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Department of Economics

DIPLOMA THESIS

Impact of education and literacy on economic growth (focus on selected African countries)

Author: Bc. Hana Nováková

Supervisor: Ing. Zuzana Křístková, Ph.D.

Declaration

I hereby declare that I have worked on my Diploma Thesis titled “Impact of education and literacy on economic growth (focus on selected African countries)” solely and completely on my own and that I have marked all quotations in the text. The literature and other material I have used are mentioned in the bibliography section of the Thesis.

In Prague on 8th April 2011

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Hana Nováková

Acknowledgement

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Impact of education and literacy on economic growth (focus on selected African countries)

Vliv vzdělání a gramotnosti na ekonomický růst (se zaměřením na vybrané africké země)

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Summary:

The focus of this thesis is to assess the impact of education level and literacy on the economic growth of African countries. This impact is examined directly - through the level of gross national income (GNI), but also indirectly - through the inflow of foreign direct investments (FDI). Relationships are proposed in a recursive econometric model and examined with the Ordinary Least Square method (OLS); the model consists of two linear equations.

Results of a regression analysis, done on 45 African countries, support the pre-hypothesis that FDI has a positive impact on the economic growth of African countries. Analysis also has shown that gross enrolment rate into secondary education has a statistically significant impact on inward FDI per capita and GNI PPP per capita in the years 2005 – 2007. These relationships have been proved to be strong and statistically significant.

Key words: developing country, gross enrolment rate in education, literacy, foreign direct investments, economic growth, regression analysis, Africa

Souhrn:

Cílem této práce je zjistit jaký vliv má úroveň vzdělání a gramotnosti na ekonomický růst afrických zemí. Tento dopad je zkoumán přímo přes úroveň hrubého národního důchodu (GNI), ale také nepřímo prostřednictvím přílivu přímých zahraničních investic (FDI). Vztahy jsou navrženy v rekurzivním ekonometrickém modelu a zkoumány metodou nejmenších čtverců (OLS), model se skládá ze dvou lineárních rovnic.

Výsledky regresní analýzy, provedené na 45 afrických zemích, podporují počáteční předpoklad, že přímé zahraniční investice mají pozitivní dopad na ekonomický růst afrických zemí. Analýza také ukázala, že hrubý zápis do sekundárního vzdělávání má statisticky významný dopad na příliv přímých zahraničních investic na obyvatele a hrubý národní důchod na obyvatele v letech 2005 - 2007. Tyto vztahy byly prokázány jako silné a statisticky významné.

Klíčová slova: rozvojová země, hrubý zápis do škol, gramotnost, přímé zahraniční investice, ekonomický růst, regresní analýza, Afrika

Content

1. Introduction

For children living in the developed worlds of Europe, America and Australia, school attendance is part of their everyday life. Most children take this for granted. They can not realise yet what impact it has on the welfare of their future life, but not only on their own welfare but also on welfare of the country they are growing up in.

Unlike these kids, children in Africa are not as lucky. Thanks to hard work of international organizations such as UNESCO, UNICEF and World Bank, the situation in Africa is improving year by year. However African level of development, welfare and most importantly (for this thesis) level of education delivered is incomparably lower than that in developed continents such as Europe.

What impact does the level of education actually have on economic growth in developing countries? Connection between education and economic growth has been discussed repeatedly. Great economists such as Friedman (1980), Lucas (1988), Mincer (1984), Barro (1998), Krueger & Lindhal (2000), Pritchett (2001), Stevens & Weale (2003), Naude (2004) and many others tried to answer this question. However they did not come to same conclusion. This thesis also attempts to find an answer for this complicated global phenomenon.

Focus of this thesis is African countries and examination of impact of literacy, primary, secondary and tertiary education on the economic growth of these countries. This impact is examined directly through level of gross national income (GNI) of the countries, but also indirectly through inflow of foreign direct investments (FDI).

FDI is chosen as the second proxy for economic growth, because for African countries FDI has been crucial source of finances, technology development and improved efficiency. FDI was also proved as a significant stem of brain drain. Nhu Tran (2004)

Nothing in reality is as easy as described in theories and this is no different when analysing FDI in Africa. There are issues arising e.g. connected with natural resources exploitation and thus positive impacts of FDI in Africa are sometimes disputable. However the situation

in Africa is very serious and it is obvious that Africa needs foreign investments. Without the influx of money from outside of the continent, Africa would be unable to reduce its dependence on aid. Therefore especially for Africa, there is certainly in the next decades no other way how to reach development and sustain economic growth than FDI.

2. Literature overview

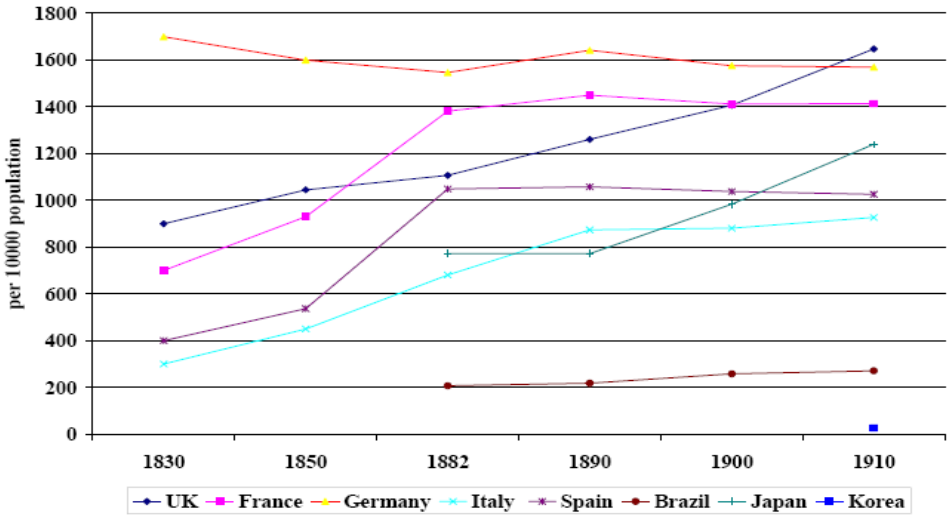
2.1. Development of education and literacy rates in the world

Education has been accessible in some form since ancient times. In England there was a large number of schools by the end of the 16th century, during the days of Queen Elizabeth, but only a few of them older than the governance of King Edward VI, which was just half a century before the reign of Queen Elizabeth. (Stevens & Weale, 2003) In Austria, the educational system dates back to the 11th century where medieval monastic schools flourished. The present Austrian education system was established by Maria Theresa's reform introduced in 1774. The aim of the education reform was to send all children of both genders and older than six years, to school. In the United Kingdom elementary education became compulsory 100 years after Austria in 1870. Nations Encyclopedia (2011)

The broadest expansion of education has happened in the last 200 years. Free secondary education was introduced in 1907, but in a very limited extent. It was not until 1944 that free secondary education was universal. With regards to tertiary education, only a small minority of people had access to tertiary education until almost the end of the 20th century. Stevens & Weale (2003)

Figure 1 shows development of primary school enrolment rates on the sample of 8 countries in the period of years 1830 – 1910. Developed countries such as UK, France and Germany had the highest enrolment rates throughout all years tracked in this graph.

Figure 1 - Primary school enrolment rates



Source: Stevens & Martin (2003)

Easterlin (1981) indicated in 1850, that very few people outside North-Western Europe and North America had any formal education. This was still true in Africa, in much of Asia and Latin America until 1940. UNESCO (2002) pointed out that school enrolment rates and adults' years of schooling have increased dramatically in almost all developing countries since 1960. Behrman (2002) validated in his work by his statistics: "In 1960 the mean expected schooling for all 76 developing economies was 4.5 years, with a standard deviation of 2.6 years and a range from (1.3 to 10.5 years). By 1981 mean expected schooling had increased to 7.5 years, with a standard deviation of 3.0 years and a range from 1.4 to 13.7 years."

Expansion of schooling among countries led to a better educated population, but that was not the only reason for spreading education widely. Stevens & Weale (2003) suggested that formal school usually preceded the beginning of modern economic growth. Mary Theresa probably set her educational reforms in place with a similar believe.

Nevertheless in some countries it wasn't true and the increase in schooling wasn't followed by the increase in economic growth. This event can be theoretically explained by Eaterlin's

assumption that the type of education was crucial. For example in Spain education was strictly controlled by the Church, therefore students only focused on oral instruction in religion and learning manual skills. Consequently illiteracy remained despite the level of school attendance. According to Easterlin's opinion, it was the combination of education and protestant Christianity which was responsible for the economic success of countries in North-Western Europe, at the time when there was little development in other countries.

Looking closely at the methods of measuring quantity of education, a number of indicators can be defined. Glewwe & Kremer (2006) suggested that the most cited and the most widely available indicator is the gross enrolment rate. Gross enrolment rate is defined by these authors as the number of children enrolled in a particular level of education, regardless of age, as a percentage of the population in the age group associated with that level. The age range for primary school was set to 6 – 11 years.

Glewwe & Kremer (2006) also suggested an alternative measure of education, that being the net enrolment rate, "the number of children enrolled in a particular level of schooling, who are of the age associated with that level of schooling, divided by all children of the age associated with that level of schooling." In comparison to gross enrolment rate this indicator cannot exceed 100% and does not have the bias of the enrolment of "overage" children in a given level, which is caused in gross enrolment rates by repetition or delayed enrolment.

Gross enrolment rate is used in Table 1 to picture the expansion of primary education in years 1960-2008. In 1960, primary school gross enrolment rates were 65% in low-income countries, 83% in middle-income countries, and in high-income countries over 100%. It can be observed that by the year 2008 in both low and middle-income countries enrolment exceeded 100%, but it unfortunately does not mean that all children in the school-age are attending school. As Glewwe & Kremer explained in their work, "first grade repetition raises gross enrolment rates." The authors hence elaborated, that "in a school system with 6 years of primary education, a 100 percent gross enrolment rate is consistent with 75 percent

of children taking 8 years to complete primary school (because each child repeats two grades) and 25 percent of children never attending school."

The most dramatic development of gross primary enrolment rate can be observed in Sub-Saharan Africa and South Asia, where the enrolment rates jumped from 40% in 1960 to 100% in year 2008.

Table 1 - Primary school gross enrolment rates (percent of students of primary school age)

Area	1960	1970	1980	1990	2000	2003 - 2008
World	80	87	97	102	104	107
Country group:						
Low-income	65	77	94	102	102	100
Middle-income	83	103	101	103	110	107
High-income	109	100	101	102	102	102
Region:						
Sub-Saharan Africa	40	51	80	74	77	100
Middle East/North Africa	59	79	89	96	97	100
Latin America	91	107	105	106	127	116
South Asia	41	71	77	90	98	107
East Asia	87	90	111	120	111	113

Sources: Glewe & Kremer (2006); Unicef (2011/1); own elaboration

Table 2 shows trends in secondary gross enrolments from 1960 to 2009. In the Middle East, Latin America, Asia and North Africa, secondary school enrolment rates were similar (10 - 14%) in 1960, but by the year 2000, the 47% rate of South Asia was much lower than 86% in Latin America and even lower than the 66% in the Middle East and North Africa. Despite that in 1960 East Asia, with its 20% share, had higher secondary enrolment than Latin America (14%), later in the year 2000 a stagnation of East Asian development can be seen. East Asia reached only 67% of secondary school gross enrolment which is a significant difference in comparison with 86% share of Latin America. In Sub-Saharan Africa a much slower development can be observed throughout this whole period.

Table 2 - Secondary school gross enrolment rates (percent of students of secondary school age)

Area	1960	1970	1980	1990	2000	2005-2009
World	29	36	49	55	67	67
Country group:						
Low-income	14	21	34	41	54	62
Middle-income	21	33	51	59	77	83
High-income	63	74	87	92	101	102
Region:						
Sub-Saharan Africa	5	6	15	23	27	36
Middle East/North Africa	13	25	42	56	66	69
Latin America	14	28	42	49	86	91
South Asia	10	23	27	39	47	52
East Asia	20	24	44	48	67	76

Sources: Glewe & Kremer (2006); Unicef (2011/1); own elaboration

The last figure to be presented is introducing development of literacy rates in the years 1960-2008. Table 3 shows the literacy rates among adults, means age above 15 years. It can be seen from the table that the literacy rates in 1960 in low income countries were approximately two thirds lower than literacy rates in high income countries, whilst, in the year 2000, the literacy rates in low income countries have increased to two thirds of literacy rates in developed countries. Low income countries are also noted to have a much greater percentage change in literacy rates between years 1960 and 2000 than middle income countries. Despite the big progress of low income countries, the universal literacy was not achieved even in years 2005- 2008.

Table 3 - Literacy rate among adults, age 15+

Area	1960	1970	1980	1990	2000	2005-2008
Country group:						
Low-income	32	44	54	63	70	66
Middle-income	62	68	75	80	85	84
High-income	95	96	97	98	98	99
Region:						
Sub-Saharan Africa	24	41	50	53	60	62
Middle East/North Africa	33	54	66	76	83	82
Latin America	67	84	90	93	95	95
South Asia	26	43	52	61	69	71
East Asia	54	83	91	95	97	96

Sources: Glewe & Kremer (2006); Unicef (2011/1); own elaboration

Benefits connected with having a basic level of education have been discussed amongst International organisations many times, with the aim to spread education to all children, young people and adults around the world. Objectives were first set at the inaugural 'World Conference on Education for All (EFA)' in Jomtien in 1990 and later reaffirmed by in the World Education Forum in Dakar in 2000. Representatives from all countries declared that "by 2015 all children of primary-school age would participate in free schooling of acceptable quality and that gender disparities in schooling would be eliminated." (UNESCO 2002)

At the 2000 World Education Forum in Dakar delegates identified following six goals, which are targeted to satisfy the educational needs of all children, youth and adults by 2015: (UNESCO 2002)

Goal 1 - Expanding and improving comprehensive early childhood care and education, especially for the most vulnerable and disadvantaged children.

Goal 2 - Ensuring that by 2015 all children, particularly girls, children in difficult circumstances and those belonging to ethnic minorities, have access to, and complete, free and compulsory primary education of good quality.

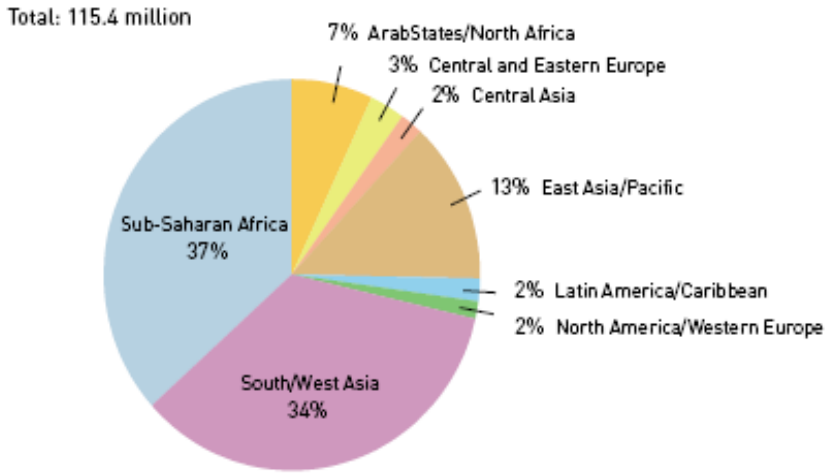
Goal 3 - Ensuring that the learning needs of all young people and adults are met through equitable access to appropriate learning and life-skills programmes.

Goal 4 - Achieving a 50 percent improvement in levels of adult literacy by 2015, especially for women, and equitable access to basic and continuing education for all adults.

Goal 5 - Eliminating gender disparities in primary and secondary education by 2005, and achieving gender equality in education by 2015, with a focus on ensuring girls' full and equal access to and achievement in basic education of good quality.

Goal 6 - Improving all aspects of the quality of education and ensuring excellence of all so that recognized and measurable learning outcomes are achieved by all, especially in literacy, numeracy and essential life skill

Figure 2 - Out-of-school children: distribution by region (1999/2000)



Source: UNESCO (2002)

Figure 2 shows how many children were out of school in different regions while the EFA goals were set in Dakar Forum in 2000.

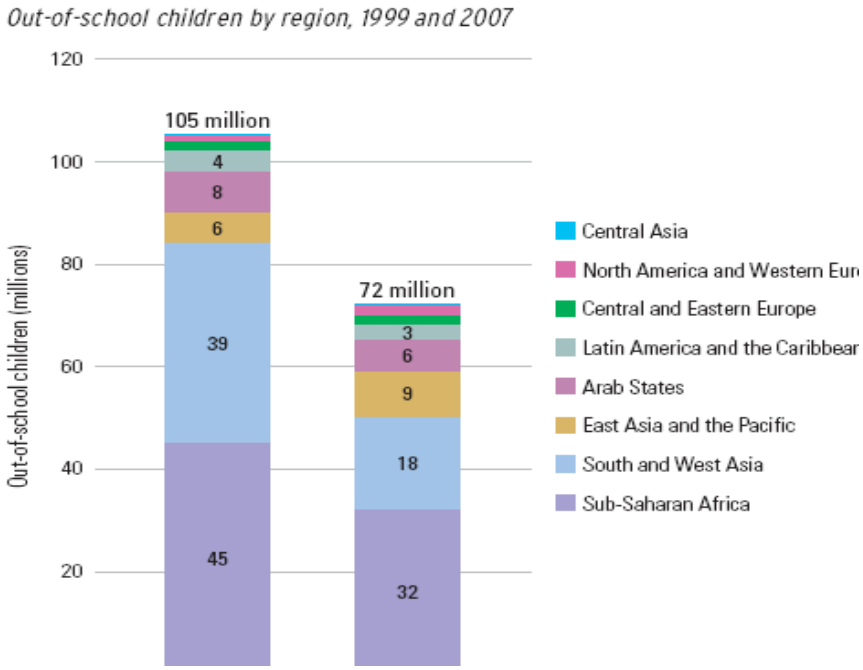
The EFA goals were evaluated in 2006, and a UNESCO report emphasized that literacy had been neglected and a higher importance was put on other EFA goals. At that time one-fifth of the world's adult population was without basic literacy skills. Most of them were from

Sub-Saharan Africa and Asia. It was pointed out that "literacy is not prominent in most education plans and typically accounts for only 1% of public spending on education."

The same report UNESCO (2006) looked at UNESCO's balance sheet and found out that aid to basic education is insufficient: "it still represents only about 2.6% of Official Development Assistance (and within this, aid for adult literacy is minuscule). It will fall far short of the US $7 billion a year estimated to be needed just for achieving universal primary education and gender parity." Aid is not allocated sufficiently to the countries with the greatest need.

UNESCO report in 2010 reviewed again the progress towards the Dakar education goals set in 2000. The report pointed out that to reach universal primary education, it is crucial to focus on getting girls into school. Between the years 1999 and 2007, out-of-school numbers for primary age children had decreased by 33million to 72million (see Figure 3 for division by regions).

Figure 3 - Numbers of out-of-school children declines



Source: UNESCO (2010)

The UNESCO 2010 report suggested that if an emphasis is not placed on marginalized groups, then potentially there could be 56 million children out of school by 2015. Some higher income countries will have to pay much more attention to their out-of-school population, because for example in the Philippines and Turkey the problem has been disregarded. Hence, they will have to target marginalized groups more systematically to deliver on the Dakar commitments. UNESCO (2010)

Despite the positive progress towards the EFA goals some of the poorer countries are still struggling to achieve universal school enrolment. New findings of UNESCO's researchers discovered that the official data might overestimate the number of children enrolled at school at the appropriate age due to late entry, drop out and also school attendance. A household survey showed that a number of countries are overestimating school attendance rate by 10% or more. UNESCO (2010)

Another issue presented in the UNESCO report 2010 was that out-of-school adolescents are frequently overlooked. Most of the effort was given towards attaining enrolment rates in primary school age children and the adolescent situation was a subject of less importance. "There are some 71 million children of lower secondary school age currently out of school. Many have not completed a full primary cycle and face the prospect of social and economic marginalization. Counting adolescents doubles the global headline figure for out-of-school children."

UNESCO (2010) further focused on literacy statistics: "An estimated 759 million adults – around 16% of the world's population aged 15 and over – lack the basic reading, writing and numeracy skills needed in everyday life. More than half live in South and West Asia, and another one-fifth in sub-Saharan Africa. Reflecting the legacy of gender disparity in education, almost two in every three adult illiterates are female." The interesting fact about literacy rates' statistics is that only 20 countries account for 80% of global illiterates – including Bangladesh, China and Pakistan which make up over half of the total number.

In conclusion UNESCO (2010) considered that the 2015 literacy target cannot be achieved on the current path. Hence it will require much more to be done to speed up the progress. A necessity will be stronger political leadership combined with governments which finally realise that investments in literacy have the possibility to create large returns to the society and also to the economy.

2.2. Benefits of education and literacy

Education and literacy has been found to produce very similar benefits to individuals and nations. In this chapter information gathered from a UNESCO report (2002), focused on the benefits of literacy, and research done by Wolfe & Haveman (2001), aimed at the benefits of education, will be presented. Both works agreed that very similar profits can be gained from literacy and education and a summary of their findings are combined and listed below.

- Education and literacy partake in ability to maintain good health, control reproductive behaviour, raise healthy children and educate them. Improving literacy and education has large social benefits such as lowering child mortality and raising life expectancy.
- Human benefits are related with improved self-esteem, empowerment, creativity and critical reflection, which were observed on students participating in adult literacy programs.
- Literacy and education might increase political participation and hence help to raise the quality of public policies and democracy. Attendants of adult literacy programs increased their participation in trade unions, community action and national political life.
- Education can help efficient and educated choice, e.g. consumer choice, and therefore has a positive impact on well-being.
- Literacy programs give an access to written culture, which can be explored by participants independently on the program's culture orientation. It means that attendants can widen their prospects about other cultures and history. Furthermore they can use their newly gained literacy for preserving and promoting culture, which lead to cultural openness and diversity.
- Education and literacy might lead to lower participation in criminal activities and also gender equality.

2.3. Impact of education and literacy on economic growth

Many various reports and articles have been written about the impact of education on economic growth. In the following chapter, the most influential and relevant works are presented.

For a basic understanding of the theoretical impact of education on economic growth, it might be handy to first look at the simplest framework of Solow's (1956) and Lucas' (1988) theories of economic growth. Despite as Solow stated "All theory depends on assumptions which are not quite true. That is what makes it theory", these theories can help to picture the dynamism of process of development of country with a connection to education.

Solow (1956) defined his model of economic growth as a simple equation consisting of two factors. It was assumed that there are two inputs, labour, L, and capital, K, with only one aggregate output, Y. Inflowing inputs can be further subdivided and human capital would be included under the factor Capital. What further emerges from the Solow model is that if the stock of human capital is expanded a higher output will be produced and a high growth rate can be expected.

Lucas (1988) suggested that a high level of education leads to a rapid growth rate. His model admits the possibility of wide and sustained differences in growth rates across countries, differences systematically linked to each country's initial capital level.

Number of scientist took part in research of impact of education and literacy on economic growth, many of them came to positive conclusions. Their works are presented in the next part of the thesis.

Behrman (2002) emphasized the positive association between 'schooling level across countries and per capita income'. The author's work is based on the demand for and the supply for schooling: "The demand for schooling tends to be higher where per capita income is greater both because there is a positive income elasticity for the services

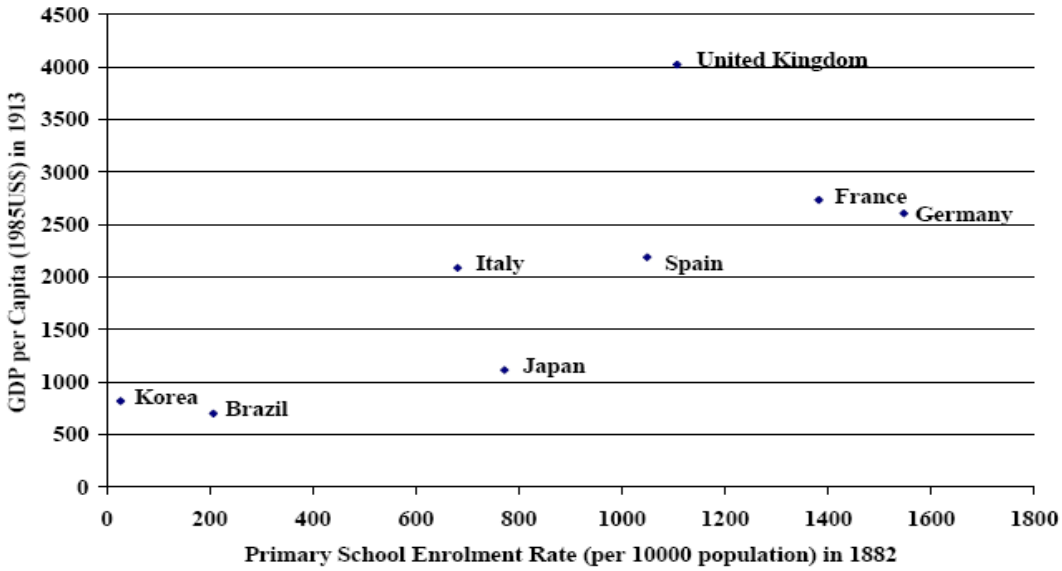
produced directly or indirectly by schooling and because the cost of waiting to obtain a return on schooling and on other investments tends to fall with the lower interest rates and longer expected lives associated with higher per capita incomes."

More recently researches from Austrian Academy of Sciences in Vienna - IIASA (2008) proved in new research that creation of human capital (population's education and health status) plays a significant role in a country's economic development. They concluded that better education leads not only to higher individual income, but is also a necessary precondition for long-term economic growth.

Looking at more specific numbers, work of Philip Stevens and Martin Weale (2003) supported other micro-economic and macro-economic analysis for effect of education on income. Most researchers agreed with rate of return in the range of 6 - 12% p.a. Stevens and Weale did not find any conclusive evidence to suggest that returns to education would be very different from this range and they also added that other results suggesting much higher or much lower rates lack credibility.

In the same work, Stevens & Weale (2003) pictured very clearly (Figure 4) that there was a high association between levels of GDP per capita and high levels of primary school enrolment thirty years ago.

Figure 4 - Education and GDP per capita



Source: Stevens & Weale (2003)

Mincer (1984) concluded that even if significant levels of human capital may not be a requirement for an increased rate of economic growth at a certain time and place, the coexisting growth and distribution of human capital appear to be necessary to ensure sustained economic development.

In the work by Benhabib & Spiegel (1994) it is found that growth in output is unaffected by expanding education, although growth is affected by the 'existing stock'. Their results indicated that there is not a significant direct influence of human capital in explaining per capita growth rates. However authors identified a model in which the growth rate of total factor productivity depends on a nation's human capital stock level. Tests using this model indicated a positive role for human capital. It means an indirect impact on per capita growth rate was proven through the productivity of factors.

It is not unusual that findings of different researchers are in dispute. Following works did not come to so positive conclusions as those stated above. Krueger & Lindahl (2000) showed that increase in schooling does not have any short-term effect on growth, but a statistically significant effect in the longer term, concretely ten to twenty years.

Pritchett (2001) in his paper “Where has all education gone?” explained how education failed in its contribution to economic growth. The author emerged that however attainment of education growth rapidly in nearly all developing countries in years 1960-1970, on average education contributed much less than was expected in the standard augmented of the Solow model. He also answered the question posed in the title of this work by three possible explanations:

- It was found that in some countries schooling created cognitive skills and these skills were in demand, but for doing wrong things. “The expansion of schooling has meant the country just has better educated pirates.”
- As the rate of growth of demand for educated labour had varied across countries, it was seen that marginal returns to education fell dramatically, stayed constant or rose.
- He blamed it as well on differing effectiveness of transmitting knowledge and skills, in some countries, education was enormously effective, but in others created hardly any skills and was worthless.

2.4. Impact of years of schooling on economic growth

Barro (1998) investigated in his analysis how important is an impact of number of years of schooling on the economic growth. His results suggested that the growth rate rose by 1.2% p.a. by only one extra year of education for men. In his framework countries with low incomes per capita tend to catch up with those with high incomes, Barro thus concluded that a total impact of education on growth is even bigger. Years of schooling have a positive impact on the rate of catch-up; hence for countries with a high level of education it is easier to absorb best-practice technology.

An earlier study by Mincer (1974) looked at individual earnings vs. years of education and also other factors such as age and experience. He found that for white males not working on farms, an extra year of education raised an individual's earnings by around 7%. When earnings were calculated relative to the number of years of work, the return to a year's schooling increased to 10.1% (see Table 4 below).

Table 4 - Mincerian Returns to Education

Income band (1985 US$)	Mean income	Years' education	Mincerian Return
Low income (<$610)	$299	6.4	11.2
Lower middle income ($610-$2,449)	$1,402	8.4	11.7
Upper middle income ($2,500-$7,619)	$4,184	9.9	7.8
High income (>$7,619)	$13,100	10.9	6.6
World	$2,020	8.7	10.1

Source: Mincer. (1974)

Krueger & Lindahl (2001) split countries into three groups based on education levels. In their analysis, a positive link between education and growth was found statistically significant, concerning only the countries with the lowest level of education. They examined a relationship between 'economic growth and years of education' and found that for low levels of education, education plays a contributing role towards growth, while for high levels of education, it slows down the rate of growth.

The role of different kind of education was also explored by Psacharopoulos & Patrinos (2002). They analysed a panel of 98 countries from the period of 1960 -1997 and found

that: “the typical estimates of the rate of return from advanced schooling were substantially lower than those from primary schooling.” The average public rate of return for primary education was 18.9 per cent, while for tertiary education it was just 10.8 per cent.

Wolff (2000) defined primary schooling as a level at which students gain the basic literacy and numerical skills that are necessary for all types of work. His results showed primary schooling as the most powerful variable for explaining growth in per capita income among countries at all levels of development.

His findings were not as positive in the case of secondary education, which was concluded as a very weak explanatory factor of productivity growth. However he further defended some types of higher education such as alternative institutional arrangements like worker-based or employer-based training, apprenticeship programs, and technical education by stating that they may bear a stronger relation to productivity growth than average years of secondary schooling.

It seems that present development policy which has been applied by many countries was influenced by such as studies as that one written by Psacharopoulos & Patrinos (2002) and Wolff (2000). Governments and major organizations e.g. UNESCO, put a big emphasis on primary education, while there is not as much attention paid to higher education. In the next chapters arguments for primary and higher education will be presented following various reasoning for different types of education.

2.4.1. Impact of primary education and literacy

Literacy has brought many benefits to society one of them being its impact on the economic development of many countries. Naudé (2004) is one of the authors who supported the positive effect of literacy. His analysis was applied on panel data for 1970-1990 for 44 African countries. He found that literacy is one of the variables which have a positive effect on GDP per capita growth.

The relationship between literacy skills and economic growth was also investigated by Coulombe & et al. (2004). He discovered that the 55% of differences in economic growth among OECD countries over 1960-1994 can be explained by differences in average literacy skills. It means that large economic returns could be yield by investing into raising the average level of skills. Moreover he found that direct measures of human capital based on literacy scores are performing better than years-of-schooling for the explanation of growth in output per capita per worker.

The author further stated that economic benefits are more extensive with an increasing number of people with access to education. Thus, it was emerged that the average literacy score is a better indicator for purpose of measuring the growth than the percentage of the population with very high literacy scores. It can be also said that a country working on its development should focus on spreading strong literacy skills widely throughout its population because it will be more successful than countries with the large gap between high-skill and low-skill groups.

Other authors considered that the impact of literacy on economic development is dependent on the initial level of literacy. Countries which went through rapid economic growth founded on technology transfers had first reached a literacy rate of at least 40 %. These findings are coming from work of Azardians & Drazen (1990) who called this event as a threshold effect.

Sachs & Warner (1997) came up with a statistically significant S-shaped relationship. This relation depends on literacy rates and reached maximum effect, if these rates were neither

very high nor very low. It means that economic growth might not be affected by small changes at high and low levels, but small changes at the intermediate levels do have a considerable impact. These small changes are typical for many developing countries.

Indirect impact of primary education on economic growth was elaborated by Colclough (1982), who concluded that labour productivity, which helps to achieve higher rates of economic growth, is increased by primary education. This works for both the urban and rural sector. That was considered as a main reason for investment into education. Colclough (1982) names other benefits of education; such as a reduction of fertility, an improvement of health and nutrition and a promotion of other behavioural and attitudinal changes which contribute to economic development.

2.4.2. Impact of higher education

Despite Friedman and his wife Rose (1980) stated that there were no records proving that "higher education yields 'social benefits' over and above the benefits that accrue to the students themselves." They later hypothesized that higher education might promote "social unrest and political instability" and that higher education might create higher tax revenues, increase investment and savings, and lead to a more entrepreneurial and civic society.

The following two presented studies are trying to challenge belief that tertiary education has only a small effect on economic development. Both studies were created in recent years and despite there being only a two year gap between them, authors intercepted different attitudes of the international development community. That might have been a sign of a positive progress in the community's strategies. In the study of David Bloom & et al. (2006), authors described the attitude of organizations, such as the World Bank, and the major donor governments as being quite uninterested to the lack of higher education in developing countries. However the authors also said that they might start to rethink the importance of higher education. Two years later in a study written by Aziz Babar & et al. (2008) progress can already be seen in the organizations' and the governments' behaviour. The authors stated that "the developing countries realized that higher education is one of the most important means of scientific, technological and industrial progress which is a vital for economic development." It is interesting to discover that such as advancement in the attitudes to the higher education was made just in two years. Nevertheless this finding might be theoretically biased by that fact that the authors focused on different geographical areas in their analyses.

Aziz Babar & et al. (2008) found a casual relationship between the system of higher education and employment rate and economic growth in Pakistan. Therefore, it was concluded that the system of higher education enrolment employment rates does have an impact on the GDPs. These findings supported their opinion that higher education plays an important role in the development of any nations and that skill labour force participation rate is important with regard to their contribution to the economic growth.

David Bloom & et al (2006) focused in their paper on Sub-Saharan Africa and reviewed evidence about the impact of tertiary education on economic development and poverty reduction. The authors suggested that this evidence highlighted higher education as a determinant and also as a result of income, and that higher education can produce public and private benefits.

The authors' analysis suggested that increasing tertiary education may be important in promoting faster technological catch-up and improving a country's ability to maximise its economic output. At the time of their study Bloom & et al. showed that the production level in Sub-Saharan Africa's was about 23 per cent below its production possibility. "Our analysis indicated that, given this shortfall, increasing the stock of tertiary education by one year would shift out Africa's production possibility frontier and increase the rate of convergence to that frontier, resulting in a 0.63 percentage point boost to income growth in the first year and an income gain of roughly 3 percent after five years."

However in the conclusion Bloom & et al. emphasised that if other barriers to development play a negative role, then higher education cannot make a difference in Africa. "Higher education creates the potential, but governments and private actors must seize the opportunities." Key factors which Africa can benefit from were highlighted as being; openness to trade and an increased cooperation with developed countries.

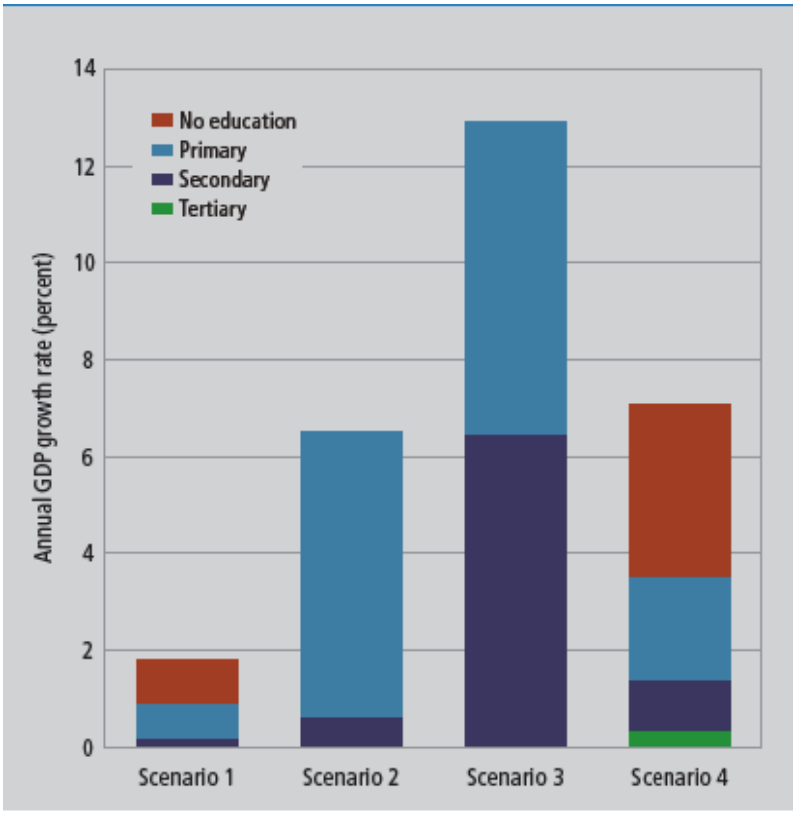
Another very unique study supporting the importance of higher education was introduced by researchers from the International Institute for Applied Systems Analysis (IIASA) and the Vienna Institute of Demography of the Austrian Academy of Sciences. This research analysed the role of schooling and as authors claimed the paper is "solving an old puzzle with new data." IIASA (2008)

The researchers defended secondary education by stating that this kind of education provides a clear boost to economic development, much more than can be achieved by universal primary education alone and therefore they considered universal primary education as an important but insufficient goal. Hence, the universal primary education must be accomplished with broad based secondary education to be likely to give poor

countries that educated capital which is necessary to bring the bulk of population out of poverty. Tertiary education will play a key role in economic growth of industrialized countries.

Researchers from IIASA suggested four alternative growth scenarios to picture how annual GDP growth rates change depending on four alternative educational distributions (Figure 5).

Figure 5 - Annual GDP growth rates according to four alternative educational attainment distributions



Source: IIASA (2008)

"Scenario 1 presents the reference case of a country with a young age structure (70% of the working age population in the 15- to 40-year-old group and 30% in the 40- to 65-year-old group), a low starting level of income and investment rate and the following educational structure: half of the population with no formal schooling, 40% with some primary, and 10% with at least completed junior secondary school (but no tertiary education). The

education groups used in the analysis (no education, primary, secondary, and tertiary) are non-overlapping. This roughly fits the demographic structure of some Latin American and African countries in the IIASA study sample, e.g., Guatemala, Honduras, Kenya, Rwanda or Uganda. On the basis of the estimated model, such a country would have rather slow economic growth." IIASA (2008)

Scenario 2 The Millennium Development Goal is to 'achieve universal primary education'. The model in scenario 2 makes the hypothetical assumption that the Millennium Development Goal has been met a long time ago – and that the previously uneducated half of the adult population now has primary education. This case would lead to reasonably higher average growth of GDP. IIASA (2008)

Scenario 3 is proposing a new additional millennium development goal, which can be effort to add widespread secondary education to universal primary education. Graph shows that investment into secondary education (in this model 50% of population with some secondary education) provide with a significant boost of the county's economic growth. IIASA (2008)

Scenario 4 elaborates the case of India and proposes, what could be another possible way for improvement away from the baseline, which is universal primary education. In this scenario is half of the population without any schooling; however 5% reach tertiary, 15% secondary and 30% primary education. This model of elitist education, with half of the population remaining completely uneducated, has obviously better results than the baseline and also better than the universal primary education combined with 10% secondary and no tertiary. Scenario 3 with universal secondary education however still does better than this scenario. IIASA (2008)

2.5. Impact of education on inflow of FDI

Considering the impact of education on economic growth, various ways of how to influence economic development by increasing education level can be considered. One of them is indirectly, through attracting FDI by a countries' human capital. Higher inflows of FDI may contribute to an increase of GDP of the country and consequently to its economic development.

2.5.1. FDI and economic growth

Firstly there has to be discussed if any link between FDI and economic growth actually exists. The following authors confirmed in their research that there is a positive relationship between inflowing FDI and the economic development of the country.

Berhanu & Samuel (2007) presented in their results FDI as one of the two most important determinants of economic growth over the study period analysed in their work. The authors also pointed out that "effect on economic growth was more through its efficiency effects than through its augmentation of domestic investment."

Despite that Fukase (2010) did not show clearly how FDI and education interact to affect economic growth; he proposed that there are various channels through which growth can be affected by FDI. The author found coefficients for the interaction term between FDI and education to be sensitive to the coverage of source, host countries and the periods included.

The positive impact of FDI on economic growth was also supported by Nhu Tran (2004) in his work. According to his findings, in many countries FDI created jobs, access to new markets, and gain opportunities to utilise comparative advantages, leading to higher relative wages, lower prices and improved national welfare. The author also indicated FDI as the best way how to transfer technology and managerial skills from developed world, and how to finance economic activities in the host country. According to Nhu Tran the right way to improve the world's efficiency is how the FDI does it. It means bringing technology and the production sites to the areas with labour, especially skilled labour and with cheapest

land available. The less developed countries should take this chance to “stem brain drain and improve economic conditions and welfare.” Nhu Tra (2004)

Between FDI and brain drain was found a very important connection. As Austrian researchers presented in their recent study IIASA (2008), elaborated in the Chapter 2.4.2., even a small percentage of people with tertiary education can make a big impact on the economic growth. It could have been seen on their example of India (Figure 5 – Scenario 4). Despite that a half of the Indian population does not have any education; their economic boost was bigger than in countries with the universal primary education accomplished with 10% of secondary education. Such results were reached only thanks to India's 5% of population with tertiary education.

However, if it is concluded that 'brain drain' worsen economic growth (IIASA, 2008) and also that FDI protects countries from brain drain (Nhu Tran, 2004), then that can be considered as another evidence supporting the fact that FDI has a positive impact on economic growth.

Gohou & Soumare (2009) found a strong positive impact of FDI on the poverty reduction at the aggregate African level. Poverty reduction was measured through welfare expressed in their analyses by Human Development Index and per capita real GDP. When they looked into regional impacts, they found that: “FDI impacts positively welfare in Central and Eastern Africa, while it has no significant impact in Northern and Southern Africa, and has an ambiguous impact in Western Africa.”

Ambiguous results were also presented in Nilsson's paper (2008), which emphasized that certain conditions have to be created otherwise FDI may not work as a mean of alleviation of poverty, through economic growth in the host country. The author also signed the level of human capital in the host country as one of the necessary conditions.

Alfaro (2003) came in her analysis to more sophisticated results. She elaborated different types of FDI and found that FDI flowing into different sectors of the economy as a primary sector, manufacturing and services have different effects on economic growth. According

to her findings FDI flowing into the primary sector usually have a negative effect on the growth, while FDI flowing into the manufacturing sector a positive one. Alfaro's evidence for the FDI in the service sector was ambiguous. Hence, the author concluded that not all types of foreign direct investments are beneficial for host countries' economies. This assumption might suggest potential change in efforts towards attracting different forms of FDI inflows, maybe even negative incentives for certain forms of FDI, concretely in compliance with her analysis investments in natural resources.

Impact of FDI on economic growth was elaborated in many articles and analysis but authors did not come to the same conclusions, as demonstrated in the following part, where arguments with negative conclusions are presented.

Following authors, Kosack & Tobin (2006), did not find much positive relation between FDI and economic development in developing countries. The authors showed theoretically and statistically, that belief that an increase of FDI is major for development, might be invalid and at least need qualification. The impact of FDI on development in their models was conditional so the authors concluded that FDI probably does not have any effect on economic growth, and it does not affect human development in more developed countries. Furthermore FDI might even slow the rate of human development in countries with low level of human capital and in countries with extremely low levels it might actually work against development. Most importantly they wanted in their analysis to point out that the conventional assumption, FDI and aid can be used as a substitute is wrong: "Poor countries need democracy and aid, not FDI." Kosack & Tobin (2006)

However, Kosack & Tobin in their conclusion warned that their results might be true only about FDI generally, because if they separated FDI into sectors or types, they maybe would have seen that certain types produce, for example, significant technological spillovers, or that the capital stock in a country is reduced by other types of FDI. Beside this, they said that it is possible that FDI does have an effect on human development or growth, but only in the long term.

Even more negative were the findings of Herzer & et al. (2007), who stated that in the majority of countries neither a long-term nor a short-term effect of FDI on economic growth exists. The authors found that there is not even one country with a positive unidirectional long-term effect from FDI to GDP.

Summer (2005) agreed that FDI might be good for aggregate growth, but it is an open question, whether it is good for increasing per capita incomes and consequently reducing income poverty. Different types of FDI are beneficial for different countries and benefits also vary in different circumstances for different business environments.

The author emphasized in his conclusion that “the question is not whether FDI is good or bad for social and economic development, but rather whether the terms upon which the FDI is accepted-the 'rules of engagement'-will lead to more harm than good.”

2.5.2. FDI and human capital

The following authors tried to clarify if human capital can influence the volume of FDI inflowing into the country. Findings supporting this argument are presented in the next part of the thesis. Mentioned also are results that did not find human capital as a determinant of FDI.

Dunning (1988) concluded that the education and skill level of labour can influence activities of transnational corporations undertaken in a country and more importantly volume of FDI inflows.

Lucas (1990) assumed that lack of human capital might discourage foreign investors to invest into less-developed countries.

Zhang & Markusen (1999) presented a model where the direct requirement of transnational corporations in the host country was the availability of skilled labour which influenced the volume of FDI inflows.

Noorbakhsh & Paloni (2001) and Schneider & Frey (1985) are authors who also came up with supportive evidence that shows secondary education as a statistically significant determinant of FDI.

Another study, which supported the hypothesis that geographical distribution of FDI might be done according to the level of human capital in the country, was written by Hanson (1996). However he showed in his cross-country analyses of 105 developing countries, that the security of property rights and political stability may have been more crucial determinants for FDI inflow than human capital.

Root & Ahmed (1979) discovered during their analysis that none of the variables which was used for human capital and skilled labour was a significant determinant of FDI inflows for their sample of 58 developing countries.

Argumentation presented above considered the connection between human capital and FDI as a 'unidirectional relationship', nevertheless according to my opinion it is important to note, that between human capital and FDI might be mutual interaction.

This interaction was described as complex and highly non-linear by Blomstom & Kokko (2002). They emphasized that potential spillovers of knowledge to the local labour force can be created by FDI inflows, while how much the FDI is attracted by the country depends on the level of human capital. On the host country's level of human capital depends also whether the benefits will be absorbed by the local firms. Therefore Blomstom & Kokko (2002) further stated, that "host economies with relatively high levels of human capital might be able to attract many technology intensive foreign multi-national corporations that could contribute significantly to the further development of local labour skills. On the other hand, economies with weaker initial conditions are likely to experience smaller inflows of FDI, and those foreign firms that enter are likely to use simpler technologies that contribute only marginally to local learning and skill development."

3. Objectives

The main objective of this thesis is to find if there is a positive impact of education on the economic growth in Africa. This objective is reached by regression analysis applied on two hypotheses and discussion of the results of the analysis. For the discussion of the results evidence from prior investigation is used.

The first hypothesis to be elaborated says that human capital is a determinant of foreign direct investments in developing countries and that way it indirectly influences economic growth:

"The level of education and literacy has an indirect impact on economic growth through flow of FDI into the developing countries of Africa."

As the impact of education on economic growth is the topic of this thesis, it is supposed, (based on findings of scientists' presented in chapter 2.5.1) that there is a positive relationship between FDI and economic growth.

An impact of education and literacy on a countries' economic growth is elaborated as my second hypothesis:

"The level of education and literacy has a direct impact on the level of GNI in the developing countries of Africa."

The hypotheses are examined on the sample of 52 African countries. Africa was chosen due to continuing crisis of the standard of education delivered by this continent to its inhabitants. Universal literacy and primary education in Africa has not been reached, therefore it can be discussed how different levels of education actually influence the inflow of FDI and the level of GNI in these countries. A sample of countries that reached universal literacy and primary education would not allow this discussion.

4. Methodology

Data used in the empirical part are collected only from reliable sources; African Development Indicators 2010 published by World Bank; World Development Report 2008 published by United Nations' Conference on Trade and Development (UNCTAD); Country Profiles published by United Nations Children's Fund (UNICEF) and also The Economist Intelligence Unit's index of democracy report published by Laza Kekic for Economist in the year 2007.

For an economic growth analysis, a long time series would likely show relationships between variables more precisely and would be more suitable for this kind of analysis. However, longitudinal data was unavailable therefore data is only gathered for the years 2005, 2006 and 2007.

In empirical part are firstly presented **descriptive statistics** (mean, standard deviation, median) of the variables entering the model and **exploratory analysis** of the data set is performed. In this part normality of the data is checked and outliers are identified. For this purpose Normality Test is applied. Further some graphical tools such as histogram and box plots show the distribution of the data and identify observations lying beyond the normal distribution (Johnson & Wichern, 1992). Some of these outputs are presented in the appendix.

Empirical part further includes a **Regression Analysis** calculated in statistical software SPSS 17.0. Relationships proposed in a recursive econometric model are examined with the **Ordinary Least Square method** (OLS); the model consists of two linear equations. Recursive model is a model in which the current values of one explained variable influence the current values of another explained variable, while the previous values of the second explained variable have already affected the current values of the first. Hansen & Sargent (2005)

“The OLS is one, very common approach, to the estimation problem. This method analyse the general linear model $Y = X\beta + \mu$, where Y is an n x 1 vector of observations on the regressand, X is an n x k matrix of n observations on k repressors (n>k), β is a k x 1vector of the unknown parameters and μ is the n x 1 vector of disturbance terms. Dependent variable Y is determined linearly by the independent k variables in X; parameters β_i (i=1,2,…k) are unknown constants and the error term represents the difference between the observed value of Y and that given by the theoretical model (Xβ). The term μ is referred to as the ‘error’ term. Estimation of this model by OLS involves utilizing observed data (Y, X) to calculate an estimate of the vector β. If β is estimated by the value b then Xb represents the estimated value of Y and the errors are the estimated by the vector Y-Xb; this vector is referred to as the ‘residual’ and the process of estimation seeks to minimize the residuals.” Darnell (1994)

In the OLS method we are looking for the most suitable variables by **Backward method**. This method begins with a model with all explanatory variables and progressively eliminates variables from the model based on the size of the regression sum of squares. Hebak & et al. (2005)

In addition to the regression analysis simple **correlation coefficients** are presented to demonstrate the interdependence between the explanatory and explained variables.

Level of statistical significance (p-value) is set on $p < 0.05$.

5. Empirical part

5.1. Introduction of the model

Recursive model, which consist of two linear equations expressing the two hypotheses proposed, is defined as following:

"The level of education and literacy has an indirect impact on economic growth through flow of FDI into the developing countries of Africa."

$$FDI\ PC = \gamma_{11} + \gamma_{12}\ PGER + \gamma_{13}\ SGER + \gamma_{14}\ TGER + \gamma_{15}\ LR + \gamma_{16}\ PCR + \gamma_{17}\ PPTR + \\ + \gamma_{18}\ DI + \mu_1 \qquad (1)$$

"The level of education and literacy has a direct impact on the level of GNI in the developing countries of Africa."

$$GNI\ PPP\ PC = \gamma_{21} + \beta_{21}\ FDI\ PC + \gamma_{22}\ PGER + \gamma_{23} SGER + \gamma_{24}\ TGER + \gamma_{25}\ LR + \gamma_{26}\ PCR + \\ + \gamma_{27}\ PPTR + \mu_2 \qquad (2)$$

FDI PC – FDI per capita in dollars

GNI PPP PC – GNI PPP per capita in dollars

PGER – Gross enrolment rates into primary education (%)

SGER - Gross enrolment rates into secondary education (%)

TGER – Gross enrolment rates into tertiary education (%)

LR – Total adult literacy rate (%)

PCR – Primary completion rate (%)

PPTR – Pupil-teacher ratio in primary education

DI – Democracy index

The choice of variables for two linear equations was influenced by the accessibility of the data. Unfortunately African statistics have a narrow span not only in number of indexes, but

also in time series available. Therefore some of the suitable indicators could not have been included in the analysis.

One of them is net enrolment rate into education. This indicator may give a more exact representation than gross enrolment rate, because it takes into consideration only students of age connected with certain level of education and also cannot be biased by repetition rate. Completion rates and pupil-teacher ratios were as well not accessible for secondary and tertiary level of education.

In both equations there is only one observation used for each variable. The observation for all variables, except of literacy and democracy index, is calculated as a simple average from years 2005 - 2007. Literacy was accessible for the whole sample of countries only as an average of years 2003 - 2008. Literacy is a quite stable index that does not annually go through significant changes. Therefore it is supposed that use of mean of years 2003 – 2008 should not bias the results. The Economist published a Democracy index for the first time in the year 2007 and since this time updated data only every two years. This means only an index for the year 2006 is available and subsequently used in this analysis.

Prior to calculation of average missing values for one of the years (2005 - 2007) from the date set were calculated, if possible, and added into the data set. They were calculated by extrapolation from the longest period, which was available prior of the missing observation.

It is expected to find direct dependency of explained variable FDI PC on group of explanatory variables PGER, SGER, TGER, LR, PCR, DI in the first equation (1) and explained variable GNI PPP PC on group of explanatory variables FDI PC, PGER, SGER, TGER, LR, PCR in the second equation (2). It supposes that parameters Gama for explanatory variables and parameter Beta for FDI PC should be positive, which means that with increase of the explanatory variables should also explained variables increase. Indirect dependency is expected between FDI PC and PPTR in equation (1); GNI PPP PC and PPTR in equation (2). Thus parameters γ_{17} and γ_{27} are supposed to be negative, which means that if explanatory variable PPTR increases explained variables FDI PC and GNI PPP PC decrease.

5.2. Explanatory data analyses

5.2.1. Descriptive analysis of the data set

Further variables entering the model are defined. Data collected for these variables are presented in tables and graphs, constructed for each variable. The tables present extreme values appearing in the data set. The graphs show the rest of the values, which are not included in the tables and lying closer to average value.

FDI per capita in $

As Duce (2003) defined in his book: "FDI is the aim of obtaining a lasting interest by a resident entity of one economy in an enterprise that is resident in another economy. The 'lasting interest' implies the existence of a long-term mutual relationship and investor's a significant degree of influence on the management of the latter."

Data for FDI PC is collected for 52 African countries from World Investment Report 2008 published by UNCTAD (2008/1). UNCTAD's calculation of FDI is as following: "FDI includes the three following components: equity capital, reinvested earnings and intra-company loans. Data on FDI flows are presented on net bases (capital transactions' credits less debits between direct investors and their foreign affiliates)." UNCTAD (2002)

In the FDI PC data set are quite big differences in observations among the countries. In Table 5 are captured the highest and the lowest observations. Maximum inflow of FDI PC was measured for Equatorial Guinea and is equal to $2,804. Minimum inflow of FDI PC was negative and equal to $-55.44 in Angola and $ –0.42 in Eritrea.

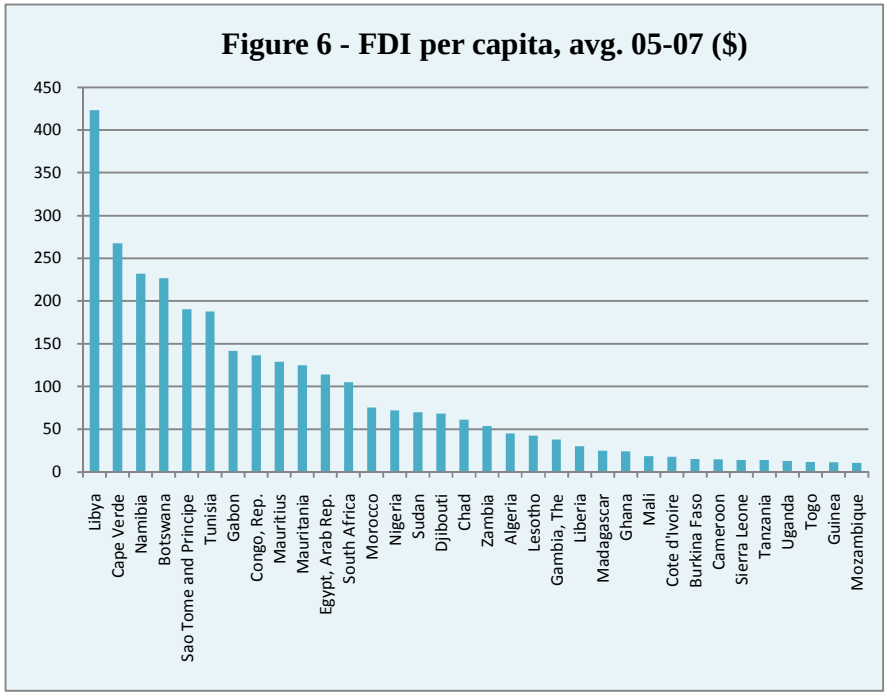
As UNCTAD (2002) explains "FDI flows with a negative sign indicate that at least one of the three components of FDI (equity capital, reinvested earnings or intra-company loans) is negative and not offset by positive amounts of the remaining components." As Angola is one of the recipients with a quite high regular inflow of FDI, it has to be explained that negative inflows registered in the years 2005 and 2006 were due to the acquisition which Angola experienced at that time in oil industry field. UNCTAD (2007)

Mean of the data set is equal to $ 166, while median is only $ 25. Standard deviation that equals to $ 470 together with other indicators shows the presence of outliers in the date set. As Table 5 shows there is couple of extreme values measured in case of Equatorial Guinea and Seychelles, which push the average higher.

Figure 6 pictures inflow of FDI PC into 34 countries, values of inflow for these countries were in a range of $ 11 (in case of Mozambique and Guinea) to $ 423 (Libya).

Table 5 - Highest and lowest inflow of FDI PC to Africa - avg.05-07 ($)

Highest inflows: Equatorial Guinea	2,804.01
Seychelles	1,893.24
Central African Republic	841.68
Lowest inflows: Angola	-55.44
Eritrea	-0.42
Burundi	0.05
Comoros	1.63
Niger	2.63
Malawi	2.73
Congo, Dem. Rep.	2.78
Rwanda	3.46
Ethiopia	4.63
Zimbabwe	5.67
Benin	6.33
Swaziland	6.45
Kenya	7.13
Guinea-Bissau	7.53
Senegal	9.85



Source – Table 5; Figure 6: UNCTAD (2008/1); own elaboration

GNI PPP per capita in international $

"GNI comprises the total value produced within a country together with its income received from other countries (notably interests and dividends), less similar payments made to other countries." (Lequiller & Blades, 2006) GNI PPP is then gross national income which is adjusted by purchasing power parity. Such adjustments are used in the process of conversion thus eliminating differences in price levels between nations. As OECD (2011) states "Purchasing power parities are currency conversion rates that both convert to a common currency and equalise the purchasing power of different currencies."

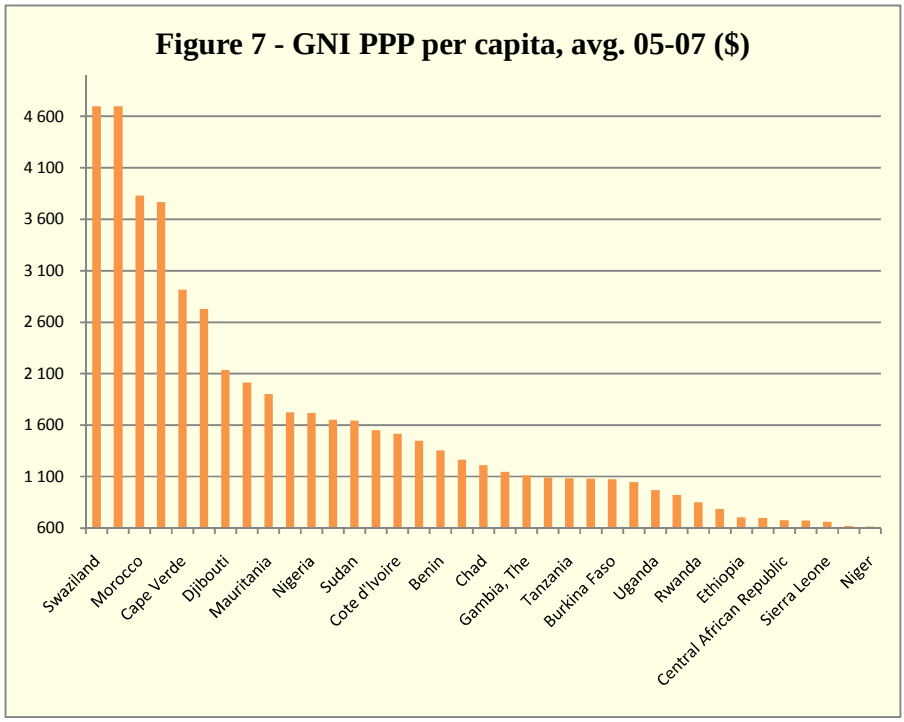
Data for GNI PPP PC is collected from African Development Indicators 2010 published by World Bank (2010). World Bank calculates GNI PPP PC as "gross national income (GNI) divided by midyear population converted to international dollars using purchasing power parity rates. An international dollar has the same purchasing power over GNI as a U.S. dollar has in the United States." World Bank (2011)

GNI PPP PC is monitored for 52 African countries. The highest level of GNI PPP PC is shooting to $17,964 in Seychelles. The mean calculated for this data set is equal to $ 3,260 and median is $1,402. Standard deviation for this variable is $4,184. These figures show that there are outliers included in the data.

The highest and the lowest levels of GNI PPP PC in Africa are shown in Table 6. The ten countries in the sample highlighted dark orange have levels of GNI PPP PC over $5,000. These countries push the average value much higher. If these 10 countries are excluded from the sample, the mean would drop by more than two times to $1,456. The lowest levels of GNI PPP PC are in Zimbabwe $164 and in Liberia $262.

Figure 7 pictures 37 countries with GNI PPP PC in range of $ 615 (Niger) to $ 4,698 (Swaziland); however most values on the graph sit under $ 2,000.

Table 6 - Highest and lowest GNI PPP PC avg. 05-07 ($)	
Highest GNI: Seychelles	17,963.82
Equatorial Guinea	14,115.72
Libya	13,607.85
Botswana	11,887.08
Gabon	11,650.12
Mauritius	10,675.15
South Africa	8,915.60
Algeria	7,206.04
Tunisia	6,618.19
Namibia	5,724.05
Lowest GNI: Zimbabwe	163.80
Liberia	262.18
Congo, Dem. Rep.	271.52
Burundi	351.12
Guinea-Bissau	498.15



Source – Table 6; Figure 7: World Bank (2010); own elaboration

Gross enrolment rate into education

"Gross enrolment rate measures the number of children enrolled in a particular level of education, regardless of age associated with that level of schooling." Glewwe & Kremer, (2006)

This rate is represented in percentages. Due to the principle of its calculation, measured values can exceed 100%. Such excess expresses either high repetition rates or late enrolment of children into the certain level of education. This phenomenon mostly appears in gross primary school education.

For the purpose of this analysis, gross enrolment rate into primary, secondary and tertiary education is used. All data was gathered from African Development Indicators 2010 published by World Bank (2010).

Gross enrolment rate into primary education

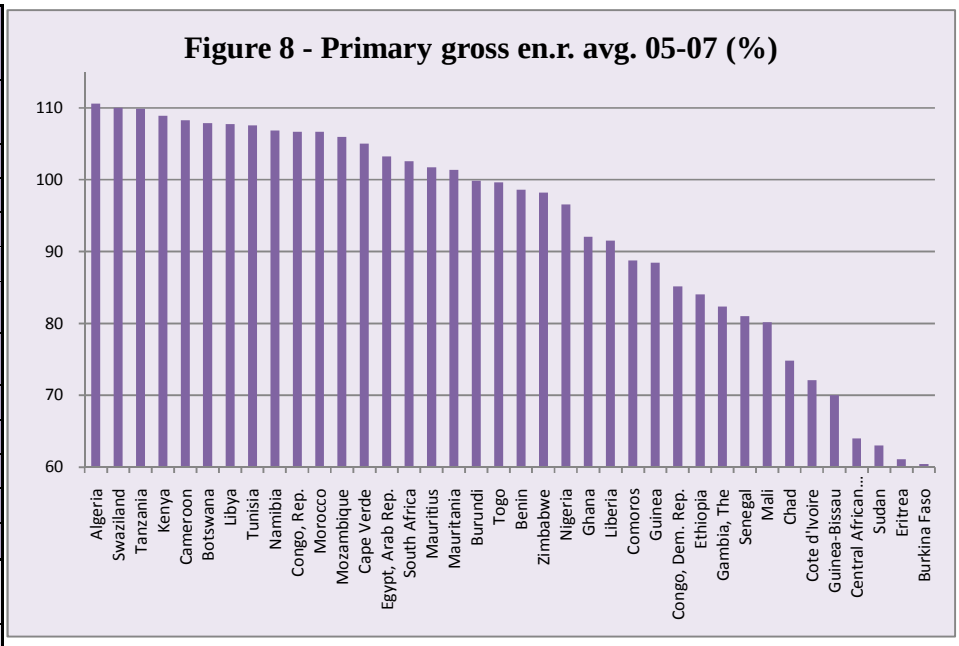
Sample of 52 African countries has an average gross enrolment rate into primary education equal to 101 %, with median of 103 %. Nevertheless, as it is explained above, this value of enrolment does not indicate universal primary education. Standard deviation is calculated as 27 %. Angola with its PGER of 194% is the only outlier of the data set.

Table 7 includes the highest and the lowest gross enrolment rates into primary education. The highest level of gross enrolment among these African countries includes Angola, Gabon, Sierra Leone and Madagascar. It should be pointed out that value of this enrolment rate, especially in case of Angola (194%), is quite high. Extreme excess of 100% might be either caused by late enrolment of kids into primary schools or by high repetition rate. The lowest gross enrolment rate into primary education is Djibouti (44%) and Niger (51%). Neither too high nor too low rates of enrolments are a positive sign of the standard of education delivered by that country.

Figure 8 pictures 38 countries, which have gross enrolment rate into primary education in the range of 60% to 111%.

Table 7 - Highest and lowest prim. gr. en.r. avg. 05-07 (%)

Highest rates: Angola	194.00
Gabon	152.50
Sierra Leone	147.08
Madagascar	139.99
Rwanda	138.53
Sao Tome and Principe	127.88
Equatorial Guinea	121.85
Malawi	118.58
Seychelles	116.94
Uganda	116.92
Zambia	116.82
Lesotho	115.98
Lowest rates: Djibouti	44.06
Niger	51.21



Source – Table 7; Figure 8: World Bank (2010); own elaboration

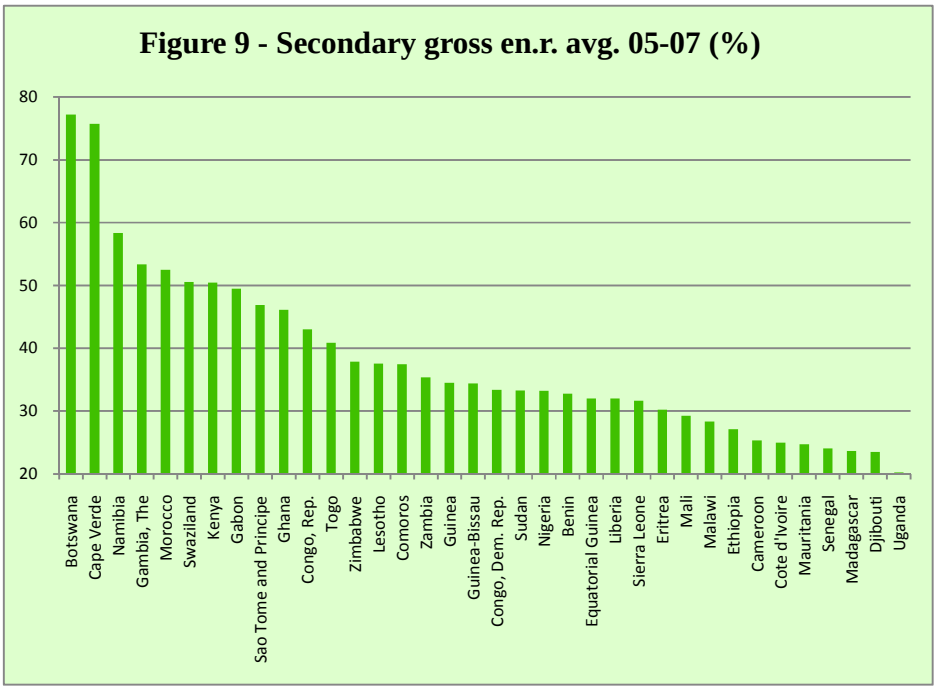
Gross enrolment rate into secondary education

Secondary gross enrolment rates analysed on the sample of 52 African countries have span between 7% in Tanzania to 106% in Seychelles. Table 8 and Figure 9 are showing how big differences between the countries can be observed. In Table 8 are the highest and the lowest rates sorted. Only small number of countries exceeds 85% of gross enrolment rate into secondary education. 43 countries from the sample has secondary gross enrolment rate under 60%.

Mean of this data set is equal to 41% and median has value of 33%. Standard deviation is calculated as 25% and indicates that there are no extreme values appearing in the data set.

Table 8 - Highest and lowest sec. gr.en.r. avg. 05-07 (%)

Highest rates: Seychelles	106.04
South Africa	96.86
Libya	96.82
Mauritius	90.75
Egypt, Arab Rep.	88.00
Algeria	86.07
Tunisia	85.39
Lowest rates: Tanzania	6.50
Niger	10.52
Central African Republic	11.26
Burundi	14.20
Burkina Faso	14.62
Mozambique	15.70
Rwanda	15.89
Chad	16.75
Angola	17.50



Source – Table 8; Figure 9: World Bank (2010); own elaboration

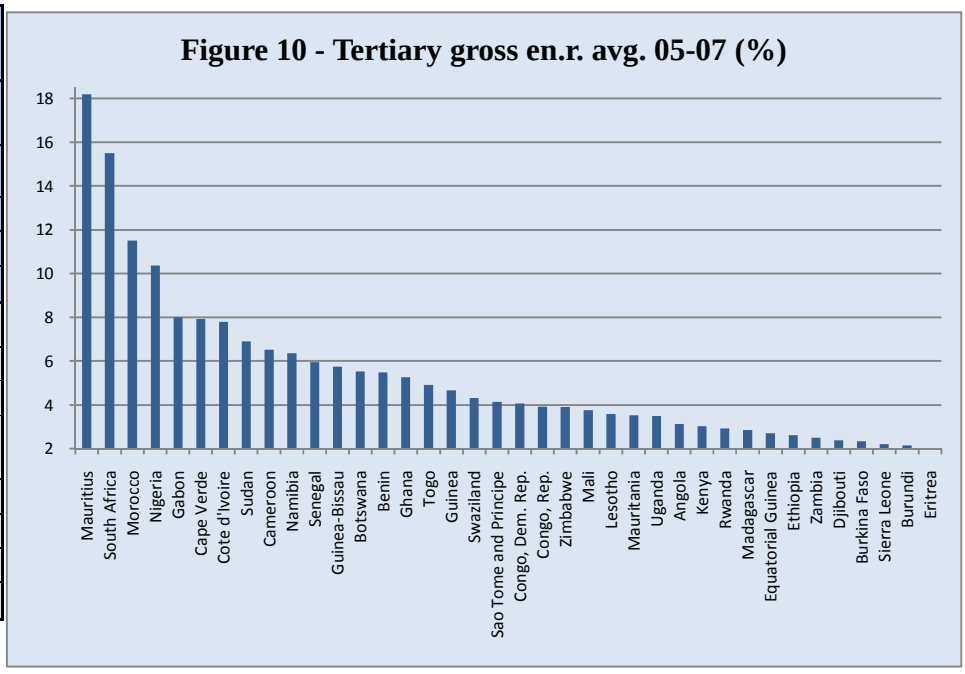
Gross enrolment rate into tertiary education

Tertiary gross enrolment rate is elaborated on 51 African countries, not 52, as data for Seychelles was not available. The average value for this variable is 7%, while the median is 4%. Standard deviation is calculated as 10%. The range of the tertiary gross enrolment rates is between the lowest of 0.5% for Malawi and 49% for Libya. It can be concluded from these figures that Libya is an extreme value of this data set.

As it can be seen in Table 9, among the highest tertiary enrolment rates are mainly more developed countries from North Africa. Figure 10 pictures countries whose gross enrolment rates into tertiary education are between 18% as in Mauritius and 2% as in Eritrea and Burundi. It needs to be pointed out that 42 African countries out of the sample have tertiary enrolment rate under 10%, tertiary enrolment of 36 countries out of these sit under 6%.

Table 9 - Highest and lowest ter. gr. en.r. avg. 05-07 (%)

Highest rates: Libya	48.80
Egypt, Arab Rep.	37.82
Tunisia	30.63
Algeria	22.40
Liberia	22.00
Lowest rates: Malawi	0.48
Niger	1.09
Comoros	1.10
Central African Republic	1.20
Chad	1.24
Tanzania	1.48
Gambia, The	1.70
Mozambique	1.72



Source – Table 9; Figure 10: World Bank (2010); own elaboration

Total adult literacy rate

The Data collected is from Country Profiles Statistics published by UNICEF (2011/2). UNICEF (2011/2) defines adult literacy rate as "the percentage of persons aged 15 and over who can read and write."

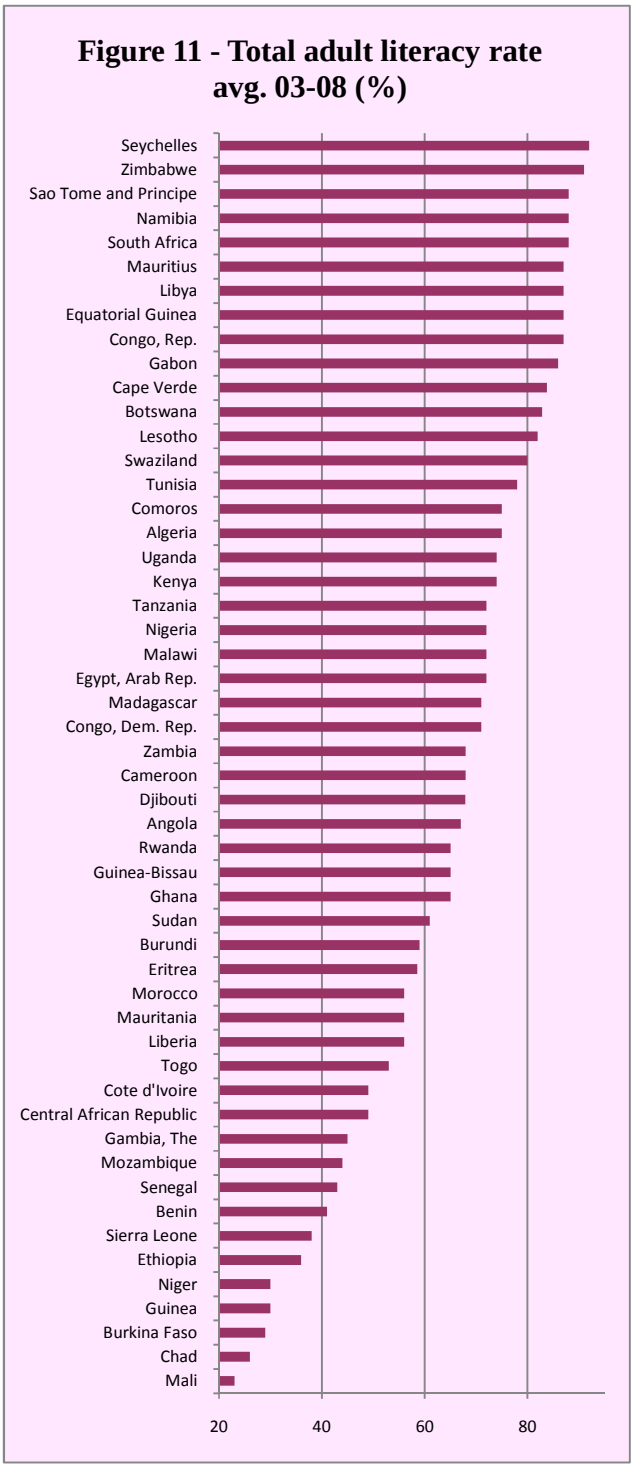
Figure 11 pictures total adult literacy rate for all 52 countries. The average adult literacy rate in these countries is 65%, while median is 68%.

The highest literacy rates are in Seychelles, Zimbabwe and Sao Tome and Principe and sit around 90%. None of these 52 countries reached universal literacy, however the majority of countries, 39 of them, have literacy rate over 50%.

The lowest literacy rate has Mali with 23% and Chad with 26%.

Standard deviation calculated for this data set is equal to 18%.

Figure 11 - Total adult literacy rate avg. 03-08 (%)



Source – Figure 11: UNICEF (2011/2), own elaboration

Primary education completion rate

World Bank defines PCR as "the total number of students regardless of age in the last grade of primary school, minus the number of repeaters in that grade, divided by the number of children of official graduation age." (World Bank, 2011) Due to the principle of calculation, this indicator can be biased in case of high repetition rates.

Table 10 - Highest and lowest prim. ECR avg. 05-07 (%); Data source - World Bank (2010); own elaboration

Highest rates: Seychelles	113.57
Tunisia	106.20
Libya	100.00
Egypt, Arab Rep.	96.75
Botswana	95.45
Lowest rates: Central African Republic	26.31
Chad	30.81
Burkina Faso	31.62
Niger	33.98
Djibouti	34.32

Data for this indicator is gathered for 52 African countries from African Development Indicators 2010 published by World Bank.

This indicator perfectly complements gross enrolment rate into primary education, because it shows the percentage of students enrolled into primary education who actually graduate. It can indicate that despite the fact some countries have high gross enrolment rate not all of the students get to the last grade and graduate. Therefore the gross enrolment rate might be misleading without taking into consideration actual completion rates.

Mean of primary education completion rate is equal to 65%; median is also equal to 65%. Standard deviation calculated for this variable is equal to 21%. The data set does not include any extreme values.

Table 10 indicates that students have the highest chance to get to the last grade of primary education in Seychelles (114%) and Tunisia (106%). Considering primary school students in Djibouti and Niger only 34% have the chance to graduate the elementary school.

Pupil – teacher ratio

World Bank defines PPTR as "the average number of pupils per teacher in primary education in a given school-year, based on headcounts for both pupils and teachers." World Bank (2011)

Data for this indicator were gathered for 52 African countries from African Development Indicators 2010 of World Bank.

Table 11 - Highest and lowest PTR avg. 05-07; Data source - World Bank (2010); own elaboration	
Highest no.: Central African Republic	87.57
Ethiopia	72.28
Rwanda	67.05
Malawi	66.82
Mozambique	66.18
Lowest no.: Seychelles	13.16
Libya	13.74
Tunisia	19.09
Liberia	19.27
Mauritius	21.84

Unlike other variables, in the case of PPTR the lower value of observation is preferential. Lower PPTR means, that there is a lower number of pupils in one classroom, hence students should get more attention from their teachers.

Average PPTR is equal to 41 students and median was calculated as 40 students per teacher. Standard deviation for the PPTR data is equal to 15 students.

Looking at Table 11 the highest PPTR can be found in Central African Republic. In one country's classroom, 88 pupils may be present with only one teacher. Seychelles and Libya have the lowest PPTR. These two countries would have 14 students in one classroom.

Democracy index

Data for democracy index for year 2006 were gathered for 50 African countries from "The Economist Intelligence Unit's index of democracy" report published by Laza Kekic for Economist in the year 2007.

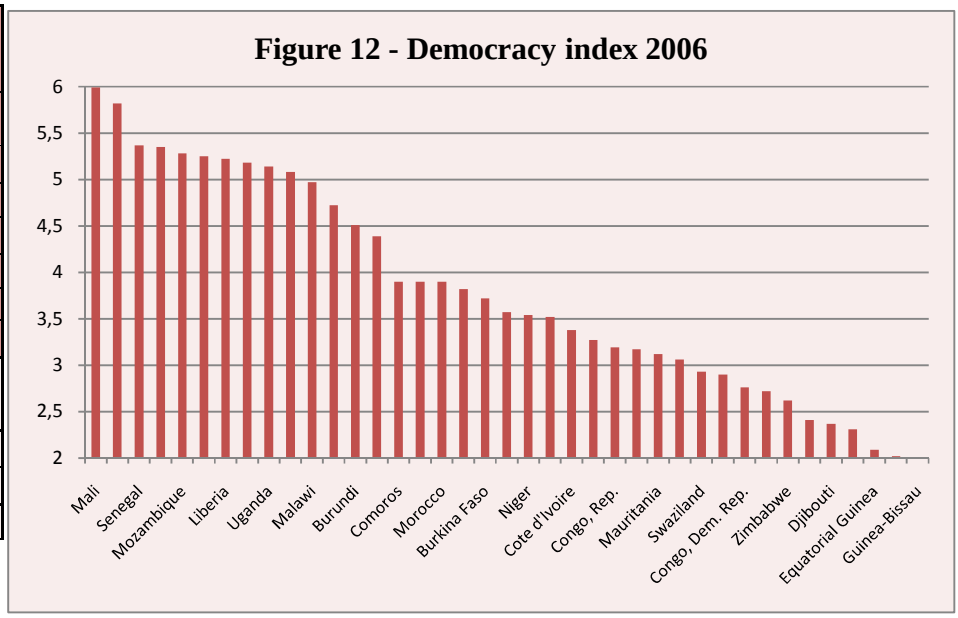
"The Economist Intelligence Unit's democracy index, on a 0 to 10 scale, is based on the ratings for 60 indicators grouped in five categories: electoral process and pluralism; civil liberties; the functioning of government; political participation; and political culture. Adjustments to the category scores are made if countries do not score a 1 in the following critical areas of democracy: whether national elections are free and fair; the security of voters; the influence of foreign powers on government; the capability of the civil service to implement policies." Kekic (2007)

The mean of democracy index calculated for this sample of African countries is equal to 4.11 and median is 3.77. Standard deviation of this data set is calculated as 1.73. These numbers show that the entire democracy index data does not include any extreme values.

Table 12 includes the highest and the lowest democracy indexes. The highest level of democracy index is reached in Mauritius with value of 8.04 and South Africa with value 7.91. On the other hand the lowest democracy index can be found in Central African Republic with 1.61 and Chad with 1.65.

Figure 12 pictures 39 countries in which is democracy index in 2 to 6 range.

Table 12 - Highest and lowest democracy in. 06	
Highest in.: Mauritius	8.04
South Africa	7.91
Botswana	7.60
Cape Verde	7.43
Namibia	6.54
Lesotho	6.48
Benin	6.16
Lowest in.: Central African Republic	1.61
Chad	1.65
Togo	1.75
Libya	1.84



Source –Table 12; Figure 12: Kekic (2007), own elaboration

Table 13 is for better orientation in the basic statistic indicators of all variables giving an overview.

Table 13 - Collective descriptive statistics	FDI PC ($)	GNI PPP PC ($)	PGER (%)	SGER (%)	TGER (%)	LR (%)	PPTR	PECR (%)	DI
Mean	165.88	3 259.63	100.87	41.23	7.33	64.69	41.15	65.28	4.11
Median	24.52	1 401.54	102.89	33.32	3.91	68.00	40.16	64.72	3.77
Std. Deviation	470.37	4 184.31	26.54	25.34	9.55	19.24	15.30	21.40	1.73
Minimum	-55.44	163.80	44.06	6.50	0.48	23.00	13.16	26.31	1.61
Maximum	2 804.01	17 963.82	194.00	106.04	48.80	92.00	87.57	113.57	8.04

Source - own calculation; PPTR – number of pupils per teacher; DI – in range of 0 – 10

5.2.2. Explanatory analyses of data set

In the explanatory analysis it is necessary, in addition to descriptive part, to examine whether the data meet the conditions to enter the regression analysis. Explained variables (GNI PPP PC & FDI PC) should be lying in a normal distribution. In the data set should not appear outliers or even extreme values of observations, both in terms of explaining and explained variables. Such values could significantly affect estimation of the parameters of the model and should therefore be removed.

The original data set contains all available observations in 52 monitored countries in Africa. However due to unavailability of some observations for tertiary education and democracy index, Sao Tome and Principe and Seychelles have to be excluded from further analysis. Eritrea and Angola have negative observations of the inflows of FDI PC. Since it is rather unusual to have negative values of inward FDI these countries are also omitted. Another part of the analysis is entered by the 48 African countries with available information about all the variables.

Data distribution and data transformation

For examination of normality and outliers, the histogram and box plot are used. These graphical outputs picture the shape of a distribution of variables. An overview of selected histograms and box plots is attached in the Appendix 2. Distribution of both explained variables have, as could be expected from these kinds of variables (Zaharim, 2009), a character of the log-normal distribution (Figure 13 - 16). It is necessary to execute a logarithmic transformation on these variables to convert them to the shape of a normal distribution (Figure 17 - 20) and so make them suitable for the model.

Identification of outliers and extreme observations

Before the regression analysis itself it is still necessary to remove some outliers. In terms of the variable FDI PC Equatorial Guinea and the Central African Republic reach extreme values and therefore are excluded. After a logarithmic transformation of the explained

variables it is appropriate to also omit Burundi, which reaches extremely low values also for FDI PC (Figure 18).

Outliers occurring among other explanatory variables are only countries omitted already. Therefore there is no need for further reduction. Only distribution of TGER is markedly abnormal and several extremely high values are occurring. Even in this case helps a logarithmic transformation to enable inclusion variable in the model.

Verification of the relationship between variables

Prior to presenting the actual results of regression analysis it would be useful to verify the relationship between explained and explanatory variables. To do so, Pearson's product-moment correlation coefficient is used to measure mutual linear dependence between two observed variables. (Hebak & et al., 2005) Pearson's correlation coefficients and adequate P-values are captured in Table 14.

Table 14 - Pearson's product-moment correlations coefficients

		FDI PC (ln)	PGER	SGER	TGER (ln)	LR	PPTR	PECR	DI
FDI PC (ln)	Pearson Correlation	1.000	0.147	0.619	0.601	0.389	-0.518	0.515	0.175
	Sig. (2-tailed)		0.334	0.000	0.000	0.008	0.000	0.000	0.249
	N	45	45	45	45	45	45	45	45
GNI-PPP PC (ln)	Pearson Correlation	0.728	0.244	0.739	0.562	0.459	-0.512	0.517	0.216
	Sig. (2-tailed)	0.000	0.107	0.000	0.000	0.002	0.000	0.000	0.153
	N	45	45	45	45	45	45	45	45

For both explained variables FDI PC and GNI PPP PC significant relationship exists with all the explanatory variables except of a variable PGER and DI. The lowest significant influence has LR on FDI PC. Other relationships show a relatively high linear dependence between pairs of variables. The greatest impact on FDI PC has SGER (0.62) and TGER (0.60), for GNI PPP PC is the correlation coefficient even a little higher with SGER (0.74). This relationship is almost identical in the size of a mutual dependency between the two explained variables (0.73).

From the results is obvious that between variables that characterize the education (except PGER) and a variable representing the economic growth is a simple dependency. And there is a presumption that this dependency could also appear in the results of the recursive model.

5.3. Results of the regression analysis of the recursive model

Equation (1)

When evaluating the results of regression analysis let's begin with equation of dependency of FDI PC that has the following form:

$$ln(FDI\ PC) = \gamma_{11} + \gamma_{12}\,PGER + \gamma_{13}\,SGER + \gamma_{14}\,TGER + \gamma_{15}\,LR + \gamma_{16}\,PCR + \gamma_{17}\,PPTR + \gamma_{18}\,DI + \mu_1 \quad \textbf{(1)}$$

By application of the OLS method and base on the procedure assembling the model by method Backward, number of variables is progressively reduced:

$$ln(FDI\ PC) = \gamma_{11} + \gamma_{13}\,SGER + u_1$$

Results of estimations for the first equation of the model are shown in Table 15. Predicted ln(FDI PC) with point estimates g_j (b_j) of the coefficients γ_j (β_j) has form of the following equation:

$$ln\ (est(FDI\ PC)) = 1.732 + 0.037\ SGER$$

Table 15 - Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
(1)	(Constant)	1.732	0.344		5.036	0.000	1.038	2.425
	SGER	0.037	0.007	0.619	5.165	0.000	0.022	0.051

Influence of variable SGER in the equation (1) is statistically significant at the 0.1% level of significance (Table 15).

In the Table 16 is presented value of R Square, this ratio describes from how many percent is the model created identical with the data set (Johnson&Wichern, 1992). R square equal to 0.383 indicate that the equation describes the variable ln (FDI PC) by 38%.

Adjusted R square is R square modified by the number of explanatory variables in the observed equation, therefore its value would be usually lower than value of R square. (Hebak & et al; 2005) This indicator has however the same interpretation as R square and in case of the equation (1) is equal to 0.369 (Table 16).

Table 16 - Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
(1)	0.619	0.383	0.369	1.149

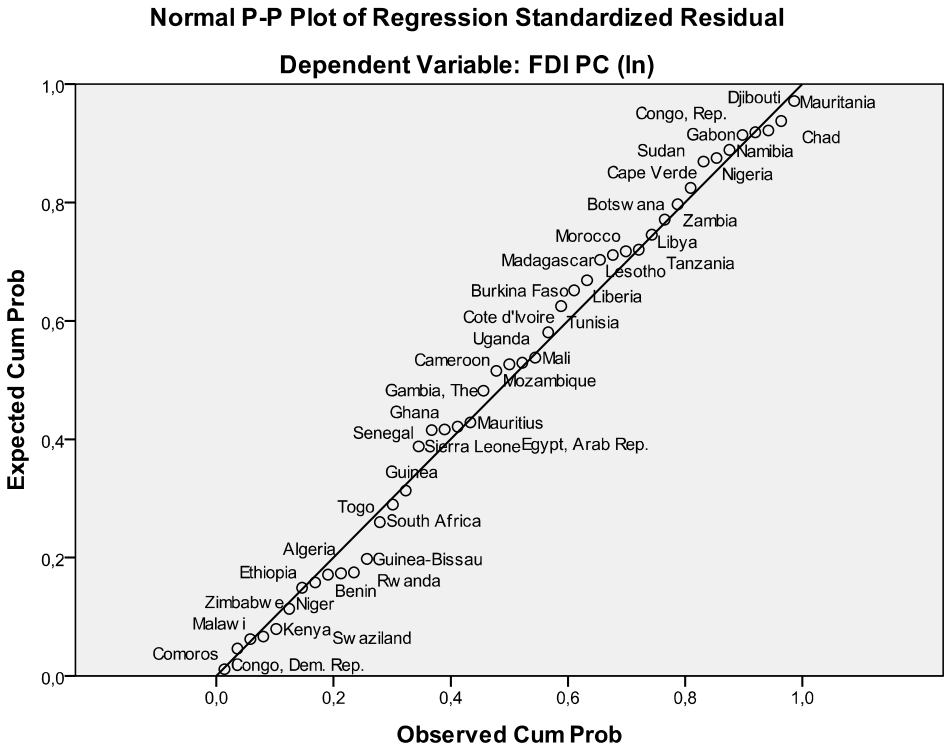
Value of F-test is equal to 26.677 (p-value = 0.000), which shows that R square same as the whole model is statistically significant (Table 17).

Table 17 - ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
(1)	Regression	35.229	1	35.229	26.677	0.000
	Residual	56.786	43	1.321		
	Total	92.015	44			

The Figure 21 shows, how big compliance between observed and expected values is.

Figure 21 – Normal P-P plot of regression standardized residuals of equation (1)



Equation (2)

Now let's proceed to evaluation of the results of the equation expressing dependency of GNI PPP PC on education. The equation enters analysis in the following form:

$$ln(GNI\ PPP\ PC) = \gamma_{21} + \beta_{21}\, ln(FDI\ PC) + \gamma_{22}\, PGER + \gamma_{23} SGER + \gamma_{24} TGER + \gamma_{25}\, LR +$$

$$+ \gamma_{26}\, PCR + \gamma_{27}\, PPTR + \mu_2 \qquad \textbf{(2)}$$

By application of the OLS method and base on the procedure assembling the model by method Backward, number of variables is progressively reduced:

$$ln\ (GNI\ PPP\ PC) = \gamma_{21} + \beta_{21}\, ln(FDI\ PC) + \gamma_{23} SGER + u_1$$

Results of estimations for the first equation of the model are shown in Table 18. Predicted ln (GNI PPP PC) with point estimates g_j (b_j) of the coefficients γ_j (β_j) has form of the following equation:

$$ln\ (est(GNI\ PPP\ PC)) = 5.534 + 0.318\ ln(FDI\ PC) + 0.020\ SGER$$

Table 18 - Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
(2)	(Constant)	5.534	0.234		23.626	0.000	5.061	6.006
	FDI PC (ln)	0.318	0.082	0.439	3.856	0.000	0.151	0.484
	SGER	0.020	0.005	0.468	4.112	0.000	0.010	0.030

Dependence of GNI PPP PC on explained variable from the first equation FDI PC is statistically significant and its significance level is at the 0.1%.

Influence of variable SGER in the equation (2) is statistically significant at the 0.1% level of significance.

In the Table 19 is presented value of R Square. R square equal to 0.665 shows that 67 % of variability of ln (FDI PC) is explained by the model created.

Table 19 - Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
(2)	0.815	0.665	0.649	0.621

If there is in equation (2) as an explanatory variable only SGER, value of R square would be 0.546 (squared Pearson's correlation coefficient from Table 14). From that is obvious

that variable FDI PC is increasing proportion of explained variability of the model by 11.9%.

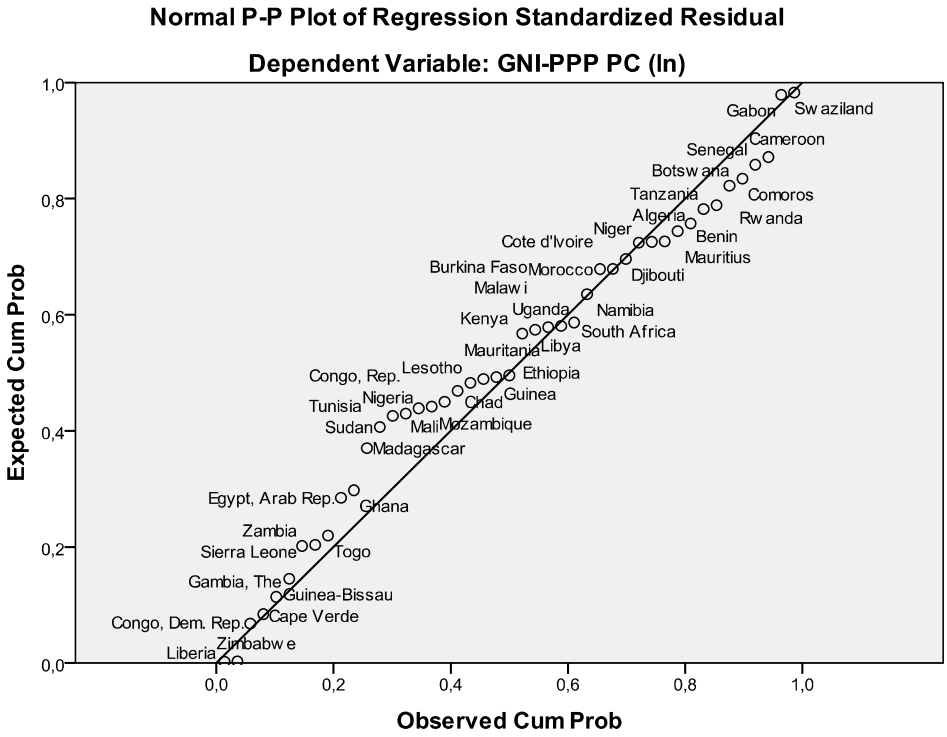
Table 20 - ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
(2)	Regression	32.093	2	16.047	41.639	0.000
	Residual	16.186	42	0.385		
	Total	48.279	44			

Value of F-test is equal to 41.639 (p-value = 0.000), which shows that R square same as the whole model is statistically significant (Table 20).

The Figure 22 shows how consistent observed values with values expected are.

Figure 22 – Normal P-P plot of regression standardized residuals of equation (2)



The aim of this analysis was to find a good model with the greatest number of countries. Before the analysis itself were therefore omitted only countries, which could have significantly influenced estimation of regression parameters. However residuums of the second equations are quite high. In case that other two outliers would have been removed from the model in terms of GNI PPP PC (Liberia, Zimbabwe), the percentage of explained variability of the GNI PPP PC would be raised by 8%.

Theoretical scenarios

Let's use the results of the regression analysis and try to simulate scenario in which is Africa trying to progress one level up in the World Bank countries classification. The World Bank divides countries into groups according to their GNI per capita. An average value of GNI PPP per capita calculated for the 45 countries African countries is equal to $ 2 899, which classify them into the lower middle income countries. World Bank (2011/2)

If it is supposed that these 45 African countries would progress in the World Bank classification to upper middle income countries, they would need to raise its GNI PPP per capita to at least $ 3 946. According to the results this level of GNI PPP per capita can be reached through increase of FDI PC or increase of SGER.

1st Scenario - How much would these African countries have to increase its FDI PC to reach GNI PPP per capita equal to $ 3 946? For calculation is used equation (2) and average level of SGER and FDI PC calculated for 45 African countries:

$$ln(\text{est}(GNI\ PPP\ PC)) = 5.53 + 0.32 * ln(FDI\ PC) + 0.02 * SGER$$

$$8.28 = 5.53 + 0.32 * ln(FDI\ PC) + 0.02 * 41.91$$

$$ln(FDI\ PC) = 5.99$$

$$FDI\ PC = 403.20\ \$$$

If the result $ 403.20 is compared to the average FDI PC ($ 64.36), it is obvious that these countries' FDI PC would have to be increased more than six times, so the World Bank classify them as the upper middle income countries.

2nd Scenario - How much would these African countries have to increase its SGER to reach GNI PPP per capita equal to $ 3 946? Applying the same calculation as above, it is reached result for SGER = 71%. That means that these African countries would have to increase its average gross enrolment rate into secondary education by 30%.

If these two factors (FDI & SGER) are influencing level of GNI PPP per capita both at the same time and in mutual interaction as in reality, their increase, to reach the set level of GNI PPP PC, would probably not have to be as high as it is shown here. However it can be concluded that these scenarios are quite improbable to become reality in at least next decade.

5.4. Discussion of the results

A regression analysis done on 45 African countries has shown that gross enrolment into secondary education has a statistically significant impact on inward FDI per capita in years 2005 – 2007. It might be discussed that, what has been shown in this analysis is an empirical proof and therefore could be only anecdotal; however this is certainly not the first analysis which has produced such results.

There is work of Noorbakhsh & Paloni (2001) who were also focusing on the impact of human capital on FDI, using secondary school enrolment, accumulated years of secondary school in the working population and accumulated years of secondary and tertiary school in the working population as their variable. Noorbakhsh & Paloni found all three determinants to be significant. According to their coefficient, they even concluded that human capital is one of the most important determinants for FDI.

Schneider & Frey (1985) proved a positive relationship, saying that the more spread is secondary education; more direct investment will flow into the country. Banga (2003) found secondary enrolment ratio as one of the main economic fundamentals which are significant determinants of FDI. Other evidence to be presented is a paper written by Kolstad & Tondel (2002). These scientists also agreed that there are results showing that "improvements in human capital through secondary education have a positive impact on FDI."

The wider context of these results in Africa will now be explored. The situation of FDI flowing into Africa is a very disputable topic. As was discussed on the flagship African show in Press TV (Africa Today, 2010) and also in World Investments Reports 2006 - UNCTAD (2006), World Investment report 2007 - UNCTAD (2007), most FDI inflowing into the African countries are targeting natural resources such as oil, gas and minerals. Furthermore these FDI are targeted towards a relatively limited group of African countries. "The World Bank in a recent report classified 24 African countries as oil and mineral dependent. It said these countries accounted for about three quarters of annual FDI flows over the past two decades." Africa today (2010)

Ample discussions arising because it seems that these kinds of FDI have only little positive impact on local communities and wider economy and sometimes it is even seen as help to exploit more than develop Africa. Outside investors coming to Africa are seen as nothing more than someone who is providing capital to use the host economy's abundant resources and low-skilled labour more efficiently, however, The Center for Global Development's report from year 2008 has shown this concept is far too static and does not always have to be the only truthful one.

Even though most of the African FDI is flowing into industries connected with natural resources, there are other areas which are growing hand in hand with exploitive industries. FDI rose in the primary and services sectors in many countries, partly because of exploitation of Africa's vast natural resources and because of a wide range of national privatisation schemes. There is also an increasing number of FDI flowing into infrastructure sectors in many African countries e.g. telecommunication and banking. UNCTAD (2008/2)

Now going back to the results of the analysis let's try to answer the question, why is it secondary education, which is proven as significant determinant of FDI and not other types of education or literacy? Foreign corporations building plants in Africa are integrating into their global competitive strategies and therefore bring their package of management and technology. Foreign corporations merging with local businesses, also bringing their 'know how and technologies' into Africa, therefore logically these FDI funded businesses also tend to use more advance technologies than local businesses and as a consequence demand more skilled workers.

The Center for Global Development's report 2008 approves: "Overall the spread of multinational investment around the world has raised the demand for skilled workers wherever the investment is located. This increases the premium earned by those with education and training, and justifies policies to provide greater access to education and training in developing countries."

World Health Organization (2011) brings up this phenomenon in their article in a negative light saying that “in some countries FDI employs only relatively skilled workers; therefore benefits are unlikely to flow to most vulnerable groups.” This statement shows not as positive effects of FDI, but is certainly supporting findings of the analyses presented in the empirical part of this thesis.

According to the results of the analyses and other presented supporting evidence, it can be concluded that investors of FDI flowing into Africa are, the most out of human capital, attracted by semi-skilled workers, that means a work force with secondary education.

Additionally to explain, why tertiary education does not appear to be a significant determinant of FDI in the results of analyses, it should be pointed out that as it is clear from the presented reports, foreign companies coming to Africa usually bring their high-skilled workers (e.g. managers, technicians) with them. It can be supposed that therefore they are not looking for this kind of workforce in the hosting country and consequently tertiary education is not proved in the analyses to be a significant determinant of FDI.

Results for equation (2) support the pre-hypothesis that FDI has a positive impact on the economic growth of African countries. As the coefficients of correlation and further results of the model show, this relationship is very strong and statistically significant.

In the chapter 2.5.1, this direct dependence is supported by studies, which also found FDI having significant impact on economic growth: Berhanu & Samuel (2007); Furkase (2010; Nhu Tran (2004); IIASA (2008). Study of Gohou & Soumare (2009) is the only one, which examines this relationship on the aggregate African level and presents strongly positive results.

An important point was brought up by Alfaro (2003). This scientist came up with results which show that not all FDI have a positive impact on economic growth. FDI inflowing into the primary sector usually have a negative impact, while FDI coming into the manufacture sector have a positive impact. These Alfaro’s findings will be analyzed in further discussions.

My second main hypothesis, which is targeted in the analyses, is stating that level of education and literacy has a positive impact on economic growth in African countries. GNI PPP PC was used as a proxy for economic growth. Out of all education and literacy variables used in this work, only secondary education is proven as statistically significant.

A number of authors came to the same results concerning secondary education within their research. Their works are presented in the literature overview, chapter 2.4.2. However important names connected with this research are Lucas (1988) and Barro (1998). Both scientists concluded in their works that the higher education a country's workforce has, the higher is country's overall productivity.

6. Conclusion

The main objective of this thesis was to explore if boost of educated population in African countries could raise the countries' economic growth. Investigation done was focused on two hypotheses and led to supportive results. It was identified that secondary education can influence economic growth in Africa not only directly, but also indirectly through FDI.

According to the results of the regression analysis and supporting evidence presented, spreading of higher education is what African countries should target in future. Unfortunately, as is presented in chapter 2.1, Unesco report (2010) shows that all focus of development programs is going towards primary education and secondary education is being rather overlooked.

It is quite understandable that Africa cannot jump from almost total illiteracy, as was the reality in Africa only a few decades ago, and target in their present development programs mainly higher education. However it should be noted that higher education might be very crucial for all African countries' development. Research presented by IIASA (2008) in chapter 2.4.2 shows very clearly that higher education is the 'way to go' in order to raise economic growth. This is for example the case of developing countries presented as Scenario 3 - Figure 5 IIASA (2008) and possibly could also be in Africa.

The following points are aimed to recapitulate the main findings:

1. FDI was proven to have a significant impact on the economic growth of African countries.
2. Secondary education was proven to be a significant determinant of FDI and to have a significant impact on the economic growth of African countries.
3. FDI flowing into extractive industries in Africa have only little positive impact on local communities.
4. There is an increasing number of FDI flowing into infrastructure sectors in Africa.

5. Alfaro (2003) concluded that FDI flowing into the primary sector does not have a positive impact on economic growth, while FDI flowing into the secondary sector does.

Findings above can be further developed on example of the telecommunication industry and other infrastructure sectors in India, which as mentioned above are also growing in Africa. As Banga (2003) claimed in his work, secondary education is crucial for attracting FDI and generally for economic growth in India. He added that especially Indian technical skills are widely recognized and are a strong attraction for FDI into locations of technologically more demanding operations e.g. as in telecommunication industry.

The World Investment Report 2008 witnessed that African telecommunication industry was in the years 1996 - 2006, from 40% funded by FDI. Fujita (2008)

Based on the example presented above, it might be hypothesized that Africa can follow a similar path. Further development and spreading of secondary education in this case could attract FDI which are not only natural resources oriented. A workforce with secondary education in Africa could be that factor which will attract FDI expanding manufacturing and service industries. Exploitation of African natural resources cannot be stopped but can be mitigated and used to help to develop other industrial sectors through foreign direct investments.

Africa has been standing on an intersection not knowing which way to go. Maybe this could be a hint for Africa on which direction to take on in next decade and beyond. By following this direction, the evidence and potential is there for Africa to get on the path of sustainable development and economic growth.

7. Appendix 1 – List of abbreviations

ANOVA	Analysis of Variance
DI	Democracy Index
EFA	Education for All
FDI	Foreign Direct Investment
FDI PC	Foreign Direct Investment Per Capita
GDP	Gross Domestic Product
GER	Gross Enrolment Rate
GNI	Gross National Income
GNI PPP PC	Gross National Income adjusted by Purchasing Power Parity Per Capita
IIASA	International Institute for Applied Systems Analysis
LR	Total Adult Literacy Rate
OECD	Organisation for Economic Co-operation and Development
OLS	Ordinary Least Square Method
PCR	Primary Education Completion Rate
PGER	Primary Gross Enrolment Rate
PPTR	Pupil – Teacher Ratio for Primary education
SGER	Secondary Gross Enrolment Rate
TGER	Tertiary Gross Enrolment Rate
UK	The United Kingdom of Great Britain and Northern Ireland
UNCTAD	United Nations' Conference on Trade and Development
UNESCO	United Nations' Educational, Scientific and Cultural Organisation
UNICEF	United Nations Children's Fund

8. Appendix 2 – Overview of chosen histograms and box plots

Figure 13 – Histogram of FDI PC before logarithmic transformation

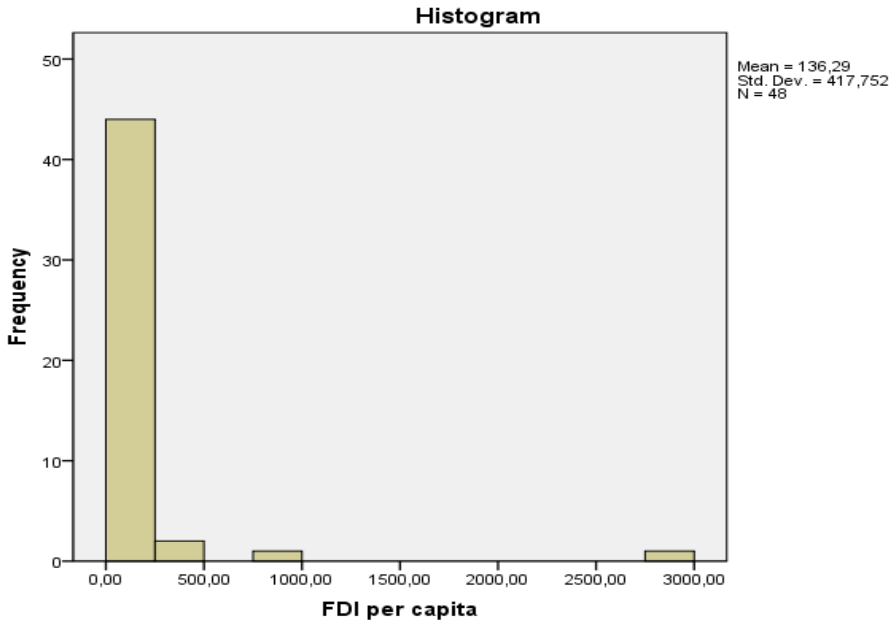


Figure 14 – Box plot of FDI PC before logarithmic transformation

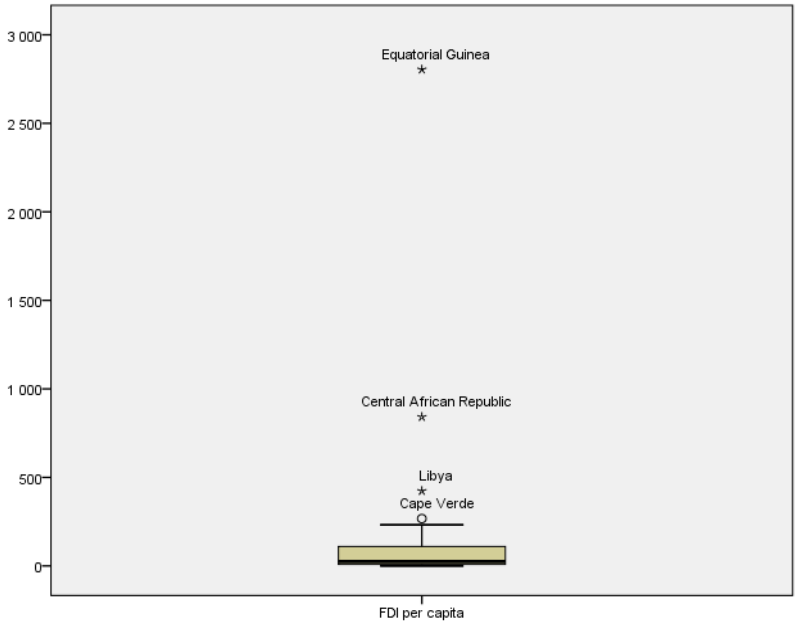


Figure 15 - Histogram of GNI PPP PC before logarithmic transformation

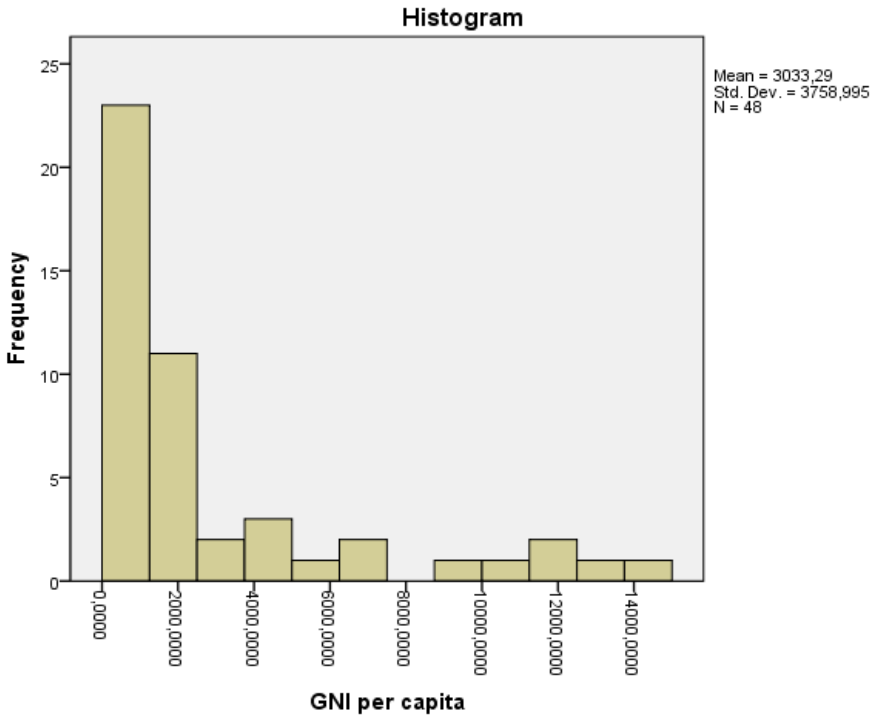


Figure 16 – Box plot of GNI PPP PC before logarithmic transformation

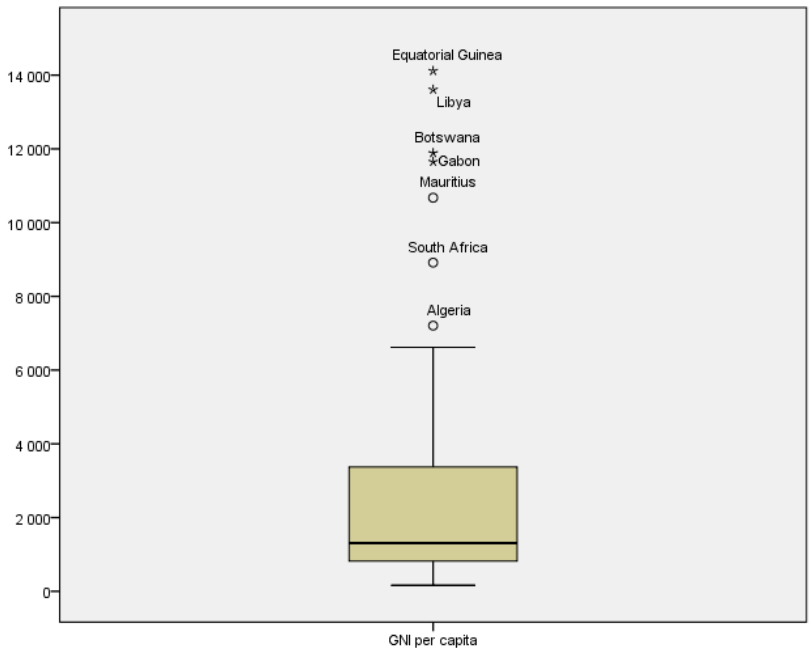


Figure 17 – Histogram of FDI PC after logarithmic transformation

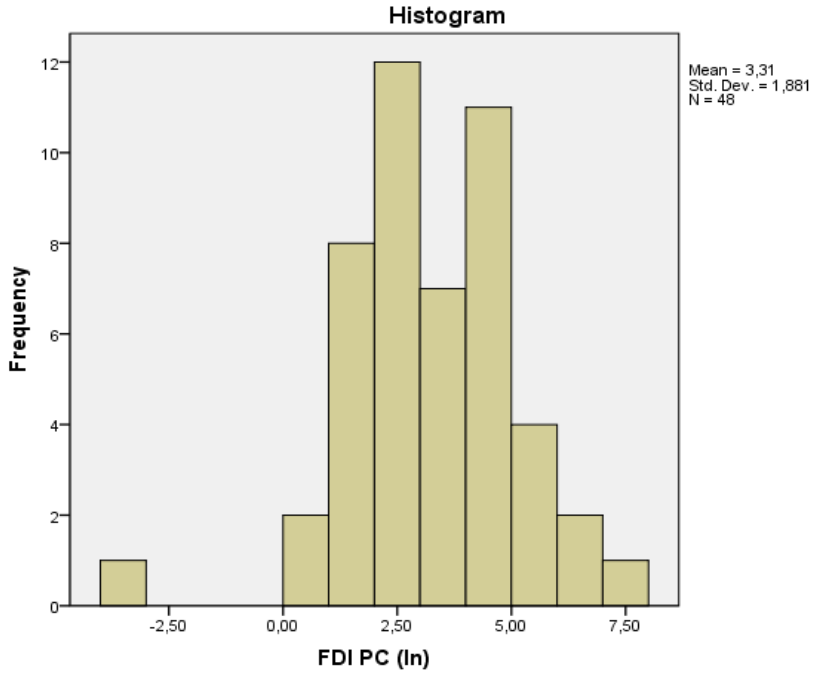


Figure 18 – Box plot of FDI PC after logarithmic transformation

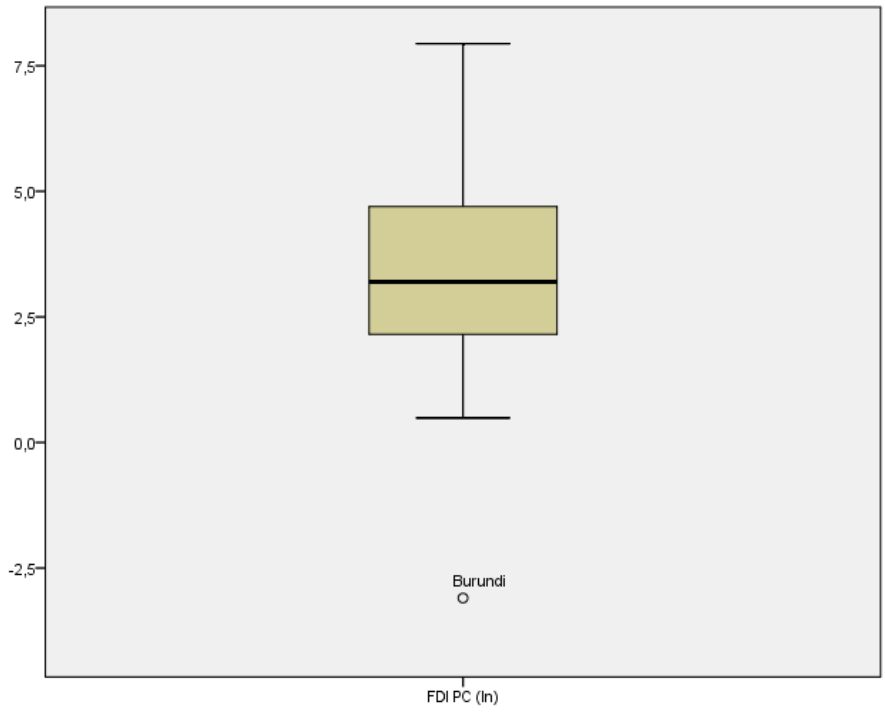


Figure 19 - Histogram of GNI PPP PC after logarithmic transformation

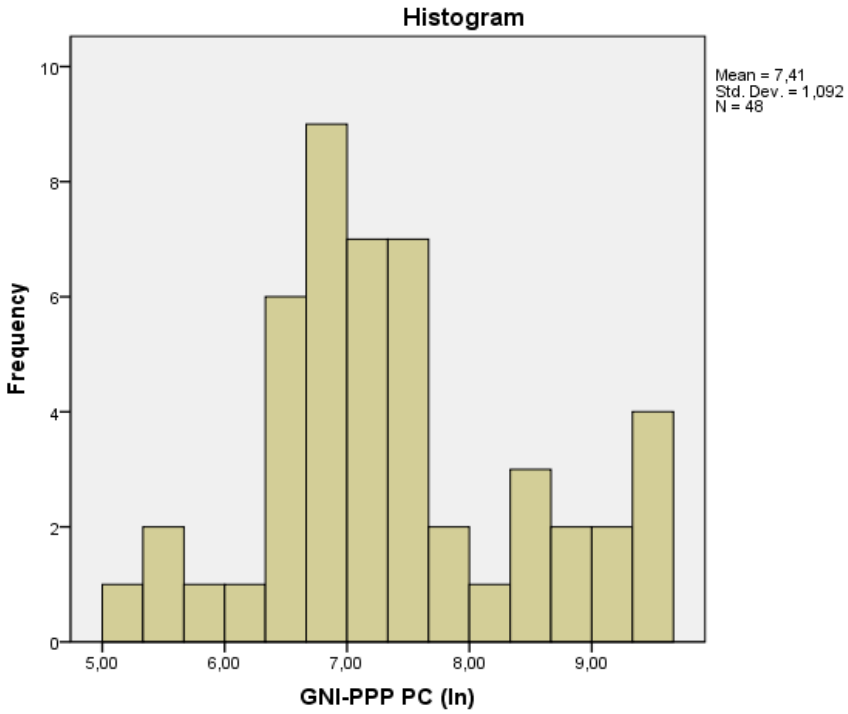
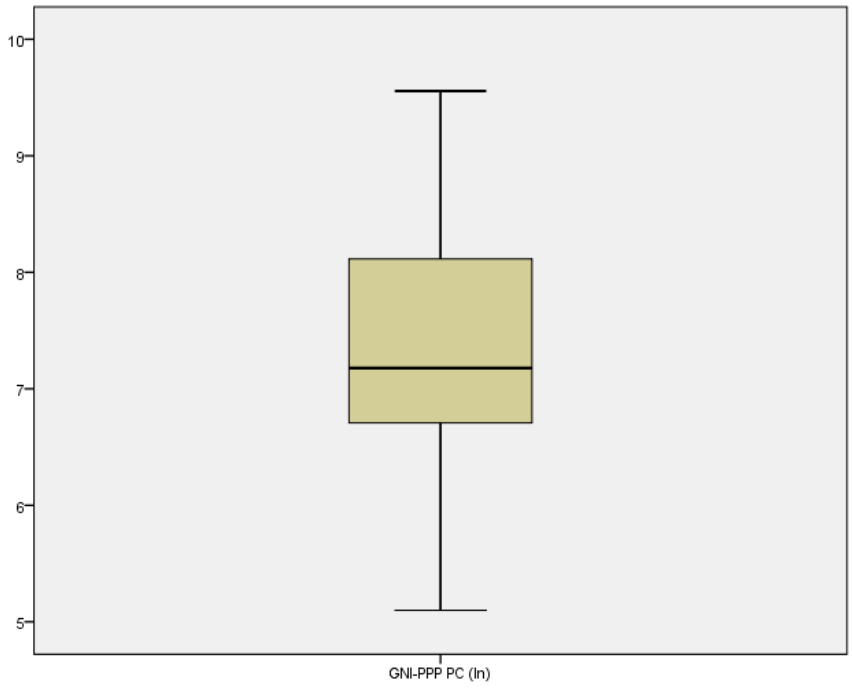


Figure 20 – Box plot of GNI PPP PC after logarithmic transformation



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