. 2008.
- GBPC (Global Business Policy Council). 2004. FDI confidence index. Alexandria, Va: A.T. Kearney. 44 p. [http://www.atkearney.com/shared\\_res/pdf/FDICIOct\\_2004\\_S.pdf](http://www.atkearney.com/shared_res/pdf/FDICIOct_2004_S.pdf) Date of access: 10 Apr. 2007.
- GBPC (Global Business Policy Council). 2005. FDI confidence index. Alexandria, Va: A.T. Kearney. 40 p. [http://www.atkearney.com/shared\\_res/pdf/FDICI\\_2005.pdf](http://www.atkearney.com/shared_res/pdf/FDICI_2005.pdf) Date of access: 1 Sept. 2007.
- GREENER, R., JEFFERIS, K. & SIPHAMBE, H. 2000. The impact of HIV/AIDS on poverty and inequality in Botswana. *South African journal of economics*, 68(5):888-915, Dec.
- GRIES, T. 2005. Endogenous formation of regions in developing countries. *Journal of development perspectives*, 1(1):29-62, Sept.
- GUJARATI, D.M. 2003. *Basic Econometrics*. 4<sup>th</sup> ed. Boston, Mass.: McGraw-Hill. 1001 p.
- HANSEN, H. & RAND, J. 2006. On the causal links between FDI and growth in developing countries. *World economy*, 29(1):21-41, Jan.

- INVESTOPEDIA. 2000. Foreign direct investment. (*In Investopedia. Investment dictionary.*)  
<http://www.answers.com/topic/foreign-direct-investment> Date of access: 23 Jul. 2007.
- JANSEN, K. 1995. The macroeconomic effects of direct foreign investment: The case of Thailand. *World development*, 23(2):193-210.
- KAMBOU, G., DEVARAJAN, S. & OVER, M. 1992. The economic impact of AIDS in an African country: Simulations with a general equilibrium model of Cameroon. *Journal of African economies*, 1(1):103-130.
- KUGLER, M. 2006. Spillovers from foreign direct investment: Within or between industries? *Journal of development economics*, 80:444-477.
- LARSON, A. 1990. The social epidemiology of Africa's Aids epidemic. *African affairs*, 89(354):5-25, Jan.
- LEE, G. 2006. The effectiveness of international knowledge spillover channels. *European economic review*, 50:2075-2088.
- LENSINK, R. & MORRISSEY, O. 2006. Foreign direct investment: Flows, volatility, and the impact on growth. *Review of international economics*, 14(3):478-493.
- LI, X. & LIU, X. 2005. Foreign direct investment and economic growth: An increasingly endogenous relationship. *World development*, 33(3):393-407.
- LIM, E.G. 2001. Determinants of, and the relation between, foreign direct investment and growth: A summary of the recent literature (working paper no. 01/175, Nov.). Washington, D.C.: International Monetary Fund. 27 p.
- LOOTS, E. 2000. Foreign direct investment flows to African countries (research paper no. 0011, Oct.). Johannesburg: Randse Afrikaans University. 19 p.
- LUI, G.G.; YIN, D.D.; LYU, R.; CHAIKLEDKAEW, U.; & LOUIE, S. 2002. Economic costs of HIV infection: An employer's perspective. *European journal of health economics*, 3(4):226-234.
- MANKIW, N.G., ROMER, D. & WEIL, D.N. 1992. A contribution to the empirics of economic growth. *Quarterly journal of economics*, 107(2):407-437, May.
- MASANJALA, W. 2007. The poverty-HIV/AIDS nexus in Africa: A livelihood approach. *Social science & medicine*, 64(5):1032-1041, Mar.

- MIYAMOTO, K. 2003. Human capital formation and foreign direct investment in developing countries (working paper no. 211, Jul.). Paris: Organization for Economic Co-operation and Development. 46 p.
- MOHR, P. 2004. Economic indicators. Revised ed., 5<sup>th</sup> impression. Pretoria: University of South Africa Press. 234 p.
- NAIDU, V. & HARRIS, G. 2005. The impact of HIV/AIDS morbidity and mortality on households: A review of household studies. *South African journal of economics (special issue)*, 73:533-544, Dec.
- NAUDÉ, W.A. & KRUGELL, W.F. 2003. Managing and developing human resources for attracting foreign direct investment in Africa. *Management dynamics*, 12(3):2-11.
- NIAID (National Institute of Allergy and Infectious Diseases). 2005. HIV infection and AIDS: An overview. *NIAID fact sheet*. [www.niaid.nih.gov/factsheets/hivinf.htm](http://www.niaid.nih.gov/factsheets/hivinf.htm) Date of access: 22 Mar. 2007.
- NIAID (National Institute of Allergy and Infectious Diseases). 2006. Treatment of HIV infection. *NIAID fact sheet*. [www.niaid.nih.gov/factsheets/treat-hiv.htm](http://www.niaid.nih.gov/factsheets/treat-hiv.htm) Date of access: 22 Mar. 2007.
- NOORBAKHS, F., PALONI, A. & YOUSSEF, A. 2001. Human capital and FDI inflows to developing countries: New empirical evidence. *World development*, 29(9):1593-1610.
- NUNNENKAMP, P. 2001. Foreign direct investment in developing countries: What policymakers should not do and what economists don't know (discussion paper no. 380, Jul.). Kiel: Kiel Institute for the World Economy.
- NUNNENKAMP, P. 2002. Determinants of FDI in developing countries: Has globalization changed the rules of the game? (working paper no. 1122, Jul.). Kiel: Kiel Institute for the World Economy. 44 p.
- OECD (Organisation for Economic Co-Operation and Development ). 1999. OECD benchmark definition of foreign direct investment. 3<sup>rd</sup> ed. <http://www.oecd.org/dataoecd/10/16/2090148.pdf> Date of access: 19 Jul. 2007.
- OKOROSOBO, T. 2000. The socio-economic impact of HIV/AIDS in the African region. *African health monitor*, 1(2):17-19, Jul – Dec.
- OXFORD UNIVERSITY. 2008. Oxford English dictionary (OED) online. <http://www.puk.ac.za.2108> Date of access: 20 June 2007.

- PELTZER, K.; SHISANA, O.; UDJO, E.; WILSON, D.; REHLE, T.; CONNOLLY, C.; ZUMA, K.; LETLAPE, L.; LOUW, J.; SIMBAYI, L.; ZUNGU-DIRWAYI, N.; RAMLAGAN, S.; MAGOME, K.; HALL, E.; & PHURUTSE, M. 2005. Educator supply and demand in the South African public education system: Integrated report. Cape Town: Human Sciences Research Council Press. 140 p.  
<http://www.hsrcpress.ac.za/freedownload.asp?id=2119> Date of access: 11 Apr. 2007.
- PERKINS, D.H., RADELET, S. & LINDAUER, D.L. 2006. Economics of development. 6<sup>th</sup> ed. New York: Norton. 864 p.
- PERRY, G.L. 1966. Unemployment, money wage rates, and inflation. Boston, Mass.: MIT Press. 143 p.
- PHILLIPS, A.W. 1958. The relation between unemployment and the rate of change of money wage rates in the United Kingdom, 1861-1957. *Economica*, 25(100):283-299, Nov.
- PISANI, E. 2000. AIDS into the 21<sup>st</sup> century: Some critical considerations. *Reproductive health matters*, 8(15):63-76, May.
- REPRODUCTIVE HEALTH MATTERS JOURNAL. 2003. Vulnerability, not just sex, responsible for high AIDS prevalence in Africa (round up). *Reproductive health matters*, 11(22):192, Nov.
- ROBALINO, D.A., VOETBERG, A. & PICAZO, O. 2002. The macroeconomic impacts of AIDS in Kenya estimating optimal reduction targets for the HIV/AIDS incidence rate. *Journal of policy modelling*, 24(2):195-218, May.
- ROSEN, S., VINCENT, J.R., MACLEOD, W., FOX, M., THEA, D.M. & SIMON, J.L. 2004. The cost of HIV-AIDS to businesses in South Africa. *AIDS 2004*, 18(2):317-324.
- SABATIER, R. 1987. AIDS in the developing world. *International family planning perspectives*, 13(3):98-103, Sep.
- SALVATORE, D. 1995. International Economics. 5<sup>th</sup> ed. Upper Saddle River, N.J.: Prentice-Hall. 778 p.
- SARB (South African Reserve Bank). 2007. Quarterly bulletin, December 2007 (246). 80 p.  
[http://www.reservebank.co.za/internet/Publication.nsf/LADV/16CD6B38A1FCCD1B422573AD003BFBD5/\\$File/BOP122007.pdf](http://www.reservebank.co.za/internet/Publication.nsf/LADV/16CD6B38A1FCCD1B422573AD003BFBD5/$File/BOP122007.pdf) Date of access: 28 Feb. 2008.

- SCHIERHOUT, G. 2005. Education outcomes and household illness and death in the South African school setting. *South African journal of economics (special issue)*, 73:600-612, Dec.
- SCIENCE MUSEUM. 2004. RNA: the "messenger" molecule. [http://www.makingthemodernworld.org.uk/learning\\_modules/biology/01.TU.03/?section=5](http://www.makingthemodernworld.org.uk/learning_modules/biology/01.TU.03/?section=5) Date of access: 15 Jan. 2008.
- SHISANA, O., HALL, E., MALULEKE, K. & STOKER, D. 2003. The impact of HIV/AIDS on the health sector: national survey of health personnel, ambulatory and hospitalised patients and health facilities. Pretoria: South African department of health. 175p.
- SORENSEN, P.B. & WHITTA-JACOBSON, H.J. 2005. *Introducing advanced Macroeconomics: Growth and business cycles*. London: McGraw-Hill. 869 p.
- TODARO, M.P. 2000. *Economic development*. 7<sup>th</sup> ed. New York: Addison-Wesley Longman. 783 p.
- TODARO, M.P. & SMITH, S.C. 2003. *Economic development*. 8<sup>th</sup> ed. Boston, Mass.: Addison-Wesley. 829 p.
- UNAIDS & WHO (Joint United Nations Programme on HIV/AIDS and the World Health Organisation). 2005. UNAIDS/WHO global HIV/AIDS online database. <http://www.who.int/globalatlas/dataQuery/default.asp> Date of access: 19 Aug. 2007.
- UNAIDS & WHO (Joint United Nations Programme on HIV/AIDS and the World Health Organisation). 2006a. AIDS epidemic update: special report on HIV/AIDS, Dec. Geneva: UNAIDS & WHO. 96 p. [http://data.unaids.org/pub/EpiReport/2006/2006\\_EpiUpdate\\_en.pdf](http://data.unaids.org/pub/EpiReport/2006/2006_EpiUpdate_en.pdf) Date of access: 16 Feb. 2007.
- UNAIDS & WHO (Joint United Nations Programme on HIV/AIDS and the World Health Organisation). 2006b. 2006: A global view of HIV infection. [http://data.unaids.org/pub/GlobalReport/2006/2006GR-PrevalanceMap\\_en.pdf](http://data.unaids.org/pub/GlobalReport/2006/2006GR-PrevalanceMap_en.pdf) Date of access: 19 Aug. 2007.
- UNAIDS & WHO (Joint United Nations Programme on HIV/AIDS and the World Health Organisation). 2006c. 2006, Report on the global AIDS epidemic: The impact of AIDS on people and societies. Geneva: UNAIDS. 629 p. [http://data.unaids.org/pub/GlobalReport/2006/2006\\_GR\\_CH04\\_en.pdf](http://data.unaids.org/pub/GlobalReport/2006/2006_GR_CH04_en.pdf) Date of access: 16 Feb. 2007.
- UNAIDS & WHO (Joint United Nations Programme on HIV/AIDS and the World Health Organisation). 2006d. HIV and AIDS estimates and data, 2005 and 2003. [http://data.unaids.org/pub/GlobalReport/2006/Annex2\\_Data\\_en.xls](http://data.unaids.org/pub/GlobalReport/2006/Annex2_Data_en.xls) Date of access: 19 Aug. 2007.

UNAIDS (Joint United Nations Programme on HIV/AIDS). 2001. Special session of the general assembly on HIV/AIDS, round table 3, socio-economic impact of the epidemic and the strengthening of national capacities to combat HIV/AIDS. [http://data.unaids.org/Publications/External-Documents-Restored/gas26-rt3\\_en.pdf](http://data.unaids.org/Publications/External-Documents-Restored/gas26-rt3_en.pdf) Date of access: 20 May 2007.

UNCTAD (United Nations Conference on Trade and Development). 1999. Foreign portfolio investment (FPI) and foreign direct investment (FDI): Characteristics, similarities, complementarities and differences, policy implications and development impact. (*In Expert meeting on portfolio investment flows and foreign direct investment, Geneva, Switzerland, June 28-30. Geneva: UNCTAD. 18 p).*

UNCTAD (United Nations Conference on Trade and Development). 2005a. Economic development in Africa: Rethinking the role of foreign direct investment. Geneva, UNCTAD. 115 p. [http://www.unctad.org/en/docs/gdsafrica20051\\_en.pdf](http://www.unctad.org/en/docs/gdsafrica20051_en.pdf) Date of access: 6 Feb. 2008.

UNCTAD (United Nations Conference on Trade and Development). 2005b. Economic development in Africa: The role of foreign direct investment in growth and development. (*In the fifty-second meeting of the Trade and Development Board, Geneva, Switzerland, October 3-14.*) Geneva: UNCTAD. [http://www.unctad.org/en/docs/tdb52sc211a1\\_en.pdf](http://www.unctad.org/en/docs/tdb52sc211a1_en.pdf) Date of access: 18 Oct. 2007.

UNCTAD (United Nations Conference on Trade and Development). 2005c. GIPA: Prospects for foreign direct investment and the strategies of transnational corporations, 2005-2008. Geneva: UNCTAD. 74 p.

UNCTAD (United Nations Conference on Trade and Development). 2006. World investment report – FDI from developing and transition economies: implications for development. Geneva: UNCTAD. 340 p. [http://www.unctad.org/en/docs/wir2006\\_en.pdf](http://www.unctad.org/en/docs/wir2006_en.pdf) Date of access: 5 Feb. 2007.

UNCTAD (United Nations Conference on Trade and Development). 2007a. Foreign direct investment rose by 34% in 2006. <http://www.unctad.org/Templates/webflyer.asp?docid=7993&intlItemID=1528&lang=1> Date of access: 12 Feb. 2007.

UNCTAD (United Nations Conference on Trade and Development). 2007b. Foreign direct investment statistics (FDIStat) database. <http://stats.unctad.org/fdi/ReportFolders/ReportFolders.aspx> Date of access: 10 Sept. 2007.

UNCTAD (United Nations Conference on Trade and Development). 2007c. Inward FDI indices. <http://www.unctad.org/Templates/Page.asp?intlItemID=2468&lang=1> Date of access: 12 Sept. 2007.

UNCTAD (United Nations Conference on Trade and Development). 2007d. The investment compass. <http://compass.unctad.org> Date of access: 12 Sept. 2007.

UNCTAD (United Nations Conference on Trade and Development). 2007e. The inward FDI potential index – methodology. <http://www.unctad.org/TEMPLATES/WebFlyer.asp?intItemID=2470&lang=1> Date of access: 12 Sept. 2007.

UNDP (United Nations Development Programme). 2005. Human development report 2005. New York: UNDP. 372 p. [http://hdr.undp.org/reports/global/2005/pdf/HDR05\\_complete.pdf](http://hdr.undp.org/reports/global/2005/pdf/HDR05_complete.pdf) Date of access: 10 Apr. 2007.

UNDP (United Nations Development Programme). 2007. Human Development Report, 2007/8. Houndsmills: Plagrave Macmillan. 384 p. [http://hdr.undp.org/en/media/hdr\\_20072008\\_en\\_complete.pdf](http://hdr.undp.org/en/media/hdr_20072008_en_complete.pdf) Date of access: 27 Mar. 2008.

URATA, S. & KAWAI, H. 2000. The determinants of the location of foreign direct investment by Japanese small and medium-sized enterprises. *Small business economics*, 15(2):79-103.

USDHHS (United States Department of Health and Human Services). 2007. HIV/AIDS 101. [www.aids.gov/basic/101/index.html](http://www.aids.gov/basic/101/index.html) Date of access: 22 Mar. 2007.

VEENSTRA, N. & WHITESIDE, A. 2005. Economic impact of HIV. *Best practice & research clinical obstetrics & gynaecology*, 19(2):197-210, Apr.

WORLD BANK. 2007. States and markets. *World development indicators, 2007* <http://siteresources.worldbank.org/DATASTATISTICS/Resources/WDI07section5-intro.pdf> Date of access: 31 Mar. 2008.

WORLD BANK. 2008a. Definitions. <http://web.worldbank.org/WBSITE/EXTERNAL/DATASTATISTICS/0,,contentMDK:20452065~isCURL:Y~menuPK:2236139~pagePK:64133150~piPK:64133175~theSitePK:239419,00.html> Date of access: 1 Apr. 2008.

WORLD BANK. 2008b. World development indicators online. <http://ddp-ext.worldbank.org/ext/DDPQQ/member.do?method=getMembers&userid=1&queryId=135> Date of access: 15 Mar. 2008.

WORLD BANK. 2008c. Worldwide governance indicators. <http://info.worldbank.org/governance/wgi2007/> Date of access: 15 Mar. 2008.

WORLDMAP. 2007. Sub-Saharan Africa. <http://www.worldmap.org/region.php?region=Sub-Saharan%20Africa> Date of access: 10 Sept. 2007.

YOUNG, A. 2005. The gift of the dying: The tragedy of AIDS and the welfare of future African generations. *Quarterly journal of economics*, 120(2):423-466, May.