Africa: blessed or cursed by Chinese FDI?

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Abstract

In the last three decades China has transformed itself from a subordinate economy into the second largest economy in the world. To support its growth it needs an enormous amount of commodities. China finds these in Africa. Scientist, politicians, economists and other scholars have different opinions on what the consequences of China's involvement in Africa will be for Africa, for China and for the rest of the world. This thesis will investigate how the intensifying relationship between China and Africa influences both the well-being of the African people and the economy of Africa. The four characteristics that define well-being in this thesis are inequality, corruption, pollution and child labor. These four components and the economic performance are investigated to see whether and how they react to Foreign Direct Investment (FDI) coming from China. The country-time data is from 1995 until 2009 for 47 countries in Sub Saharan Africa. These five components have been controlled for several economic and sociologic variables, time effects and country-specific effects. This thesis finds support that the Chinese FDI is increasing both inequality and corruption in Africa. However, evidence is also found that Chinese presence is decreasing environmental damage and that it stimulates economic growth.

Keywords: China, Africa, well-being, FDI

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1. Introduction

In the last three decades China has transformed itself from a subordinate economy into the second largest economy in the world (see www.cia.gov). In this period the country has faced an average growth of 10 percent a year (see www.wdi.org). This has surprised both supporters as well as critics of China, since China does not have a western economic model based on capitalism. China managed to grow by 8.7 percent in 2008 and 9 percent in 2009 (see www.cia.gov), even though during that period the whole world was confronted with the huge financial crisis and most capitalist countries faced a negative economic growth. To keep its astronomical rise sustainable China is in need of enormous amounts of raw materials. This call for commodities forces China to look overseas, since the domestic supply is not sufficient.

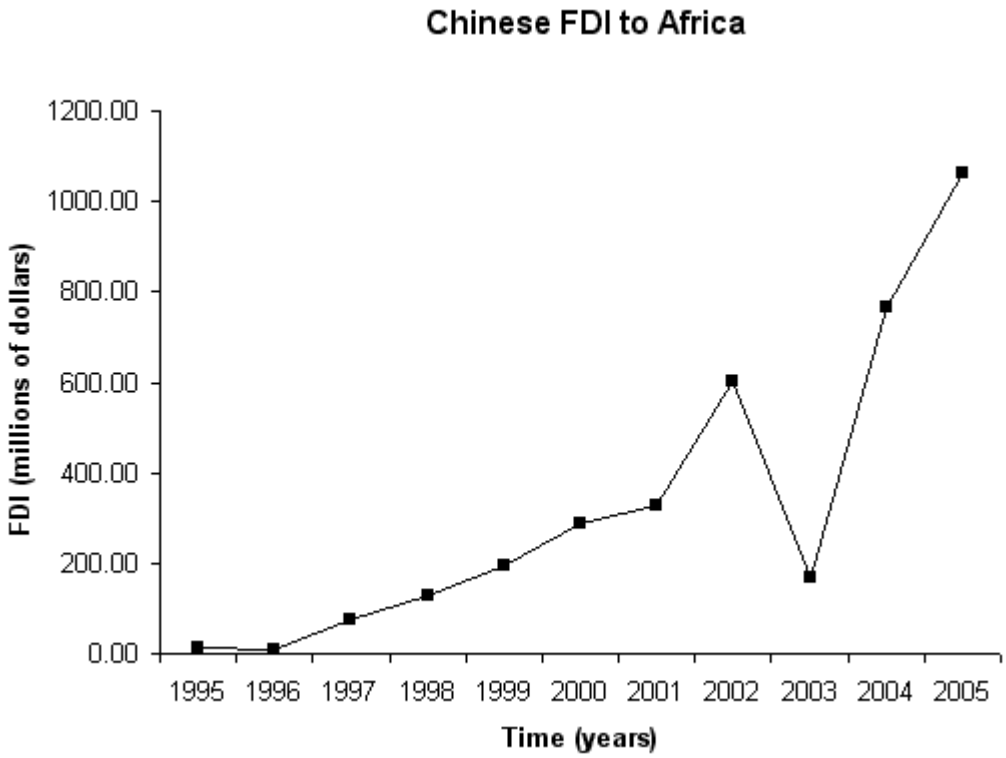
Africa is a so called underdeveloped continent where outsiders find opportunities to make lucrative investments.[1] Africa's wide range of commodities is what makes the continent attractive for China, consequently the Chinese have shown a growing interest in Africa in the first decade of the twenty first century.

Most African countries have limited capital resources. For instance they need help to improve their infrastructure, building quality, infrastructure of information technology (IT) and energy supply networks. China is not only in need of what Africa has to offer, Africa also needs China's growing capital. China does not limit itself to remittances and investments in Africa, but its presence also includes domestic construction workers and engineers that help to coordinate infrastructure and building projects on the ground (Wang, 2007). In return, China buys and extracts many of the African commodities such as oil from Sudan and Nigeria, cotton from Mali and copper from Zambia.

Since the end of the twentieth century China has rapidly raised its FDI flows towards African countries, as the figure below illustrates.

[1]See Foreign Direct Investment Opportunities in Africa << Craig Eisele on ... Available at:http://craigeisele.wordpress.com/2007/09/02/foreign-direct-investment-opportunities-in-africa/ or Herman et al. (2004), who states that developing countries in general give higher returns on investment

Figure 1: Chinese FDI to Africa, based on data of the National Bureau of Statistics of China



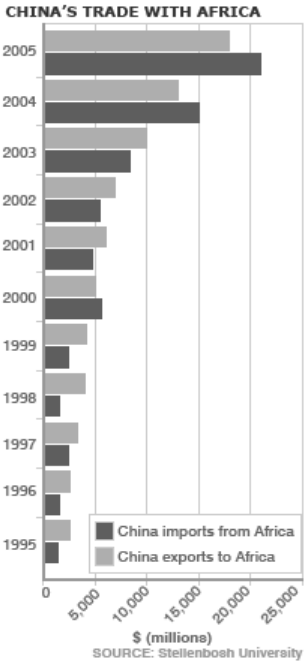
In 1995 China had a total outflow of approximate 14.6 million dollars and major FDI flows to four African countries only, namely: Liberia, Mauritius, Nigeria and Madagascar. In 2005 China invested a total of over 1 billion dollars in 27 African countries: an increase of more than 7000% compared to 1995.[2]

[2] One of the explanations for the sudden decline in 2003 might be the Severe Acute Respiratory Syndrome (SARS) epidimy in South East Asia

The following figures show the investment flows towards Africa in 2005.

Figure 2: China's Foreign Direct Investment in Africa (2005), source: BBC NEWS | Africa | China in Africa: Friend or foe?

Figure 3: China's trade with Africa, source: BBC NEWS | Africa | China in Africa: Friend or foe?



The strong connection between Africa and China became very clear during the Forum on China-Africa Cooperation (FOCAC) in Beijing in November 2006, drawing attention from third parties. Because Africa still has a long way to go regarding its development, investment in and trade with Africa is widely supported by the international community (Asiedu, 2001; Wang, 2007).[3] Lately concerns have risen about the increasing Chinese presence in Africa and how this affects the African development (Konings, 2007).[4] China makes investments in African countries purely for its own benefit regardless of the lack of human rights enforcement or good governance. Therefore critics have expressed their worries about the FDI flowing from China to these African countries. They wonder if the Chinese FDI will be a blessing or a curse for Africa.

Sudan, a country in North Africa, receives significant amounts of FDI from China because of its oil reserves. However, Sudan is known for its instability, especially considering the on-going war in the Darfur region. Under pressure of the international community Western companies have been forced to withdraw from the region, because of the violation of human rights by political leaders (Konings, 2007). Meanwhile the Chinese are

[3] The website of the UN is another example: How to boost trade within Africa: Lower barriers and diversify production. Available at:http://www.un.org/ecosocdev/geninfo/afrec/vol16no2/162reg3.htm

[4] See also the Washington post, available at: http://www.washingtonpost.com/wp-dyn/articles/A21143-2004Dec22.html

expanding their business in Sudan. Critics are concerned that Chinese money is being used to propagate violence, which is most likely not in the best interests of the country and of its population. Critics imply that it is much more convenient for China to extract oil from a more or less abandoned region, than from a populated region. Hence China benefits from the war, since it forces many people to leave Darfur.[5]
Critics with more extreme points of view claim that China is creating more "Darfurs" in other African countries, for instance Ethiopia.[6] Due to the oil and gas found in Ethiopia, China's presence in Ethiopia is growing. China has even been accused of supporting regional leaders in cleaning this area of people, in order to make the exploitation of oil and gas easier.

These claims form the first part of my motivation for this research: to investigate the effects of China's interest in Africa. Or more specifically: What are the effects of Chinese FDI in Sub Saharan Africa? The focus is on Chinese FDI, since recently the Chinese have been accused of being reckless and inhumane in their investment decisions, causing Africa to lose out in the long term (Besada, 2008; Zhang, 2006). The choice to limit this research to Sub Saharan Africa is due to the fact that this region is more unified than Africa as a continent. Even though China also has major investments in northern African countries, culturally and economically these countries are considered to be a part of the Middle East and the Arab world rather than of the African world. From here on Sub Saharan Africa will be referred to as 'Africa'.
Because in this case the focus is on Chinese FDI, the indicators of well-being and economic performance have been controlled for FDI flows from other regions in the world. It is generally accepted that FDI brings along technological improvements and rising employment; this causes acceleration in the development and growth of the Gross Domestic Product (GDP) (De Mello, 1997). Since general happiness is related to several (macro-)economic factors (Di Tella et al., 2001), GDP and other economic variables have been controlled for their impact, as well as social effects.
This thesis examines what the accumulated data can reveal about the relation between China and both the well-being of the African people as well as the economic performance of African countries. In this thesis well-being is composed of four elements: inequality[7], corruption, pollution and child labor. The results of this thesis do not prove that Chinese

[5]For instance the article: China Invests Heavily In Sudan's Oil Industry (washingtonpost.com). Available at: http://www.washingtonpost.com/wp-dyn/articles/A21143-2004Dec22.html

[6] China creert Darfur In Ethiopie - Ethiopie - VKBlog - de Volkskrant China creert Darfur In Ethiopie. http://www.vkblog.nl/bericht/20715/China_creert_Darfur_In_Ethiopie

[7] Unless otherwise stated inequality stands for inequality of wealth

FDI puts young children to work, which is consistent with Davies et al. (2007).[8] On the other hand there is evidence suggesting that Chinese FDI increases inequality and that it worsens overall corruption in African countries. These results are confirmed in the relevant literature.[9] However, proof is found that Chinese FDI improves the environment, which is contradictory to what is stated in the relevant literature.[10] The last result is that proof has been found that Chinese FDI does enhance economic performance in Africa.

Two major problems regarding this thesis are that data on Africa is in general very limited and second that well-being remains a subjective sentiment and is not exactly quantifiable. Therefore results concerning the relationship between Chinese FDI and African well-being will only form a rough indication, not a hard and fast rule.
This thesis is constructed as follows: In the next section a review of relevant literature regarding FDI, China and Africa is being discussed. In the third section the methodology and data sources are explained. Thereafter this thesis presents the analyses and results followed by a discussion of these results, after which a conclusion is formulated.

[8]Davies et al. (2007) do not find a general link between child labor and FDI flows.

[9] On a more general level Pinto, M. P. and B. Zhuz (2008) find comparable results coupling corruption and FDI.

[10] Jones et al. (1998) show FDI generally increases damage to the environment

2. Previous Literature

The second reason to research the influence of Chinese FDI on the well-being of the Africans is that when I was residing in Ghana (West Africa) in the winter of 2009/2010, I was confronted directly with Chinese investments. I visited the sports stadium of the twin city Sekondi-Takoradi, the third city of Ghana, which was constructed with the help of Chinese funds. The Chinese involvement was clearly visible in the stadium: many of the signs contained Chinese words. While driving through the country, I came across many signs stating that this road was being constructed (partially) with Chinese money. At first glance it seems that Ghana is prospering by the Chinese presence. The Ghanaians themselves appreciate the constructions and developments and according to Moyo (2009) this Chinese influence is a blessing for Africa. Moyo (2009) argues that investments from China do not come with the strict western demands and therefore Chinese FDI is more beneficial to Africans. She blames Western aid and involvement for Africa's underperformance. At the beginning of the cold war the West sent billions of dollars to Africa. The first reason was that the Marshall Plan had been very successful in Europe; therefore the Americans assumed a similar aid program should work for Africa as well. The second reason was to prevent the African countries from allying themselves with the Soviet-Union and turn communist. The collapse of the Berlin Wall and the Soviet Union drove away the fear of communism. Still the West continued to send aid to Africa this time under pressure of idealists, artists, politicians and scholars. They thought that the given aid to Africa had not yet reached the desired effects and the aid supply should therefore be maintained or even increased. Moyo (2009) claims that the aid only worsened the situation in Africa. According to her this is partially due to the fact that in return for this aid the West imposed its own values upon the African continent, such as human rights and democracy. These values may fit the West, but not necessarily Africa. Africa should not be dominated by western culture and should be allowed to follow its own path according to Moyo (2009). She continues that FDI rather than aid is the way to develop Africa and that is exactly what the Chinese do. Where aid does nothing to the self-esteem of the Africans, FDI makes them an equal partner. Second, the Chinese do not judge the African values and do not demand to adjust the African culture to their own values. Moyo's opinion is shared by many Ghanaian intellectuals I talked to in Ghana. However, in Ghana I met many West Europeans who harbour grave doubts concerning Chinese investments and their impact on Ghana or Africa, because of the fact that the Chinese do not share Western values on governance and possibly abuse human rights. They are not the only ones concerned, several scientists and politicians share their opinion such as Konings (2007).

For starters the relevant literature concerning the general effects of FDI has been consulted. What do scholars and studies reveal about FDI and its impact on economic growth, inequality, pollution and other indicators of well-being? Borensztein et al. (1998) state that the FDI contributes more to GDP growth, compared to domestic investments, due to the fact that FDI also brings knowledge of technology. This conclusion, however, holds only when a minimum threshold value of human capital is available in the host country. They utilize data of 69 industrial countries over the period 1970 until 1989 and analyse how their FDI flows affect developing countries. Chowdhury et al. (2006) do an empirical study to see whether it is FDI that causes economic growth or that the relation is reversed. After using a Toda-Yamamoto causality test they find that for Chile it is the economic growth that attracts FDI. In both Thailand and Malaysia the causality is bi-directional. An important condition of the economic growth is the quality of the growth and that the poorest among the population benefit from the growth as well.

It is widely accepted that FDI is essential for developing countries to grow and develop. The question is what is the impact of FDI on society, environment and general well-being?

Jones et al. (1998) find that FDI causes environmental degradation. The authors conclude that this is explained by the fact that one way for Multinational Corporations (MNC) to gain competitive advantage is to decrease environmental standards. These MNC's will reallocate their more polluting industries to developing countries, since developing countries are most likely to trade-off their environment for economic gain. It is most likely that MNC's in the business of extracting resources or processing chemicals are drawn to countries where laws and regulations regarding the environment are (nearly) non-existent. Therefore FDI may cause environmental degradation in developing countries. Hippert (2002) examines the effects of MNC's on women's health in Mexico, the Philippines, India and Indonesia. He finds that even though MNC's create jobs especially for women, at the same time these women are often being exploited. Women are considered to be inferior, not only by their fellow countrymen but also by the MNC's.

Thus Jones et al. (1998) state that developing countries are willing to trade-off environment for GDP growth and Hippert (2002) argues in the same line that women are willing to trade-off their human rights for a job. Both Hippert (2002) and Jones et al. (1998) come to the same conclusion: MNC's and their FDI are all-powerful.

Pinto et al. (2008) hypothesizes that effects of FDI on corruption depend on the political and economic structure of the host country. The economic environment is measured by the degree of diversification, the level of competition and the possibility to extract rents. The latter stimulates investors to offer and civil servants to accept the bribe. The political climate influences the level at which bribes are accepted and the probability that those involved in corruption will be prosecuted. In the paper by Pinto et al. (2008) aggregated

data on FDI covering the period from 2000 until 2004 has been used. This hypothesis is confirmed by their empirical results. In addition Pinto et al. (2008) find that countries with economies that depend mainly on the export of resources are more plagued by corruption caused by FDI and trade. On the other hand, FDI flowing into a more democratic country with an advanced economy reduces corruption, but the impact of FDI on corruption in democratic countries is less strong than its effect in non-democratic countries.

Herman (2004) argues that FDI can have undesirable side-effects such as job loss, abuses of human rights, political tensions, financial volatility and environmental problems. However, these side-effects are rare, short term effects or only hypothetical with the exception of the impact on the financial market and the environment. Therefore the advantages of FDI exceed the disadvantages by far, due to the fact that it catalyses economic growth and that it increases competition, employment, innovation and technological spillover.

So far mainly the negative effects of FDI on well-being have been discussed. An increase in FDI decreases child labor, argues Davies et al. (2007). They use data from 145 countries in the year 1995 and they control for the endogeneity of FDI and trade. Only after controlling for GDP per capita, the relationship between child labor and FDI vanishes. This suggests that child labor deceases as GDP grows. Therefore an indirect link between child labor and FDI exists, since FDI stimulates GDP.

The above discussed results cover effects of general FDI flows. The contribution of this thesis is that it researches the effects of Chinese FDI towards the African continent. In the academic world, China's role in Africa has not gone unnoticed. Much research has already been done regarding FDI flowing from China into Africa. However, to the best of my knowledge no specific research has yet been done on the effect of Chinese FDI on the well-being of the Africans.

Wang (2007) combines public and private trade, official development assistance, FDI, debt, debt relief and labor services to analyse the forces behind the Africa-China relations. He finds that the Chinese government policies, the growing markets of both the Africans and the Chinese, Africa's need for improving infrastructure and the different Chinese approach to investing abroad, influences the Africa-China relations greatly. To exploit opportunities of their growing markets to the maximum both Africa and China need decent African infrastructure. The improvement of infrastructure is a main focus of the Chinese policies. The biggest influence on Africa are the FDI from and the trade with the private sector that invests, contracts, builds, helps and creates market opportunities.

Goldstein et al. (2006) find that in particular the oil producing and exporting countries improve their relations with China. Some of these countries, mostly those rich in

commodities, have decreased their relations with countries which are member of the Organisation for Economic Co-operation and Development (OECD) in favor of their relationship with China, partially due to the fact that China's demand for commodities is among the highest in the world. Not only commodities draw China's attention to Africa, it are also the trade opportunities. These growing trade relations have positive and negative consequences for Africa. Quotas to protect the African export have been abolished in 2005, which put many local Africans out of business. On the other hand the average consumer benefits from the cheap Chinese goods. China wants Africa to be technologically skilled, to have a decent infrastructure and to be more advanced in order to improve trade efficiency.

Zhang (2006) argues that China's main supplier of oil is the Middle East. China, however, prefers to diversify its oil supplies to sustain its growth. This desire has driven China to develop access to African oil and gas. This development concerns critics in the international community, because they claim that China does not respect and care about human rights. Zhang (2006) states as well that China's hunt for oil and gas on the African continent is generally exaggerated by the West, mostly due to erroneous information, partly-informed commentators and prejudices. Zhang (2006) continues that Beijing should anticipate the criticism, regarding its oil diplomacy. If China continues its aggressive oil diplomacy and ignores the international community, it might benefit in the short term. However, in the long term it runs the risk that the disadvantages might exceed the advantages. Furthermore Zhang (2006) points out that China should increase its effort to create a better future for everyone and take away the fear of another Darfur or Rwanda. This way both China and Africa will benefit greatly.

In addition similar criticism regarding the Chinese-African relation is found by Sautman et al. (2007). In their paper Chinese influence in Africa including migration and aid policies is examined. They argue that the Chinese defend themselves against Western criticism by showing that Africans widely support them. China's policy towards developing countries implies rapid industrialization generated by high amounts of FDI and focus on export. China also, unlike the West, introduces a low-tariff and low subsidy regime, that allows developing countries to export freely to and therefore compete with China. Hence it can be argued that the Chinese policy is more liberal than the Western policy. In addition the Chinese goods are cheaper than Western ones, therefore more advantageous for the poor African consumers. A final note is that Western parties are not as ethical as they like to portray themselves to be. For instance it is not only China, but also the European Union (EU) that purchases large amounts of illegal African timber. In addition the companies that are involved in bio piracy in Africa are Western pharmaceutics. Thus the authors conclude that the 'People's Republic of China (PRC) seem a lesser evil than the Western countries in terms of support for Africa's

development and respect for African nations'. This is in line with the statements by Moyo (2009).

Konings (2007) emphasizes the growing relation between Africa and China. African companies can expand their business to China, because of the growing demand for African products in China. Moreover Chinese governance creates room for trade, investment opportunities and strategic partnership. Investing in and giving aid to Africa is relatively cheap for China. On the other hand Chinese trade and FDI are attractive for Africa, since China offers a so called 'total package'. This includes cash, low-interest loans, FDI, technological skills, construction, bribe, military cooperation, political protection (obtained by China's membership of United Nations Security Council (UNSC)), among other things to advance their level of competition. First of all African rulers benefit from this, because the Chinese do not interfere in state sovereignty, do not impose conditions when giving aid and do not restrict African leaders, unlike the West. The major benefit, however, is for the Chinese; the trade balance is in their favor and local African sectors such as merchants and manufacturers have been hurt by the enormous flow of cheap Chinese goods. Not only economic motives, but political motives as well drive China to Africa. China aims to form a long lasting alliance with Africa and has founded the China-Africa cooperation Forum in 2000 to stimulate strategic partnership and political affairs. However, recently tensions have arisen. On the political front dialogues regarding human rights and democracy are promoted by the newly founded organisations such as the New Partnership for Africa's Development (NEPAD) and the African Union (AU). These African organizations are aware that China offers a great opportunity and at the same time could be a huge threat. These organisations are allowed to interfere in one of their member states and insist 'on good governance'. Zafar (2007) states that African consumers gain from low-priced Chinese products, but African producers are hurt by the same products. This and the potential Dutch disease[11] caused by natural resources may threaten Africa. If however China develops good policy and provides the right macroeconomic management, China presents opportunities for Africa.

The previous literature is unanimous about the increasing role of China in Africa. However, it is not unanimous on what this effect will entail. Sautman et al. (2007) state that Chinese influence will probably not be as harmful as western influence has been in the past, which is in line with the opinion of Moyo (2009). In contrast to this Konings

[11] The Dutch disease is a phenomenon that often occurs in countries that have recently started to exploit resources. These countries generally face difficulties with industrialization. The export of resources may appreciate the real exchange rate and this causes the concerning countries to lose competitive advantage. This hinders development and maintenance of the industrial sector. The Dutch disease is typically a short term problem.

(2007) argues that Chinese influence will be profitable for the African leaders and the Chinese but not necessarily for the majority of the Africans. Zhang (2006) states that if China adjusts its diplomacy towards Africa, both will greatly benefit and Zafar (2007) argues that with the right macroeconomic management China is an opportunity for Africa.

Hence, scientists and economists are divided regarding the consequences of Chinese FDI for Africa. The discussed papers are based on policy, literature, theoretical studies and economic gains regarding the impact of China on Africa. This thesis provides a study based on the data available and therefore it provides an objective contribution to the consequences for the African continent of the China-Africa relation. This thesis emphasizes the African well-being rather than on the possible economic advantage of FDI or what the (economic) consequences will be for China and the world.

3. Data and Methodology

In this first section I will start with defining well-being. Amongst other things the term denotes health(care) education, environment, equality, prosperity, human rights, freedom of speech and overall happiness. As already mentioned in this thesis well-being has been split into the following four indicators.

- Inequality is quantified using the gini coefficient. This coefficient is a proxy for wealth differences in a country. The value of the gini coefficient is between 0 and 100, where 0 stands for the lowest possible inequality. The gini coefficient is denoted as $gini_{i,t}$ whereby the 'i' subscript is the concerning country and subscript 't' is the year in concern. Data is from: World of Happiness (WOH) database, a sociological database, managed by Ruut van Veenhoven, emeritus-professor at the Erasmus University Rotterdam.

- Corruption is represented by the corruption transparency index. This index is a number between 0 and 10, where 10 represents no corruption. The traditional definition of corruption is the abuse of public office for private purposes. Corruption has been blamed for its negative influence on the efficiency of public spending, its disturbing effects on democratic development and the decreasing effectiveness of aid (Svensson, 2005), which can be especially harmful for many African countries, since the majority of them depends heavily on aid. For these reasons the analysis includes corruption as a second factor of well-being. The corruption index is extracted from Transparency International and the variable will be denoted as $corruption_{i,t}$.

- Environmental damage may lower life expectancy and can be very harmful for agriculture, which is still a very important sector in Africa. There are many ways to quantify environmental damage, this thesis uses the CO_2 emission as a proxy for environmental damage. CO_2 is the most common gas coming from plants, construction works and cars. It is the main cause of global warming and is a good indicator for the damage done by gas emissions. The CO_2 is calculated in tons per capita and restored as variable $co2_{i,t}$. Data is from the World Development Indicator (WDI).

- Child labor is the last well-being factor to be investigated. Because data for child employment is hardly available in Africa this thesis will use children that do not go to school as a proxy for child employment. Almost no observations are available for child employment, however for the children out of school variable some observations are available. It is denoted as the variable $childoutsch_{i,t}$ and it is computed by dividing the amount of children up until the age of 14 not going to school over the total country population. The source for children not going to school per capita is the WDI.

- Economic performance is represented by the $gdp_{i,t}$ variable. This variable is the GDP per capita, corrected for the Purchasing Power Parity (PPP) computed in constant prices US dollar 2005. Data on this variable is available at the WDI as well.

Data has been collected over the period 1995 to 2009. China started to expand its investments enormously around the year 2000. During the period 1995 till 2000 Chinese FDI was not yet massively flowing, as a result this period is included as a benchmark. In addition this extra data increases the degree of freedom, thus enhancing the reliability of the results in this thesis. In practice only data for 1995 until 2005 has been used, due to the fact that observations of more recent years are not available except the corruption index and the European FDI flows.

This cross-section consists of 47 Sub Saharan African countries listed below:

1	Angola
2	Benin
3	Botswana
4	Burkina-Faso
5	Burundi
6	Cameroon
7	Cape Verde
8	Central Africa
9	Chad
10	Comoros
11	Congo. Dem. Rep.
12	Congo Rep.
13	Cote d'Ivoire
14	Djibouti
15	Eritrea
16	Ethiopia
17	Gabon
18	Gambia
19	Ghana
20	Guinea
21	Guinea Equatorial
22	Guinea-Bissau
23	Kenya
24	Lesotho

25	Liberia
26	Madagascar
27	Malawi
28	Mali
29	Mauritania
30	Mauritius
31	Mozambique
32	Namibia
33	Niger
34	Nigeria
35	Rwanda
36	Senegal
37	Seychelles
38	Sierra Leone
39	Somalia
40	South Africa
41	Sudan
42	Swaziland
43	Tanzania
44	Togo
45	Uganda
46	Zambia
47	Zimbabwe

Below the descriptive statistics of the dependent variables are shown:

Dependent variables	$gini_{i,t}$	$corruption_{i,t}$	$co2_{i,t}$	$childoutsch_{i,t}$
Mean	46.96164	2.980138	0.756122	0.050509
Maximum	74.3	8.8	9.045212	0.117808
Minimum	28.9	0.69	0	0.000521
Std. Dev.	9.076368	1.157134	1.674203	0.029942
N	73	362	493	289

The dependent or observed variables are well-being factors and therefore sociological. The explanatory variables or independent variables are the variables which may explain

the dependent variables. Those will be both of the social as well as economic type. Hence, the data collected comes from both economic as well as sociologic sources. Most of the economic data comes from the WDI as well as the poverty line. The data on total FDI to Africa and European FDI to Africa is from the United Nations Conference on Trade and Development (UNCTAD). Data on FDI flows from China to Africa comes from National Bureau of Statistics of China and the FDI flows from the United States to Africa are available at the Bureau of Economic Analysis (BEA) at the section International Economic Accounts.

The social indicators gini coefficient and free press are from the WOH. Below the descriptive statistics for the explanatory variables:

FDI flows	$fdi(ch)_{i,t}$	$fdi(us)_{i,t}$	$fdi(eu)_{i,t}$	$fdi(ot)_{i,t}$
Mean	34.7273	4.476972	1.186463	-0.61415
Maximum	1443.28	179.5252	44.93554	5.958857
Minimum	0	-240.3	-35.3299	-17.6449
Std. Dev.	156.5364	25.57789	5.655482	5.23755
N	262	427	388	17

Economic explanatory variables	$gdp_{i,t}$	$trade_{i,t}$	$savings_{i,t}$	$inflation_{i,t}$
Mean	2806.759	67.56902	11.83611	77.24627
Maximum	31308.94	182.5117	50.90532	24411.03
Minimum	150.807	27.68826	-9.04381	-9.61615
Std. Dev.	4351.174	31.82292	8.912518	1067.571
N	615	70	64	545

Sociological explanatory variables	$freepress_{i,t}$	$povgap_{i,t}$
Mean	53.09434	23.03385
Maximum	93	47.74
Minimum	22	0.9
Std. Dev.	20.07006	12.3837
N	159	65

Four well-being indicators have been used and tested against Chinese FDI, FDI from the United States and Europe and several control variables, such as economic variables as

trade, GDP and several well-being variables. These control variables may be potential cofactors of happiness. The four models have been tested:

$$gini_{i,t} = \beta_1 + \beta_2 fdi(ch)_{i,t-1} + \beta_3 fdi(us)_{i,t-1} + \beta_4 fdi(eu)_{i,t-1} + \beta_5 fdi(ot)_{i,t-1} + \beta_6 gdp_{i,t} + \beta_7 gdp_{i,t}^2 + \beta_8 trade_{i,t-1} + \beta_9 savings_{i,t} + \beta_{10} inflation_{i,t} + \varepsilon_{i,t} \quad (1)$$

$$corruption_{i,t} = \beta_1 + \beta_2 fdi(ch)_{i,t-1} + \beta_3 fdi(us)_{i,t-1} + \beta_4 fdi(eu)_{i,t-1} + \beta_5 fdi(ot)_{i,t-1} + \beta_6 gdp_{i,t} + \beta_7 trade_{i,t-1} + \beta_8 savings_{i,t} + \beta_9 inflation_{i,t} + \beta_9 freepress_{i,t} + \varepsilon_{i,t} \quad (2)$$

$$co2_{i,t} = \beta_1 + \beta_2 fdi(ch)_{i,t-1} + \beta_3 fdi(us)_{i,t-1} + \beta_4 fdi(eu)_{i,t-1} + \beta_5 fdi(ot)_{i,t-1} + \beta_6 gdp_{i,t} + \beta_7 gdp_{i,t}^2 + \beta_8 trade_{i,t-1} + \beta_9 savings_{i,t} + \beta_{10} inflation_{i,t} + \varepsilon_{i,t} \quad (3)$$

$$childoutsch_{i,t} = \beta_1 + \beta_2 fdi(ch)_{i,t-1} + \beta_3 fdi(us)_{i,t-1} + \beta_4 fdi(eu)_{i,t-1} + \beta_5 fdi(ot)_{i,t-1} + \beta_6 gdp_{i,t} + \beta_7 trade_{i,t-1} + \beta_8 savings_{i,t} + \beta_9 inflation_{i,t} + \beta_9 gini_{i,t} + \beta_{10} povgap_{i,t} + \varepsilon_{i,t} \quad (4)$$

In the subsection 4.3. attention has also been paid to the effects on the economic performance of Africa caused by Chinese FDI. This is estimated by the model:

$$gdp_{i,t} = \beta_1 + \beta_2 fdi(ch)_{i,t-1} + \beta_3 fdi(us)_{i,t-1} + \beta_4 fdi(eu)_{i,t-1} + \beta_5 trade_{i,t-1} + \beta_6 savings_{i,t} + \beta_7 inflation_{i,t} + \varepsilon_{i,t} \quad (5)$$

Most of the economic variables are calculated per GDP as is standard in literature. The descriptions of the economic variables are as follows:

- $fdi(x)_{i,t-1}$ is the net FDI flowing into Africa coming from country x per GDP. FDI is lagged because the influence of FDI may be delayed. The t-1 subscript means the variable is lagged with one year.
  - us stands for USA (data from the BEA)
  - ch stands for China (data from National Bureau of Statistics of China)
  - eu stands for all of Europe excluding Russia, the Caucasus and Turkey (data according UNCTAD)
  - ot stands for other. This is the FDI going to Africa coming from the rest of the world. This variable is calculated by taking the total FDI flow to Africa (source: WDI) minus the FDI flows from China, the US and Europe. Formally:

$$fdi(ot)_{i,t} = fdi(total)_{i,t} - fdi(ch)_{i,t} - fdi(us)_{i,t} - fdi(eu)_{i,t}$$

- $gdp_{i,t}$ is the GDP is per capita, corrected for the Purchasing Power Parity (PPP) measured in constant prices US dollar 2005. For the a priori sign of the GDP coefficient see the description of the GDP squared variable later on.

- $trade_{i,t-1}$ is the $(import + export)_{i,t-1}/GDP_{i,t-1}$, data from WDI. In the literature this is also known as trade openness. As it is the case with FDI, trade depends on foreign

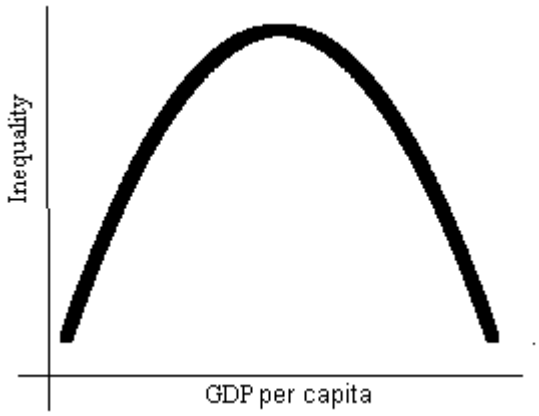
countries, therefore the influence may be delayed. That is why the variable is lagged with one year. The hypothesis is that trade increases inequality if a country is already unequal, thus a negative sign a priori (Mitra, 2003). A similar effect has trade on corruption. Trade worsens corruption in already highly corrupted countries (Pinto et al., 2008).

- $savings_{i,t}$ is the gross savings per GDP (source WDI). The effects of savings are highly ambiguous and therefore the sign is undetermined a priori (Elliot et al., 2010; Mitra et al., 2005).

- $inflation_{i,t}$ is the yearly change in consumer prices expressed in percentages (source WDI). Bulíř (2004) shows reduction in inflation decreases inequality. Therefore the sign is a priori negative. Al-Marhubi (1998) finds that corruption and inflation are positively correlated. Thus regarding the corruption model the inflation coefficient is positive.

- $gdp_{i,t}^2$ (GDP squared) is included as an explanatory variable both for inequality in (1) and environmental damage in (3) because of the Kuznets curve (Kuznets, 1955). As pointed out before FDI stimulates economic growth, however according to the Kuznets curve GDP growth is not advantageous in the short run for the well-being indicators inequality and environment. This curve states that GDP growth causes a short term increase of inequality and environmental damage. Only when GDP grows over a longer period of time, inequality will diminish. Thus a developing country in Africa will face unequal allocation of wealth as GDP grows until it has reached its zenith. Only after that point inequality will decrease. This is also known as an inverted U shape between inequality and economic growth, hence it is not a linear relation as the next figure illustrates:

Figure 4: The Kuznets curve, also known as the inverted U curve.



Therefore the GDP squared is included in (1) and a priori negative.

Evidence for the inverted U curve has also been found in environmental damage (Egli, 2007). This is why GDP squared is also included in (3) and a priori negative.
The economic variables discussed above are not alone in their impact on well-being. Social factors will have impact as well.

- $freepress_{i,t}$ represents the freedom of press: the higher this number, the less freedom the press enjoys. Brunetti et al. (2003) have found strong support that the freedom of press lowers corruption. This thesis finds this relation as well. The data comes from WHO and the variable is constructed as follows:

"Index of repression based on responses to questionnaire by journalists in the country. Questions concerned:

1) physical attacks, imprisonment and direct threats,
2) indirect threats,
3) legal situation and unjustified prosecution,
4) censorship and self censorship,
5) state monopoly on public media,
6) economic and administrative pressures,
7) state control of internet and new media"[12]

- $povgap_{i,t}$ stands for poverty gap representing the amount of people living on less than 1.25 dollar a day, also called the poverty line. The variable is in percentages. The paper by Basu et al. (1998) finds that the more people live under the poverty line, the higher child labor will be. Variable available at WDI

In all the variables the subscripts 'i' and 't' represent respectively country 'i' and time 't'.

The data comes with problems and difficulties. Unlike the United States or the European Union, many African countries are suffering from civil wars, or political instability. Thus creating well-functioning organizations that collect, maintain and update statistical data is not a high priority in Africa and therefore many observations are not available.
A second problem is that some of the FDI variables may be highly correlated among each other. When one explanatory variable is highly related with another, one has to deal with the so-called multicollinearity problem. Both variables will explain nearly the same variation in the independent variable. Especially the combination of lacking data and multicollinearity makes it hard if not impossible to carry out tests. For instance the

[12] Description available at: http://worlddatabaseofhappiness.eur.nl/statnat/topic_pages/FreePress.htm

correlation between the FDI variables, such as the FDI from China and the FDI from the rest of the world (FDI from other countries) are for more than 80% correlated. The correlation matrix of FDI flows below will show the correlation among each other. The closer the value is to (negative) one the more the variables are (negatively) correlated among each other. Correlations close to (negative) one cause problems in the regressions.

Correlation Matrix	$fdi(ch)_{i,t}$	$fdi(us)_{i,t}$	$fdi(eu)_{i,t}$	$fdi(ot)_{i,t}$
$fdi(ch)_{i,t}$	1	-0.139	0.119	-0.841
$fdi(us)_{i,t}$	-0.139	1	-0.330	-0.330
$fdi(eu)_{i,t}$	0.119	-0.330	1	-0.413
$fdi(ot)_{i,t}$	-0.841	-0.330	-0.413	1

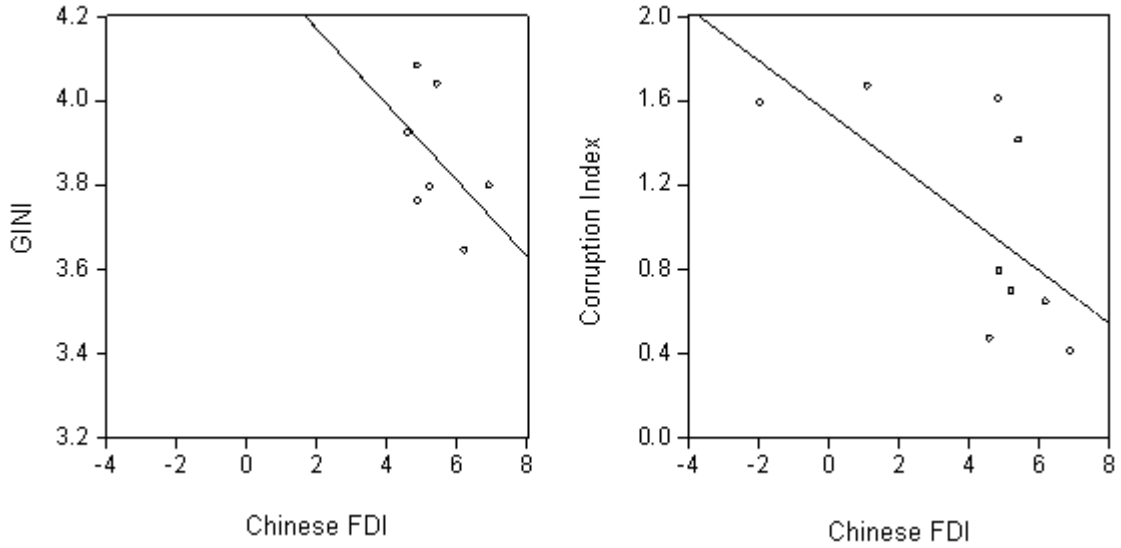
Since FDI from other countries is also hardly available (only 17 data points) this variable has been eliminated, in order to still be able to perform regressions.

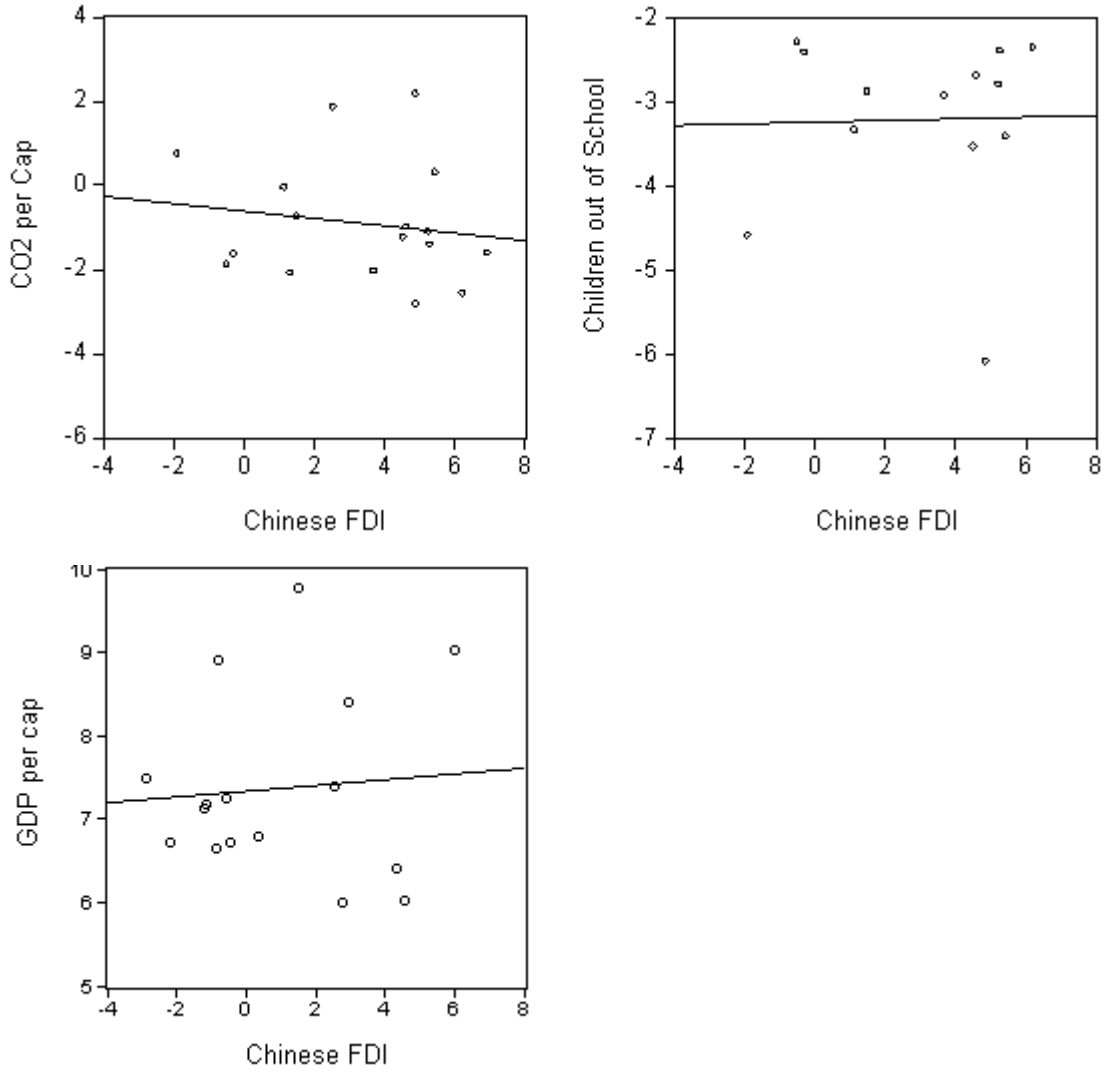
4. Results

From the variables both natural logarithms and first difference values have been used instead of the absolute value. The logarithmic models have been estimated using Ordinary Least Squares (OLS). For the first difference models Generalized Least Squares (GLS) is used if possible to correct for heteroskedasticity (none constant variance). If GLS is not possible OLS is used instead. First this thesis discusses the results using natural logarithms and thereafter the results for the first difference value are being shown.

4.1. Natural Logarithms:

All the data found is transformed into natural logarithms. For example the conversion to logarithms for the trade variable has been done as follows: $\ln(trade_{i,t}) = {}^{e}\log(trade_{i,t})$ where ${}^{e}\log()$ means the logarithm with base e. e is a mathematical constant approximate 2.718 and per definition the base of the natural logarithm. The advantage is that the estimated coefficients can be seen as elasticities. In other words the estimated coefficients represent a relative change, not an absolute change. Natural logarithms may also reduce the statistical problem of heteroskedasticity (Gujarati, 1995). Heteroskedasticity implies that the variables have different variances. Below the scatter plots are shown with the four dependent variables on the vertical (Y) axis and Chinese FDI on the horizontal (X) axis, plotted in logarithmic scale and based on data of the year 1999 of all the African countries available.





The scatter plots in absolute values are not shown, but those are clearly characterized by heteroskedasticity. Looking at the scatter plots above the heteroskedasticity problem does not seem to be less apparent. The following tables show the descriptive statistics of the variables are shown for the total panel period (1995 – 2009).

Dependent variables	$gini_{i,t}$	$corruption_{i,t}$	$co2_{i,t}$	$childoutsch_{i,t}$
Mean	3.83111	1.024512	-1.42203	-3.283611
Maximum	4.308111	2.174752	2.202236	-2.138703
Minimum	3.363842	-0.37106	-6.34196	-7.559353
Std. Dev.	0.192409	0.363758	1.388235	0.94437
N	73	362	491	289

FDI flows	$fdi(ch)_{i,t}$	$fdi(us)_{i,t}$	$fdi(eu)_{i,t}$	$fdi(ot)_{i,t}$
Mean	0.941201	-0.26165	-1.01748	-0.124233
Maximum	7.274674	5.190316	3.805229	1.462595
Minimum	-5.199308	-4.8861	-5.9359	-3.003459
Std. Dev.	2.331254	2.015054	1.881276	1.286604
N	180	376	252	14

Economic explanatory variables	$gdp_{i,t}$	$trade_{i,t}$	$savings_{i,t}$	$inflation_{i,t}$
Mean	7.276829	4.225354	2.442515	2.010355
Maximum	10.35166	5.646987	4.041302	10.10279
Minimum	5.016001	2.692765	-2.589	-3.305445
Std. Dev.	1.027932	0.496435	0.900767	1.404684
N	615	606	515	505

Sociological explanatory variables	$freepress_{i,t}$	$povgap_{i,t}$
Mean	3.891038	2.930245
Maximum	4.532599	3.86577
Minimum	3.091042	-0.10536
Std. Dev.	0.419586	0.749156
N	159	65

4.1.1. Inequality:

Because of the use of country-time data (data for multiple countries over a certain period also known as panel data) this thesis controls for differences within countries and differences within years. To do this both country (cross section) and time (period) effects are set on fixed. This however requires a certain amount of data availability.[13] Since $fdi(ot)_{i,t}$ is eliminated as pointed out before the first equation is reduced to:

$$gini_{i,t} = \beta_1 + \beta_2 fdi(ch)_{i,t-1} + \beta_3 fdi(us)_{i,t-1} + \beta_4 fdi(eu)_{i,t-1} + \beta_5 gdp_{i,t} + \beta_6 gdp_{i,t}^2 + \beta_7 trade_{i,t-1} + \beta_8 savings_{i,t} + \beta_9 inflation_{i,t} + \varepsilon_{i,t} \quad (1a)$$

[13] Because both time and period effects need to be fixed, it is not possible to correct also for the earlier mentioned data problem of heteroskedasticity.

Since there is not sufficient data available, the use of fixed effects for cross-section is not yet possible. It is only possible in the period to use fixed effects. The results are:

Dependent variable: **$gini_{i,t}$**	(1a)	(1b)	(1c)	(1d)	(1e)	(1f)	(1g)
$fdi(ch)_{i,t-1}$	0.063** (0.032)	0.061** (0.021)	0.059* (0.065)	0.078** (0.017)	0.079** (0.014)	0.092*** (0.005)	-0.003 (0.958)
$fdi(us)_{i,t-1}$	-0.039* (0.066)	-0.040** (0.044)	-0.045* (0.067)	-0.049* (0.072)	-0.052** (0.049)	-0.046* (0.093)	-
$fdi(eu)_{i,t-1}$	0.016 (0.643)	0.015 (0.645)	-	-	-	-	-
$gdp_{i,t}$	-0.433 (0.622)	0.124* (0.095)	0.089** (0.085)	0.064 (0.156)	0.072* (0.099)	-	-
$gdp_{i,t}^2$	0.035 (0.529)	-	-	-	-	-	-
$trade_{i,t-1}$	0.229** (0.038)	0.211** (0.025)	0.110 (0.342)	0.083 (0.479)	-	-	-
$savings_{i,t}$	0.233*** (0.006)	0.227*** (0.002)	0.204** (0.015)	0.229*** (0.006)	0.217*** (0.005)	0.270*** (0.001)	0.157 (0.772)
$inflation_{i,t}$	-0.043 (0.352)	-0.030 (0.422)	-0.024 (0.615)	-	-	-	-
β_1	3.666 (0.311)	1.519** (0.030)	2.218*** (0.001)	2.424*** (0.000)	2.732*** (0.000)	3.155*** (0.000)	3.434* (0.071)
Cross-section	no effects	no effects	no effects	no effects	no effects	no effects	fixed
Period	fixed	fixed	fixed	fixed	fixed	fixed	fixed
Periods included	3	3	3	3	3	3	3
Cross-sections included	12	12	14	15	15	16	20
N	15	15	19	20	20	21	27
R^2	0.971	0.968	0.819	0.728	0.716	0.602	0.964
Adj. R^2	0.898	0.909	0.674	0.569	0.585	0.47	0.684

All variables in logarithmic values. Probability value in parentheses. *P<0.10; **P<0.05; ***P<0.01.

To use fixed effects for both Cross-section and period explanatory variables have to be removed in order to obtain more observations (N in the tables) for the total model. The values in brackets, equal the probability (between 0 and 1) that the variable is not significant. So a (0.032) implies there is 3.2% probability that the $fdi(ch)_{i,t-1}$ variable is not significant in model (1a). Thus higher values correspond to lower significance in the regression, or in other words, it corresponds to less added value of the variable in the total model.

As one can see $gdp_{i,t}^2$, from Kuznets theory, is not significant in (1a), so it has been deleted in (1b). In model (1b) it is still not possible to control for cross-section effects.

Hence in (1c) $fdi(eu)_{i,t}$ is eliminated (the least significant value) since it is still not possible to use cross-section fixed effects. This procedure is continued until it is possible

to set both period and cross section on fixed effects. The final model is eventually reduced to:

$$gini_{i,t} = \beta_1 + \beta_2 fdi(ch)_{i,t-1} + \beta_3 savings_{i,t} + \varepsilon_{i,t} \quad (1g)$$

So (1g) gives the final results since it is controlled for time and country effects. This is not possible in the more extensive models, since sufficient observations are not available. The estimated coefficients of -0.003 implies: A decrease of Chinese investment of -0.003% corresponds to a 1% increase of the gini index. Thus FDI from China has a negative impact on overall inequality ($gini_{i,t}$). However the value in brackets times 100% (0.958*100% = 95.8%) is the probability this variable does not influences $gini_{i,t}$. Thus formally: with a probability of 95.8% the Null hypothesis (H_0), that Chinese FDI does not influence the gini coefficient, cannot be rejected,. To put it simply: there is no evidence that FDI from china influences the inequality of Africa. Because of missing data it has not been possible to control for FDI from US and GDP even though these variables are significant in (1e) and (1f).

Generally spoken only probabilities below 10% may be regarded as significant and are therefore marked with an asterisk (*). Values below 5% are marked with 2 asterisks (**) and below 1% (***), where the latter is often the strictest level of significance.

4.1.2. Corruption:

Something similar is done for all the remaining models. So for (2) analysis involving the corruption index as many economic variables as possible are included:

$$corruption_{i,t} = \beta_1 + \beta_2 fdi(ch)_{i,t-1} + \beta_3 fdi(us)_{i,t-1} + \beta_4 fdi(eu)_{i,t-1} + \beta_5 gdp_{i,t} + \beta_6 trade_{i,t-1} + \beta_7 savings_{i,t} + \beta_8 inflation_{i,t} + \varepsilon_{i,t} \quad (2a)$$

This is the same model as the original one (2) except that $fdi(ot)_{i,t}$ and $freepress_{i,t}$ are omitted. The results:

Dependent Variable: **corruption$_{i,t}$**	(2a)	(2b)	(2c)
fdi(ch)$_{i,t-1}$	-0.009	0.024	-0.053**
	(0.544)	(0.209)	(0.015)
fdi(us)$_{i,t-1}$	0.021	0.036	0.027
	(0.523)	(0.305)	(0.239)
fdi(eu)$_{i,t-1}$	0.010	-0.007	-0.008
	(0.729)	(0.822)	(0.763)
gdp$_{i,t}$	-0.062	-	-
	(0.922)		
trade$_{i,t-1}$	0.008	0.358	-0.295
	(0.979)	(0.169)	(0.131)
savings$_{i,t}$	-0.051	-0.050	-
	(0.770)	(0.714)	
inflation$_{i,t}$	0.083	-0.015	-
	(0.165)	(0.734)	
freepress$_{i,t}$	-	-	-1.515***
			(0.005)
β_1	1.631	-0.164	7.927***
	(0.741)	(0.828)	(0.004)
Cross-section	fixed	fixed	fixed
Period	no effects	fixed	fixed
Periods included	8	8	9
Cross-sections included	15	16	11
N	29	32	29
R^2	0.990	0.998	0.987
Adj. R^2	0.960	0.982	0.926

All variables in logarithmic values. Probability value in parentheses. *P<0.10; **P<0.05; ***P<0.01

In (2a) freepress$_{i,t}$ is not included in the model, because this thesis first tests on economic variables only. To use fixed effects for both cross section and period the most insignificant variable gdp$_{i,t}$ in (2b) needs to be omitted. It does not give significant results. After consulting literature on corruption the results show freedom of press lowers corruption. In (2c) this variable freepress$_{i,t}$ replaces the variables savings$_{i,t}$ and inflation$_{i,t}$ (to maintain enough observations for fixed effects). fdi(eu)$_{i,t}$ is kept in, even though it is the least significant variable in (2b), so it is possible to compare this variable with its Chinese counterpart. This gives the model:

$$corruption_{i,t} = \beta_1 + \beta_2 fdi(ch)_{i,t-1} + \beta_3 fdi(us)_{i,t-1} + \beta_4 fdi(eu)_{i,t-1} + \beta_5 gdp_{i,t} + \beta_6 trade_{i,t-1} + \beta_7 freepress_{i,t} + \varepsilon_{i,t} \quad (2c)$$

Freedom of press lowers and FDI from China increases corruption, both significantly, at respectively 5% and 1% level. The negative sign of fdi(ch)$_{i,t}$ implies that an increase in

Chinese FDI corresponds to a diminishment of the corruption index, so an increase of actual corruption (because the lower corruption index the higher is the corruption). This corresponds with the literature.

4.1.3. Pollution:

The next variable tested is environmental damage measured by the variable $co2_{i,t}$ (CO_2 per capita). For CO_2 plenty of data is available so the country and time effects can be set on fixed at once.

Results:

Dependent Variable: **$co2_{i,t}$**	(3a)	(3b)
$fdi(ch)_{i,t-1}$	-0.087	-0.093**
	(0.119)	(0.049)
$fdi(us)_{i,t-1}$	0.104	0.113
	(0.216)	(0.112)
$fdi(eu)_{i,t-1}$	0.133	0.141
	(0.217)	(0.130)
$gdp_{i,t}$	-0.103	-2.707
	(0.989)	(0.138)
$gdp_{i,t}^2$	-0.185	-
	(0.717)	
$trade_{i,t-1}$	-0.691	-0.714
	(0.401)	(0.318)
$savings_{i,t}$	0.084	0.102
	(0.574)	(0.414)
$inflation_{i,t}$	-0.295*	-0.266**
	(0.076)	(0.024)
β_1	14.923	23.807
	(0.608)	(0.120)
Cross-section	fixed	fixed
Period	fixed	fixed
Periods included	10	10
Cross-sections included	20	20
N	40	40
R^2	1.000	1.000
Adj. R^2	0.995	0.996

All variables in logarithmic values.
Probability value in parentheses. *P<0.10; **P<0.05; ***P<0.01

Kuznets theory implies the existence of a non-linear model, therefore in (3a) GDP squared is included. However this is not significant in the test so in (3b) it is excluded which results in the following estimated model:

$$co2_{i,t} = \beta_1 + \beta_2 fdi(ch)_{i,t-1} + \beta_3 fdi(us)_{i,t-1} + \beta_4 fdi(eu)_{i,t-1} + \beta_5 gdp_{i,t} + \beta_6 trade_{i,t-1} + \beta_7 savings_{i,t} + \beta_8 inflation_{i,t} + \varepsilon_{i,t} \quad (3b)$$

Here it turns out that Chinese FDI and inflation decrease the CO_2 emission, implying China has a positive effect on environment. This is in contradiction to the paper of Jones et al. (1998), where it is stated that FDI especially in the short run causes environmental degradation. Also the theory regarding Kuznets curve does not predict such a result. Inflation reduces pollution as well.

4.1.4. Child labor:

For the children not going to school rate, the proxy for child employment, no sufficient data is available to perform even a normal regression without fixed effects. Therefore $gini_{i,t}$ and $povgap_{i,t}$ have to be removed, because for these explanatory variables data is too scarce. There are only 73 and 65 observations respectively and they are hardly for the same country-time observations. Therefore the equation to estimate and its results become:

$$childoutsch_{i,t} = \beta_1 + \beta_2 fdi(ch)_{i,t-1} + \beta_3 fdi(us)_{i,t-1} + \beta_4 fdi(eu)_{i,t-1} + \beta_5 gdp_{i,t} + \beta_6 trade_{i,t-1} + \beta_7 savings_{i,t} + \beta_8 inflation_{i,t} + \varepsilon_{i,t} \quad (4a)$$

Dependent Variable: **childoutschool$_{i,t}$**	(4a)	(4b)
fdi(ch)$_{i,t-1}$	0.065	0.022
	(0.257)	(0.935)
fdi(us)$_{i,t-1}$	2.025***	0.273
	(0.001)	(0.887)
fdi(eu)$_{i,t-1}$	-0.030	-0.299
	(0.772)	(0.485)
gdp$_{i,t}$	11.065***	-2.688
	(0.004)	(0.927)
trade$_{i,t-1}$	-3.753**	2.209
	(0.029)	(0.600)
savings$_{i,t}$	0.026	-0.525
	(0.899)	(0.561)
inflation$_{i,t}$	0.054	-
	(0.848)	
β_1	-74.079***	9.125
	(0.006)	(0.969)
Cross-section	fixed	fixed
Period	no effects	fixed
Periods included	8	8
Cross-sections included	16	16
N	29	32
R^2	0.989	0.960
Adj. R^2	0.949	0.583

All variables in logarithmic values. Probability value in parentheses. *P<0.10; **P<0.05; ***P<0.01

In (4a) it is not possible to control for time effects, but after deleting the inflation$_{i,t}$ variable, the model estimated is:

$$childoutsch_{i,t} = \beta_1 + \beta_2 fdi(ch)_{i,t-1} + \beta_3 fdi(us)_{i,t-1} + \beta_4 fdi(eu)_{i,t-1} + \beta_5 gdp_{i,t} + \beta_6 trade_{i,t-1} + \beta_7 savings_{i,t} + \varepsilon_{i,t} \quad (4b)$$

No proof has been found that the percentage of school going children is influenced by economic factors.

4.2. First Differences:

To calculate first difference variables one has to take the difference between two consecutive years. So for instance the GDP difference of Ghana becomes:

$$\Delta gdp_{GHANA,1996} = gdp_{GHANA,1996} - gdp_{GHANA,1995}$$

Here Δ means difference. Technically:

$$\Delta gdp_{i,t} = gdp_{i,t} - gdp_{i,t-1}$$

This is done for all variables in the panel, so in general:

$$\Delta variable_{i,t} = variable_{i,t} - variable_{i,t-1}$$

The econometric advantage of differencing is that unknown individual effects of the countries are removed. Therefore it is not necessary to set fixed effects for the countries. The disadvantage on the other hand is that taking first differences compared to logarithms does not decrease the problem of heteroskedasticity.[14]

Another disadvantage is that this method causes the loss of one degree of freedom and that while the data is already not widely available for Africa. This may become problematic especially when the data is not consecutive. By the term 'consecutive' implies the data available for several consecutive years, such as 2000, 2001 and 2002. This problem occurs for the $gini_{i,t}$ variable, where consecutive data is an exception. Therefore by simply taking first differences all data on $gini_{i,t}$ vanishes. To get around this problem the decision has been made not to take the first difference in the traditional way, but to employ a slightly alternative method illustrated by the following example. If for the country Burkina Faso (in the subscript denoted as BF) only data for the year 2000 and 2005 is available and nothing in between, than the calculation is thus:

$$\Delta gini_{BF,2005} = gini_{BF,2005} - gini_{BF,2000}$$

This calculation is applied consequently for the explanatory variables concerning Burkina Faso. Thus for the GDP variable this becomes:

$$\Delta gdp_{BF,2005} = gdp_{BF,2005} - gdp_{BF,2000}$$

In addition for Mali (ML in the subscript) the $gini_{ML,t}$ for t=2000 and t=1999 are known. Than the calculation is:

$$\Delta gini_{ML,2000} = gini_{ML,2000} - gini_{ML,1999}$$

[14]First differencing requires only period effects to be fixed, thus it is possible to correct the heteroskedasticity problem using GLS. However in this thesis it is only possible to apply this correction for the model on gini, since the amount of control variables is limited in that model. More information at: http://www.nyu.edu/its/pubs/connect/fall03/yaffee_primer.html

and the same is done to the explanatory variables concerning Mali.

The lagged variables (FDI and trade) are therefore also not necessarily lagged one period: in the case of Burkina Faso $\Delta gini_{BF,2005}$ is tested on for instance $\Delta trade_{BF,2000}$ and $\Delta FDI_{BF,2000}$, since no data is available in between.

For first differences period effects have to be fixed, but country effects do not as stated before. The coefficients indicate absolute changes. For convenience the regression are repeated:

$$gini_{i,t} = \beta_1 + \beta_2 fdi(ch)_{i,t-1} + \beta_3 fdi(us)_{i,t-1} + \beta_4 fdi(eu)_{i,t-1} + \beta_5 fdi(ot)_{i,t-1} + \beta_6 gdp_{i,t} + \beta_7 gdp_{i,t}^2 + \beta_8 trade_{i,t-1} + \beta_9 savings_{i,t} + \beta_{10} inflation_{i,t} + \varepsilon_{i,t} \quad (1)$$

$$corruption_{i,t} = \beta_1 + \beta_2 fdi(ch)_{i,t-1} + \beta_3 fdi(us)_{i,t-1} + \beta_4 fdi(eu)_{i,t-1} + \beta_5 fdi(ot)_{i,t-1} + \beta_6 gdp_{i,t} + \beta_7 trade_{i,t-1} + \beta_8 savings_{i,t} + \beta_9 inflation_{i,t} + \beta_9 freepress_{i,t} + \varepsilon_{i,t} \quad (2)$$

$$co2_{i,t} = \beta_1 + \beta_2 fdi(ch)_{i,t-1} + \beta_3 fdi(us)_{i,t-1} + \beta_4 fdi(eu)_{i,t-1} + \beta_5 fdi(ot)_{i,t-1} + \beta_6 gdp_{i,t} + \beta_7 gdp_{i,t}^2 + \beta_8 trade_{i,t-1} + \beta_9 savings_{i,t} + \beta_{10} inflation_{i,t} + \varepsilon_{i,t} \quad (3)$$

$$childoutsch_{i,t} = \beta_1 + \beta_2 fdi(ch)_{i,t-1} + \beta_3 fdi(us)_{i,t-1} + \beta_4 fdi(eu)_{i,t-1} + \beta_5 fdi(ot)_{i,t-1} + \beta_6 gdp_{i,t} + \beta_7 trade_{i,t-1} + \beta_8 savings_{i,t} + \beta_9 inflation_{i,t} + \beta_9 gini_{i,t} + \beta_{10} povgap_{i,t} + \varepsilon_{i,t} \quad (4)$$

Because in the first model the dependent variable $gini_{i,t}$ has been used, differences are calculated as described above, in the example with Burkina Faso. For the other regressions, (2), (3) and (4), the normal first difference method is used. This causes that the descriptive statistics used for (1) is different from the descriptive statistics used for the remaining models. The descriptive statistics for (1):

Dependent Variable	$gini_{i,t}$
Mean	-0.78409
Maximum	17.9
Minimum	-15.6
Std. Dev.	6.334841
N	44

FDI flows	$fdi(ch)_{i,t}$	$fdi(us)_{i,t}$	$fdi(eu)_{i,t}$	$fdi(ot)_{i,t}$
Mean	0.095974	-0.170161	-0.36292	-0.97075
Maximum	3.729232	1.667404	1.797564	3.133104
Minimum	-10.2305	-2.06637	-6.35521	-3.99835
Std. Dev.	3.036675	0.785238	1.832957	2.583274
N	16	29	16	7

Economic explanatory variables	$gdp_{i,t}$	$trade_{i,t}$	$savings_{i,t}$	$inflation_{i,t}$
Mean	81.93743	4.452055	1.58432	3.533856
Maximum	1006.858	57.6176	27.5386	246.2505
Minimum	-177.309	-26.178	-10.0009	-66.2171
Std. Dev.	176.8354	15.32909	7.995538	41.3223
N	42	44	40	41

For the remaining regressions, the usual first difference method can be used. This means as mentioned before: the GDP difference of Ghana becomes $\Delta gp_{GHANA,1996} = gdp_{GHANA,1996} - gdp_{GHANA,1995}$, thus differencing consecutive years.

Below the descriptive statistics regarding (2), (3) and (4):

Dependent variables	$gini_{i,t}$	$corruption_{i,t}$	$co2_{i,t}$	$childoutsch_{i,t}$
Mean	-0.6	-0.01376	0.023035	-0.00357
Maximum	10.7	3.5	7.309459	0.010379
Minimum	-8.5	-3.8	-1.85185	-0.04183
Std. Dev.	5.184593	0.439245	0.403347	0.00718
N	11	306	447	235

FDI flows	$fdi(ch)_{i,t}$	$fdi(us)_{i,t}$	$fdi(eu)_{i,t}$	$fdi(ot)_{i,t}$
Mean	2.296188	-0.57914	-0.06631	-1.45367
Maximum	985.8794	306.8533	51.1758	1.221656
Minimum	-1137.83	-139.564	-80.2654	-3.99835
Std. Dev.	149.8167	20.72097	6.72125	2.369045
N	156	373	337	4

Economic explanatory variables	$gdp_{i,t}$	$trade_{i,t}$	$savings_{i,t}$	$inflation_{i,t}$
Mean	102.5957	0.948244	0.465296	41.78055
Maximum	5915.909	78.57601	45.1436	23314.35
Minimum	-1735.51	-42.9719	-57.0499	-3925.93
Std. Dev.	458.8616	11.63089	7.99517	1060.776
N	571	560	508	500

Sociological explanatory variables	$freepress_{i,t}$	$povgap_{i,t}$
Mean	0.218978	5.63
Maximum	27	5.63
Minimum	-38	5.63
Std. Dev.	7.059324	NA
N	137	1

4.2.1. Inequality

For $gini_{i,t}$ many observations have been deleted by differencing. Therefore explanatory variables have to be excluded from the model in order to perform regressions. Of the variables of the earlier model, $fdi(eu)_{i,t}$, $trade_{i,t-1}$ and $inflation_{i,t}$ are the most insignificant. They have therefore been excluded. This causes the model to be reduced to:

$$gini_{i,t} = \beta_1 + \beta_2 fdi(ch)_{i,t-1} + \beta_3 fdi(us)_{i,t-1} + \beta_4 gdp_{i,t} + \beta_5 savings_{i,t} + \varepsilon_{i,t} \qquad (1\alpha)$$

Results:

Dependent Variable: **$gini_{i,t}$**	(1α)	(1β)
$fdi(ch)_{i,t-1}$	-16.277*** (0.008)	-13.380*** (0.001)
$fdi(us)_{i,t-1}$	0.704 (0.056)*	-0.123 (0.900)
$gdp_{i,t}$	-0.005** (0.019)	-0.003* (0.051)
$savings_{i,t}$	-0.638** (0.021)	-
β_1	6.631*** (0.010)	4.934*** (0.003)
Period	no effects	fixed
Periods included	2	2
Cross-sections included	4	5
N	6	8
R^2	1.000	0.986
Adj. R^2	0.999	0.968

All variables are differenced. Probability value in parentheses.
*P<0.10; **P<0.05; ***P<0.01

The same method has been used here as before with the logarithms. (1α) does not have enough observations to use fixed effects, so the least significant variable has been deleted. Hence the final model becomes:

$$gini_{i,t} = \beta_1 + \beta_2 fdi(ch)_{i,t-1} + \beta_3 fdi(us)_{i,t-1} + \beta_4 gdp_{i,t} + \varepsilon_{i,t} \quad (1\beta)$$

The estimated -13.380 from (1β) means if FDI of China goes up by 1 unit, the gini coefficient goes up by -13.380 units. This result is significant, as the value in the brackets proves. Thus proof has been found that Chinese FDI has a negative impact on the allocation of wealth.

4.2.2. Corruption:

For $corruption_{i,t}$, the following model will be tested:

$$corruption_{i,t} = \beta_1 + \beta_2 fdi(ch)_{i,t-1} + \beta_3 fdi(us)_{i,t-1} + \beta_4 fdi(eu)_{i,t-1} + \beta_5 gdp_{i,t} + \beta_6 trade_{i,t-1} + \beta_7 savings_{i,t} + \beta_8 inflation_{i,t} + \varepsilon_{i,t} \quad (2\alpha)$$

For the dependent variable corruption, many observations are available. First only economic variables are included (2α) and in the next model (2β) the sociological variables $freepress_{i,t}$ is included as well. The results are:

Dependent Variable: **$corruption_{i,t}$**	(2α)	(2β)	(2γ)
$fdi(ch)_{i,t-1}$	-0.000 (0.976)	-0.227 (0.107)	-0.028 (0.819)
$fdi(us)_{i,t-1}$	-0.084 (0.643)	0.478 (0.186)	1.334 (0.260)
$fdi(eu)_{i,t-1}$	-0.069 (0.518)	-0.060 (0.567)	-0.031 (0.705)
$gdp_{i,t}$	-0.000 (0.568)	-	-
$trade_{i,t-1}$	0.003 (0.817)	0.006 (0.803)	-
$savings_{i,t}$	-0.012 (0.463)	0.257 (0.063)	0.537 (0.285)
$inflation_{i,t}$	0.013 (0.717)	-0.048 (0.063)	-0.142 (0.364)
$freepress_{i,t}$	-	0.081 (0.095)	0.225 (0.356)
β_1	-0.043 (0.547)	-0.123 (0.208)	-0.473 (0.352)
Period	fixed	no effects	fixed
Periods included	9	9	9
Cross-sections included	9	4	4
N	26	16	16
R^2	0.858	0.553	0.998
Adj. R^2	0.644	0.161	0.963

All variables are first differenced. Probability value in parentheses.
*P<0.10; **P<0.05; ***P<0.01

GDP and trade in (2α) are not significant. So they have been deleted from the model, in order to make it possible to include the free press variable and use fixed effects, which gives:

$$corruption_{i,t} = \beta_1 + \beta_2 fdi(ch)_{i,t-1} + \beta_3 fdi(us)_{i,t-1} + \beta_4 fdi(eu)_{i,t-1} + \beta_5 trade_{i,t-1} + \beta_6 freepress_{i,t} + \varepsilon_{i,t} \quad (2\gamma)$$

The results of (2γ): Corruption here does not significantly respond to Chinese FDI, neither does it to free press.

4.2.3. Pollution:

Results for the next dependent variable (CO_2 emission) are:

$$co2_{i,t} = \beta_1 + \beta_2 fdi(ch)_{i,t-1} + \beta_3 fdi(us)_{i,t-1} + \beta_4 fdi(eu)_{i,t-1} + \beta_5 gdp_{i,t} + \beta_6 gdp_{i,t}^2 + \beta_7 trade_{i,t-1} + \beta_8 savings_{i,t} + \beta_9 inflation_{i,t} + \varepsilon_{i,t} \quad (3\alpha)$$

Dependent Variable: **$co2_{i,t}$**	(3α)	(3β)
$fdi(ch)_{i,t-1}$	0.002 (0.273)	0.002 (0.309)
$fdi(us)_{i,t-1}$	0.016 (0.397)	0.007 (0.641)
$fdi(eu)_{i,t-1}$	-0.146*** (0.000)	-0.142*** (0.000)
$gdp_{i,t}$	0.000 (0.481)	-0.000 (0.869)
$gdp_{i,t}^2$	0.000 (0.435)	-
$trade_{i,t-1}$	-0.002 (0.521)	-0.002 (0.574)
$savings_{i,t}$	-0.004 (0.480)	-0.004 (0.452)
$inflation_{i,t}$	-0.001 (0.121)	-0.000 (0.129)
β_1	0.010 (0.691)	-0.000 (0.865)
Period	fixed	fixed
Periods included	9	9
Cross-sections included	20	20
N	53	53
R^2	0.532	0.540
Adj. R^2	0.345	0.352

All variables are first differenced. Probability value in parentheses. *P<0.10; **P<0.05; ***P<0.01

In the test on environment (3α) Chinese influence is not significant unlike the results of the logarithmic model. Also no support is found for the ecological Kuznets curve. Therefore the GDP squared is omitted in (3β). There is strong indication that European FDI has a strong negative effect (significant at the 1% level) on CO_2 emission.

4.2.4. Child Labor:

The last variable of the panel to be tested: $childoutsch_{i,t}$. In this case there is not a large amount of data available, therefore the sociologic variables have to be omitted:

$$childoutsch_{i,t} = \beta_1 + \beta_2 fdi(ch)_{i,t-1} + \beta_3 fdi(us)_{i,t-1} + \beta_4 fdi(eu)_{i,t-1} + \beta_5 gdp_{i,t} + \beta_6 trade_{i,t-1} + \beta_7 savings_{i,t} + \beta_8 inflation_{i,t} + \varepsilon_{i,t} \quad (4\alpha)$$

Dependent Variable: (4α)
$childoutsch_{i,t}$

$fdi(ch)_{i,t-1}$	0.000 (0.863)
$fdi(us)_{i,t-1}$	0.009 (0.363)
$fdi(eu)_{i,t-1}$	0.003 (0.450)
$gdp_{i,t}$	0.000 (0.368)
$trade_{i,t-1}$	-0.000 (0.665)
$savings_{i,t}$	-0.000 (0.471)
$inflation_{i,t}$	-0.000 (0.789)
β_1	-0.005 (0.151)
Cross-section	fixed
Periods included	7
Cross-sections included	8
N	25
R^2	0.355
Adj. R^2	-0.407

All variables are first differenced. Probability value in parentheses. *P<0.10; **P<0.05; ***P<0.01

Once again there is no evidence the number of children going to school is not influenced by the economic factors in the model.

4.3. The influence of FDI on the African economy

In this last section of the results the influence of Chinese FDI on the economic performance of Africa has been tested. The same economic control variables as before have been used such FDI from the US and Europe, trade and inflation. The model that has been tested:

$$gdp_{i,t} = \beta_1 + \beta_2 fdi(ch)_{i,t-1} + \beta_3 fdi(us)_{i,t-1} + \beta_4 fdi(eu)_{i,t-1} + \beta_5 trade_{i,t-1} + \beta_6 savings_{i,t} + \beta_7 inflation_{i,t} + \varepsilon_{i,t} \quad (5)$$

In the table below (5a) is the above model (5) with the variables transformed into logarithms. Model (5b) is the same model with first differenced variables.

Dependent Variable: **$gdp_{i,t}$**	(5a)	(5α)
$fdi(ch)_{i,t-1}$	0.078**	0.017
	(0.011)	(0.355)
$fdi(us)_{i,t-1}$	0.017	0.097**
	(0.635)	(0.028)
$fdi(eu)_{i,t-1}$	-0.011	-0.070
	(0.833)	(0.832)
$trade_{i,t-1}$	-0.087	4.819
	(0.663)	(0.432)
$savings_{i,t}$	0.030	0.755
	(0.389)	(0.931)
$inflation_{i,t}$	-0.023	1.108
	(0.320)	(0.331)
β_1	8.092***	126.346***
	(0.000)	(0.002)
Cross-section	fixed	no effects
Period	fixed	fixed
Periods included	10	9
Cross-sections included	20	20
N	40	53
R^2	1.000	0.930
Adj. R^2	0.999	0.905

Probability value in parentheses. *P<0.10; **P<0.05; ***P<0.01

The results suggest that FDI from the US (5a) and China (5b) have a positive effect on the economy of the African countries. FDI from Europe is not significant in this model. To sum it up, it can be concluded that FDI boosts African growth and Chinese FDI is not different in that sense.

5. Discussion

The significant impact of Chinese FDI on increasing corruption and inequality shows that China's influence has its price. On the other hand the same FDI improves the overall environment. This is remarkable since FDI in general damages the environment, especially over a short period of time. This section summarizes the empirical results and provides explanations regarding significant variables.

RESULT 1: The inequality level of Africa is increased by FDI coming from China.

This can be explained in several ways. The first explanation is that Chinese FDI stimulates GDP growth and this GDP growth worsens inequality in the short run as predicted by Kuznets theory. Because the availability of data is limited, it is not possible to correct for a complete eventual Kuznets curve (inclusion of GDP squared), however the linear GDP variable has a negative impact on equality. A second explanation is that Chinese FDI is especially profitable for leaders and rulers, but disadvantageous for local business, because it cannot compete with the low cost Chinese products (Konings, 2007). Consequently the rich are getting richer and the poor are getting poorer

RESULT 2: Corruption in Africa increases as FDI from China flows into the continent.

This result confirms the evidence that FDI in general stimulates corruption in developing countries (Pinto et al., 2008). Most African countries are developing countries. In developing countries barely protected by institutions, property rights and civil law, trade and FDI increase the possibility that government officials and investors will abuse their position. However, only FDI from China worsens corruption in Africa. A possible explanation is that companies from the United States and Europe do not accept or stimulate bribes, fearing lawsuits and loss of reputation back home, where as Chinese companies do not have that problem.
Proof has been found that when the press gains more freedom, corruption decreases. This has also been found by Brunettia et al. (2003).

RESULT 3: The state of the environment in Africa improves because of Chinese FDI.

This result is noteworthy and is contradictory to related theory and literature. Jones et al. (1998) find support that FDI generally increases damage to the environment, because FDI stimulates construction and the use of cars and other polluting devices. A possible reason that FDI from China causes a decline in pollution may come from the fact that apart from money the Chinese also bring their own expertise and capital to Africa.

Since Chinese experts are technologically more experienced and the Chinese machinery is more advanced than the African machinery, therefore Chinese presence reduces damage to the environment. Not only Chinese FDI improves the environment, so does European FDI. It may well be the case that the increase of FDI from Europe makes it possible for African countries to obtain more advanced and less polluting equipment. A last remarkable result is that inflation decreases emission of greenhouse gasses. This can be caused by the fact that inflation makes import expensive. Not all African countries have oil, so importing becomes more costly when inflation is high.

RESULT 4: Child labor is not (yet) affected by the Chinese domination in Africa.

Result 4 coincides with the results found by Davies et al. (2007) who in general do not find that FDI affects child labor. Davies et al. (2007) only finds an indirect link. The FDI fuels GDP growth and this GDP growth reduces child labor. This thesis, however, does not find a link between GDP and child labor. Children are not affected by Chinese FDI or by the other tested economic factors. It may be the case that the earlier discussed poverty line and inequality are related to what children do, but there are not sufficient data points available to carry out these tests. Another possibility is that children are affected in the long run and since China is only active in Africa since a few years, these effects are not yet visible.

RESULT 5: Chinese FDI accelerates economic growth in Africa.

This is the last result of the empirical study of this thesis and it shows that Chinese FDI fuels the economic growth in Africa. Chinese FDI is in this respect not different from general FDI, since FDI is an important factor of economic growth (Asiedu, 2001; De Mello, 1997). Also FDI from the United States causes growth in Africa; only FDI flows from Europe do not seem to have this impact. This might be a statistical problem where FDI from other regions explain the same part of economic growth as the European FDI and therefore European FDI does not seem to have an impact. Another possible reason may be that European MNC's invest in longer term projects and therefore its impact is not yet visible.

6. Conclusion

Without doubt, the presence of China in Africa has been exponentially increasing since the beginning of the 21st century. The question is whether Africa benefits from China's presence and how it benefits. This thesis has investigated what the influence of China's FDI is on the economic situation and the well-being of the African population. It has been once again confirmed that FDI is an important factor of economic growth and therefore both Chinese FDI as well as general FDI are beneficial for developing countries such as the African countries. What the effects on their well-being are, is a slightly more complex question to answer. This question is answered by analysing well-being and evaluating how it responds to Chinese FDI. Well-being is broken down into inequality, corruption, pollution and child labor. For equality of wealth this thesis concludes that it is influenced in a negative way by Chinese FDI. Also the results show that corruption tends to increase due to the Chinese FDI. However, this thesis has also found support that the presence of Chinese FDI has a positive contribution to the environment. Child labor is not affected by Chinese FDI or by any other economic factor. For the latter it is of course possible that there is no relation between Chinese investments and the above mentioned issues. However, it is also possible that the lack of data hides possible significant results, or that the results are not yet visible because China has only been economically active in Africa for the last ten years. Both problems can be resolved by repeating the same research several years from now, because the Chinese influence will become more visible due to the longer time scale and for the same reason more data will be available. As well as well-being other factors can be investigated such as life expectancy and crime rates, which in the short term will most likely not change by increasing FDI flows, but may change over a longer period of time.

Since most of the criticism comes from the Western countries and the "developed world" it is also interesting to compare the effects of Western influence such as aid and FDI versus Chinese influence on the well-being of the average African. This thesis has only controlled for western influence, but it has not checked whether the differences are statistically significant.

The data available shows that Chinese FDI worsens inequality and corruption, but improves the environment and the economic performance. Overall one can state that for now it shows Chinese FDI reduces well-being. Despite the fact that Africa is in need of FDI regarding its economic performance and despite the fact that the increase of inequality can be explained by other factors (even though limited data availability makes it difficult to control for these factors), African countries will have to be cautious regarding Chinese FDI.

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