



Utrecht University

## Master Thesis U.S.E

# *Assessing the impact of Foreign Direct Investment on Societal Development in Sub-Saharan African countries*

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**Abstract:** This research investigates the impact of Foreign Direct Investment (FDI) on societal development in a select group of Sub-Saharan African countries. Historically, FDI has played an important role in economic growth for developing countries and competitive advantages for companies. Recent trends have shown returns on FDI become diminishing once certain economic thresholds are met, leading to a shift in FDI targets. Therefore, this research aims to understand how FDI in Angola, Democratic Republic of Congo, Ethiopia, Ghana, Kenya, Nigeria, Rwanda, Tanzania, and Zimbabwe affects societal development, measured by the Human Development Index (HDI), between 1996 and 2021.

Current literature indicates the importance of institutional quality on economic growth in the specified countries, and how this affects FDI inflows. Despite the varying, yet high yields from FDI, current research is inconclusive about the effects of FDI on HDI and what drives the two. Especially in the absence of high-quality institutions the effects are difficult to observe.

To address the arising research gaps, this study employs panel data linear regression analysis to examine the relationship between FDI and HDI. The results indicate that there is a strong positive relationship between FDI and HDI, while increasing quality of institutions hinder the societal development from FDI. Additionally, the Cobalt mining activities in the DRC are found to have no significant effect as an economic driver on FDI.

The findings provide information to policymakers and investors about effective FDI in Sub-Saharan Africa in the absence of strong institutions and how such investments can improve the quality of life for local society.

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*Keywords: Development Economics; Foreign Direct Investment (FDI); Human Development Index (HDI); Panel Data Analysis*

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## 1. Introduction

With increasing competition on competitive advantages and rising manufacturing costs in virtually all production processes within the current main markets in the world economy, the question arises where the economic focus from both the supply and demand side will be in the coming decades.

Since the beginning of the industrial revolution in the 18th century, it has become apparent that the biggest players in the world's economy hold the most power. This has always been largely determined by the player who can access technologies, resources, and markets first, and create a long-lasting competitive advantage. Though only few countries such as France, Great Britain, Germany, and the Western Offshoots have managed to maintain some of the highest GDP per capita in recent history, their value creation does not arise from within their borders (GDP Per Capita, 2023). As domestic and neighboring markets saturated, companies began internationalizing to exploit competitive advantages of foreign economies. This is still occurring in the form of foreign direct investment (FDI), which is essentially international expansion by various means, typically connected to a high-stake investment in foreign markets.

Though internationalization is a relatively young phenomenon, it is one that has been significantly studied and recorded. After the early stages of rapid economic development in the USA and later in Europe, companies had to become more competitive in production, pricing, and resource access for up-and-coming technologies. At this point, the first trend shift of FDI became apparent. In the 1990's countries in Asia, specifically China, liberalized their economies drastically and provided resources to western markets. This led to a spike in FDI in Asia, which even until today shows the effects of such market shifts as four of the ten highest recipients of FDI in the world are Asian markets (Desjardins, 2019). Despite the large sums of FDI in Asia, the return on investment of FDI is slowly yielding diminishing returns as China's GDP per capita has nearly doubled between 2010 -2021, the average consumer spending has grown nearly threefold in the same time and domestic labor costs increased by approx. 38% since 2010 (GDP Per Capita (Constant 2015 US\$) - China | Data, 2023)(ShieldSquare Captcha, 2023) (Statista, 2023).

Early research by Radosevic et al. (2003) managed to capture this exact process. According to them the classic pattern of FDI begins with entering an emerging economy for resource seeking reasons, meaning companies plan to capture cheap natural and human

resources for lower production costs. As the market develops, firms seek efficiency, which goes hand in hand with improvement in the infrastructure and labor skills, while inputs are still cheap. As the foreign economy transforms into one with more consumer spending, companies turn to market seeking, meaning they aim to increase consumption of their product in the market. It is at this point where there are diminishing returns to FDI as input costs tend to increase, rendering the competitive advantage moot, which is the observed situation in China and other Asian countries currently.

The recent history of FDI inflows show us two things. Firstly, that a rise in FDI inadvertently leads to an increase in societal development, based on GDP per capita and consumer spending. The second implication is that based on previous trends, new markets must be sought out for the first step of the FDI process, for companies to maintain a competitive advantage.

According to research and international business theory, the new FDI targets will most likely be developing countries. When following current FDI flows from Europe, Asia, and North America, we are able to focus research on FDI effects in Sub-Saharan African countries. This scope becomes even more apparent when observing the 57% FDI increase in Sub-Saharan Africa between 2011 and 2021 (Foreign Direct Investment, Net Inflows (BoP, Current US\$) - Sub-Saharan Africa | Data, 2023). Due to the low input costs and the improving infrastructure, we will be researching FDI effects on societal development, measured by the Human Development Index (HDI) in Angola, Democratic Republic of Congo, Ethiopia, Ghana, Kenya, Nigeria, Rwanda, Tanzania, and Zimbabwe from 1996 – 2021. These specific countries were chosen as their resource abundance and recent economic developments show similar potential as previous FDI targets. Specifically, highly sought after minerals are predominant in the specified countries. According to the African Natural Resource Center (2016), Africa's share of valuable materials in 2010 is as follows: 74% platinum group metals, 60% of Cobalt, 20-40% of all minerals and 10% of oil. These natural resources in combination with a large population, low labor costs, vast quantities of land and improving infrastructure indicate to be the perfect breeding grounds for future markets.

This research aims to investigate “How foreign direct investment in a select group of Sub-Saharan African countries affects societal development” based on the fact that FDI can evidently improve societal development under certain circumstances, and that societal development tends to be an indicator of economic performance and comfort. In addition to this,

there will be a “case B” sub-research on the effects of the Democratic Republic of Congo’s (DRC) Cobalt mining activities and how these affect domestic FDI inflows. The reason for this second case research is that FDI requires a driver, which grants a competitive advantage. In the case of Cobalt in the DRC, it is assumed that the dependence on the mineral will only rise due to its importance in modern technologies such as mobile phones and electric vehicles. In order to conduct this research, we will analyze the trends of FDI in the specified countries and how they relate to the development of the HDI under certain economic and governance controls.

Though there is an abundance of research on the effects of FDI on HDI, and drivers of such FDI, there are evident gaps in literature on how these interplay with modern industries in the specified countries. Even more so, this research carries great societal relevance as understanding how human development is affected by FDI and under which conditions can help companies and governments in creating a fostering environment for the improvement of societal development. Furthermore, this research will indicate the fruitfulness of specified Sub-Saharan African countries as new FDI targets, production, and consumer markets. The latter proved to become relevant as recent historical events such as international conflict and the COVID-19 pandemic have shown a certain economic dependence on specific markets.

The main research question “How does foreign direct investment in a select group of Sub-Saharan African countries affect societal development?” will lead to findings, which aid in answering the above questions.

The research will begin by creating a contextual framework based on a review of existing literature. This will be followed by a description of our data methodology to give an insight into the process and use of the applied data. By means of panel data linear regression we will regress levels of FDI on HDI for the main research question. The results will then be interpreted and discussed and will finally be concluded.

## 2. Literature Review

As is to be expected, there is much research surrounding FDI in Africa. However, this research aims to fill the inherent research gap surrounding the potential of FDI in the specified countries, specifically considering the growing demand for natural resources found there and how this might affect the general society.

### 2.1 Institutional quality

Research conducted by Ouedraogo et al (2022) on the drivers of human capital development, found promising indications that the strength of institutions in 49 African countries, especially those strengths affecting further education, are the driver for economic growth. The most growth was observed in this research if certain characteristics, such as access to schooling, political stability, and absence of violence, were fostered. This becomes relevant for our research as afore mentioned indicators will be included in the model.

Similar research by the Munich Personal RePEc Archive (2022) studied the long run effects of institutional quality on economic growth in Tanzania. As to be expected, the long run equilibrium and effect is positive and brings convergence over time. However, it is suggested that the short-term effects are often negative. In line with literature, these are assumptions we must include in our research, as evidently the time frame of measurement changes the outcome of the effect direction.

In line with the previous literature, research by Olaniyi (2021) has found that there is a minimum threshold of institutional quality which must be met before institutional quality has a fostering effect, specifically on the financial market's growth effects on the economy of West African countries. This of course has implications for our research, as according to the study, many of our observed countries are operating below this threshold, therefore affecting the influence of financial and economic indicators on human development. It is important to note here that the authors were vague in identifying the drivers that positively or negatively changed the effect.

### 2.2 Economic & Institutional growth in Africa

General research conducted by the U.S. Department of Agriculture (2022) has investigated the trends of FDI in the continent of Africa, specifically the potential growth that can be achieved from the African Continental Free Trade Agreement (AfCTA). Following common economic theory, much of the research indicates that FDI effectiveness in economic growth varies with the regulatory barriers in place and the policy measures implemented by

local governments. Some aspects of the research suggests that the free trade agreement can bear fruits in a short time span and can therefore incentivize governments to more liberal regulatory frameworks and increase investment in infrastructure. With regards to the FDI inflow into Africa, the research has established that the main FDI sources remain European countries. This is, however, slowly declining and shifting toward higher FDI from Asia, specifically China. There is also a noticeable shift in FDI targets from focus areas as North and South Africa to East Africa.

Aside from the shift in FDI sources and targets, the research concerning the infrastructure of African nations such as the DRC depicts inherent issues that may arise with the effectiveness of FDI in Congo's natural resource sector. Furthermore, the liberalization of the markets through the free trade agreement proves to be valuable for the continent but can't be fully elaborated on in this research as the DRC is yet to sign the agreement.

A blog article by Sy (2016, July 29) has summarized research on Africa's rising economic growth and answered invaluable questions about prospects on the continent. The information reiterated here is that Africa as a whole is incredibly resource rich, especially as it contains 10% of the world's oil supply and almost a majority of highly demanded minerals and metals. In addition to this, the stable and young population structure, rising African middle class and the trend in democratization brings promising possibilities on and for the continent. The research does point out that the DRC, one of the most resource rich countries, is nonetheless a fragile nation due to armed conflicts and political instability, limiting the exploitation of its endowments.

### 2.3 FDI in Africa

Much as the previous research, it becomes more apparent that structural and infrastructural barriers are limiting the available growth and development in the DRC. However, a common silver lining in this topic is that economic potential typically brings about infrastructural change.

Research by Adegboye & Okorie (2023) becomes more specific on the outcome of FDI in Sub-Saharan Africa. It investigates the so called "FDI paradox", which essentially states that the return on investment on FDI in Africa outperforms essentially any other geographic market but has the lowest quantity of FDI in the world. Pooled research on 30 countries has therefore been done to research what effects FDI has, and what affects FDI decisions. Their findings show that FDI inflow has a positive effect on economic development, while political instability

and FDI outflow have a negative effect on FDI inflow. The high return on investment is therefore explained by the high risk associated with investment in Africa.

This becomes relevant in this research, as another arising gap is the lack of research in what kind of security for investment is necessary for investors to become more attracted to Africa.

Similar research on the FDI paradox by the United Nations Development Programme (2023) has found that between 2006-2011, the return on investment on FDI in Africa yielded 11.4%, approx. 4% above world average. Yet, it only holds 1.87% of the world's FDI stock compared to the 30% in Europe. The reason for this is once again the stability Europe has, which is lacking in Africa. What this research also established however, is that European demand and consumer markets are in a decline, as is the manufacturing due to rising expenses. This has led to some industry focus in Africa shifting to other industries. Ethiopia for instance moved from the extractive to the manufacturing sector. This created supplementary industries in Mauritius, which supplied Ethiopian manufacturers with intermediate goods. Here spillover effects were observed, which becomes incredibly valuable for the research on FDI effects in this research paper. Lastly, in addition to previous research, another cause of lacking FDI in Africa is that financial intermediation costs such as lending are as high as 60% in many African countries, greatly reducing the business potential.

Narrowing down to the specific research at hand, Djokoto & Wongnaa (2023) have tested what the impact of FDI on human development is. Their pool of 87 countries in various development stages showed that FDI only had an insignificant effect on human development in transition countries, meaning those transitioning from developing to developed nations. Other than that, the effect of FDI was positive. With regards to the human development stages, measured by the human development index, they found that the effect of FDI differs for all human development stages, but shows convergence between human development and FDI. Their main results show that depending on the development status, FDI must be accompanied by corresponding domestic policy to reach its full potential.

Along the same lines of the previous research, Gokmenoglu et al. (2018) researched how FDI affects specific elements of the Human Development Index in Nigeria. Interestingly, although FDI overall shows positive effects in Nigeria, specifically on school enrolment and literacy, it proved to have negative effects on life expectancy. The reason for this is that with increased FDI, there is more market and labor competition, leading to more stress from



overworking and economic insecurity. Therefore, it is advised to assess independent aspects of the Human Development Index when researching the effects of FDI. What is also important to mention for this research is that in the case of Nigeria, necessary labor laws are not in place to promote a healthy economic growth, whilst protecting citizens from factors affecting life expectancy.

#### 2.4 FDI and economic performance of the Democratic Republic of Congo

The Overseas Development Institute & Deutsche Gesellschaft für Internationale Zusammenarbeit released a research report in 2022 about the macroeconomic and trade profile of the DRC, which is the specific geographic location at hand. Overall, the GDP of the DRC has an annual growth of 5.9%, which is roughly the average of world GDP growth. Unlike many other articles and reports, it highlights that the DRC has the 3<sup>rd</sup> highest population of poor people and is ranked by the World Bank as the 34<sup>th</sup> worst business environment in Africa. However, the large resorts of natural resources, vast quantities of arable land, and access to 9 neighboring countries provide the country with many prospects in future business. This is becoming more apparent by greenfield investments in Telecommunications, Solar energy, resource extraction and agriculture.

Despite the negative indicators of Congo, the rapid modernization and potential democratization of the country brings much potential for FDI and its effects.

To evaluate the business environment of the DRC, KPMG (2014) published a report on various aspects for business in the country. The report states that among the risk factors there is political unrest arising from years of armed conflict and sustained political instability. Due to the conflicts, much of the country's infrastructure has been destroyed, which is currently being rebuilt, largely through investments from China. Aspects directly affecting the infrastructure such as access to electricity are severely lacking. In addition to this, property and contract rights are very difficult to enforce, further reducing FDI. Concerning the property however, foreigners have found to be eligible soul owners of mines if the domicile of the mining or quarrying agent is within the DRC territory. This is one of the factors leading to the increase of FDI inflow.

Lastly, to gain an insight into the actual mining industry of Congo, the Cobalt Report by the Cobalt Institute (2022) is taken into account into this research. The research found that in 2021 the market demand for Cobalt, an element greatly required for the manufacturing of batteries used in, among others, electric vehicles, has increased by 22%. In the same year, the

DRC has been found to produce 74% of the world's Cobalt supply, indicating the competitive advantage Congo has over other nations. It has been found however, that many supply chains originating from the DRC to foreign market are heavily restricted by regulation and infrastructure, currently bringing issue to meeting growing demand.

## 2.5 Theoretical framework & Scientific relevance

With the relevant literature we can now place our research in the frame that there is significant return on investment on FDI in Sub-Saharan African countries and an abundance of resources required for production of modern technologies. Furthermore, there are indicators according to research that FDI can be fruitful in various levels of institutional quality. Therefore, this research aims to add to the scientific field of development economics in Sub-Saharan Africa by investigating the link between the growing economic importance of specified Sub-Saharan African countries, depicted by FDI inflows, and the levels of human development within a framework of low institutional quality. Therefore, this research will be focused on the following hypothesis:

H0: There is no significant relationship between the levels of foreign direct investment in specified Sub-Saharan African countries and human development.

HA: There is a significant relationship between the levels of foreign direct investment specified Sub-Saharan African countries and human development

### 3. Methodology

The main research question aims to address the impact of foreign direct investment in various industries on social development in Sub-Saharan Africa. Due to the complex nature of this question and the data this encompasses, there are various sub-questions and data processes that need to be completed in order to find a method of conclusive interpretation of data output. Therefore, the methodology was approached in the following way.

The primary question at hand is the effect of FDI, under certain control variables, on HDI. In order to have a credible sample of observations, the geographic regions chosen are Angola, Democratic Republic of Congo, Ethiopia, Ghana, Kenya, Nigeria, Rwanda, Tanzania and Zimbabwe from 1996 – 2021. These countries were chosen based on available literature indicating similar potential economic growth, with similar natural resource exploitation opportunities by means of FDI as past FDI targets. The data collected for the quantitative processing and evaluation has been collected from secondary sources.

#### 3.4 Data collection

The dependent variable “HDI” (Human Development Index) data was collected from the UNDP (United Nations Development Report) (United Nations, 2023). This index consists of three factors determining human development, which is in this case used as a proxy for societal development. These factors are: Long and healthy life, measured by life expectancy at birth; Knowledge, measured by expected years of schooling; A decent standard of living, measured by GNI per capita (PPP\$). For statistical relevance these individual factors were later regressed on the independent variables as well.

The data for the main independent variable, foreign direct investment (FDI), along with the independent variable “export as percent of GDP” has been collected from the World Bank World development indicators (*World Development Indicators / DataBank, 2023*).

Finally, for the rest of the independent variables used as control variables, being Control of Corruption, Government effectiveness, Regulatory Quality, Rule of Law, Political Stability and Absence of violence/terrorism the secondary data has been collected from the World Bank Worldwide Governance Indicators (*Worldwide Governance Indicators / DataBank, 2023*).

Finally, to analyze the most specific aspect of the research, FDI effects on societal development and the effects of Cobalt production on FDI and HDI will be regressed to

determine if the prospering Industry of the Democratic Republic of Congo has effects on these variables. This data has been taken from Our World in Data (Cobalt Production, 2023)

With this combined data, a correlation between FDI inflow and human development was to be statistically evaluated.

The date range was chosen for multiple reasons. Primarily, because Sub-Saharan Africa experienced in increase in FDI starting in the late 1990's, whilst simultaneously experiencing an increasing spur of development. Furthermore, much of the independent variable data was not available prior to 1996, specifically that of the World Governance Indicators.

### 3.5 Data description

*Table 1.*

Variable	Label	Obs	Mean	Std. Dev.	Min	Max
year	Year	234	2008.5	7.516	1996	2021
fdi	FDI inflow % GDP	234	2.572	4.326	-10.725	40.167
hdi	HDI	220	.484	.077	.287	.632
li_expect	Life expectancy	234	56.17	6.414	40.64	66.989
schooling	Expected years of schooling	234	8.954	2.028	2.884	12.172
gnipc	GNI per capita (PPP \$)	234	2842.059	1694.449	682.769	7704.232
control_confli	Control of conflict	207	-.813	.559	-1.648	.776
gov_effective	Government effectiveness	207	-.811	.498	-1.841	.308
reg_quality	Regulatory quality	207	-.846	.573	-2.202	.186
ruleoflaw	Rule of law	207	-.88	.584	-1.918	.201
polit_stabil	Political stability	207	-1.033	.759	-2.848	.184
exportgdp	Export (% of GDO)	215	25.51	14.338	5.38	89.686
country		234	5	2.588	1	9
perli_expect	%ΔLife expectancy	225	.934	1.461	-6.107	7.041
perhdi	%Δ HDI	211	1.491	1.522	-2.876	7.048
perschooling	%Δ Years of schooling	225	2.38	3.203	-5.31	14.183
pergnipc	%Δ GNI per capita	225	2.607	5.915	-15.046	52.313

percontrol_conf l	%Δ Control of conflict	171	2.495	125.906	-368.994	1439.282
pergov_effectiv e	%Δ Government effectiveness	171	8.561	68.996	-143.487	557.913
perreg_quality	%Δ Regulatory quality	171	2.874	100.711	-715.326	829.763
perruleoflaw	%Δ Rule of law	171	-14.878	157.758	-1706.57	825.499
perpolit_stabil	%Δ Political stability	171	-19.856	143.457	-1242.263	540.442
gdppc	GDP per capita (current \$)	234	1001.973	926.639	99.757	5101.984
est fixed	Fixed effects estimator	234	.748	.435	0	1
est random	Random effects estimator	234	.748	.435	0	1
pergdppc	%Δ GDP per capita	225	8.371	26.748	-62.191	293.582
cobalt_prod	Cobalt production in tonnes	26	49975	36643.58	2000	109402.3
percobalt_prod	%Δ Cobalt production	25	19.436	26.513	-28.737	75

The variables life expectancy, expected years of schooling, GNI per capita, GDP per capita and Cobalt production are all in absolute values in their raw form. The dependent variable HDI is a range from 0 to 1, with 0 being the lowest and 1 being the highest. All indicators such as control of conflict, government effectiveness, regulatory quality, rule of law and political stability are all on a range from -2.5 to +2.5, with the latter being the highest achievable rank. Finally, the variables FDI and Export are both as % of GDP. In order to create interpretable and unified results we will use a percentage change version of all non-percentage variables illustrated by the variable name “*per...*” (see *Table 1*.)

### 3.6 Analysis method

Prior to the statistical evaluation in Stata, the individual data sets were combined into one Excel document, according to the panel data requirements of Stata. In this document the missing data points were adjusted, meaning either the range of years was reduced or edited with data from other legitimate secondary sources. Once all of the data was loaded into Stata, many variables were converted in order to have a more sensible relationship between dependent and independent variables.

Due to the difference in units and measurement ranges of all variables, all variables, which were not originally in percentage change were converted to percentage change with the “generate variable (A)= (A/ A.L - 1) \*100” command. This allows us to generate an equal and comparable measurement across all dependent and independent variables.

The model used to estimate the effect of FDI on HDI is an OLS (Ordinary Least Squares) model, as the panel data regression in question is a simple linear regression. The main regression is as follows:

Equation 1.

$$\begin{aligned}\% \Delta hdi = & \beta_0 + \beta_1 fdi + \beta_2 \% \Delta \text{control of conflict} + \beta_3 \% \Delta \text{government effectiveness} \\ & + \beta_4 \% \Delta \text{regulatory quality} + \beta_5 \% \Delta \text{rule of law} + \beta_6 \% \Delta \text{political stability} \\ & + \beta_7 \text{export} + \beta_8 \% \Delta \text{GDP} + \varepsilon\end{aligned}$$

The regressions to test alternative effects on the individual HDI variables are as follows:

Equation 2.

*%Δlife expectancy*

$$\begin{aligned}= & \beta_0 + \beta_1 fdi + \beta_2 \% \Delta \text{control of conflict} \\ & + \beta_3 \% \Delta \text{government effectiveness} + \beta_4 \% \Delta \text{regulatory quality} \\ & + \beta_5 \% \Delta \text{rule of law} + \beta_6 \% \Delta \text{political stability} + \beta_7 \text{export} + \beta_8 \% \Delta \text{GDP} + \varepsilon\end{aligned}$$

Equation 3.

$$\begin{aligned}\% \Delta gni = & \beta_0 + \beta_1 fdi + \beta_2 \% \Delta \text{control of conflict} + \beta_3 \% \Delta \text{government effectiveness} \\ & + \beta_4 \% \Delta \text{regulatory quality} + \beta_5 \% \Delta \text{rule of law} + \beta_6 \% \Delta \text{political stability} \\ & + \beta_7 \text{export} + \beta_8 \% \Delta \text{GDP} + \varepsilon\end{aligned}$$

Equation 4.

*%Δyears of schooling*

$$\begin{aligned}= & \beta_0 + \beta_1 fdi + \beta_2 \% \Delta \text{control of conflict} \\ & + \beta_3 \% \Delta \text{government effectiveness} + \beta_4 \% \Delta \text{regulatory quality} \\ & + \beta_5 \% \Delta \text{rule of law} + \beta_6 \% \Delta \text{political stability} + \beta_7 \text{export} + \beta_8 \% \Delta \text{GDP} + \varepsilon\end{aligned}$$

Finally, to estimate the effect of the increased Cobalt production in the Democratic Republic of Congo, based on the rise in demand for the mineral, we will regress the following:

Equation 5.

$$\begin{aligned}fdi = & \beta_0 + \beta_1 \% \Delta \text{cobalt production} + \beta_2 \% \Delta \text{control of conflict} \\ & + \beta_3 \% \Delta \text{government effectiveness} + \beta_4 \% \Delta \text{regulatory quality} \\ & + \beta_5 \% \Delta \text{rule of law} + \beta_6 \% \Delta \text{political stability} + \beta_7 \text{export} + \beta_8 \% \Delta \text{GDP} + \varepsilon\end{aligned}$$

### 3.7 Statistical tests

Once all regressions have been performed, certain tests must be conducted to make sure no OLS assumptions are violated. This is necessary to ensure the credible interpretation and validity of the data.

The first OLS assumption is **linearity**. This is required to ensure that the model is indeed linear, as per the requirements for an OLS model. In order to test for this we will have to use the Stata command “*scatter*” to create a scatter plot of the dependent variable on each independent variable.

**Independence:** For this test, we will use the Woolridge test for autocorrelation in panel data. This will be done via the “*xtserial*” command in Stata. The null hypothesis of this test is that there is no autocorrelation, which is rejected if the p-value for the test is equal to or below the significance level (0.05). The alternative hypothesis is that there is autocorrelation, which implies that the residuals are systematically related to one another.

**Homoscedasticity:** This test is performed to see whether the variability of the error terms is constant across all independent variables. In order to test for homo- / heteroscedasticity we will use the Breusch-Pagan LM test with the Stata command “*xttest2*” for cross sectional correlation. The null hypothesis, which is rejected at a p-value equal to or less than 0.05, is that there is homoscedasticity. The alternative hypothesis is that there is heteroscedasticity.

**Multicollinearity:** For this we will establish whether the independent variables are perfectly correlated with each other, whether negatively or positively. The Stata command “*collin*” will give us the Variance Inflation Factor (VIF), which indicates the degree to which the independent variables are correlated with each other. A factor below one indicates no multicollinearity, whereas according to the *Pennsylvania State University* a VIF factor below 4 doesn't require any cause for concern about multicollinearity (*10.7 - Detecting Multicollinearity Using Variance Inflation Factors | STAT 462*, n.d.)

Further tests will have to be performed on all regressions in order to allow for an accurate interpretation of the results:

One of these additional tests is the Hausmann test, in order to establish whether there is unobserved heterogeneity among the independent variables in panel data. The results of this test will determine whether the model is a fixed or random effects model. To perform this test, the Stata command “*hausman*” will be used.



Finally, we will perform a version of the augmented Dickey-Fuller test to establish whether the variables are stationary or non-stationary (random walk).

In order to circumvent any problems arising from heteroskedasticity or autocorrelation, we will be using robust standard errors in our Stata regression to take the aforementioned problems into account from the beginning.

## 4. Results

The main purpose of this research is to establish whether foreign direct investment has a positive impact on societal development, measured by the Human Development Index (HDI). Specifically for case B, whether the growing demand for Cobalt affects the level of FDI, which in turn affects societal development. The latter part of the research focused on the Democratic Republic of Congo, as the abundance of the mineral Cobalt has granted the DRC a competitive advantage in the global market. The research question “How does foreign direct investment in a select group of Sub-Saharan African countries affect societal development?” has therefore led to the following hypotheses:

H0: There is no significant relationship between the levels of foreign direct investment in specified Sub-Saharan African countries and human development.

HA: There is a significant relationship between the levels of foreign direct investment specified Sub-Saharan African countries and human development.

The regressions and statistical tests discussed in the methodology section had the following output, which allows us to find evidence concerning the hypotheses.

### 4.4 Statistical significance

Before being able to interpret the output of the main regression, the statistical tests had to be evaluated for the credibility of the data.

The first test we had to do prior to starting our regression was the Hausman test to determine whether it is a fixed or random effects model we are working with. This test yielded a p-value of 0.855, which meant we could not reject our null hypothesis (see *Appendix Table 2.*). We were therefore able to conclude that we require a fixed effects model for all following regressions.

The test we conducted next is to prove linearity between the dependent and the independent variable. According to the Stata output we can assume a weak but linear relationship (see *Appendix Figure 1.*), which allowed us to proceed with further statistical tests.

The tests to establish whether there is autocorrelation or heteroskedasticity became moot, as we used robust standard errors, which correct the regression for either of the two

violations. This allowed us to assume no autocorrelation and heteroskedasticity, which allowed us to proceed with the interpretation of the data.

Next, we tested for multicollinearity by means of Variance Inflation Factor (VIF). These results are illustrated in *Appendix Table 1*. and indicate that none of the independent variables show signs of multicollinearity as no VIF value exceeds 1.08, and a mean VIF value of 1.03. This allowed us to prove the assumption as fulfilled and proceed with further testing and interpretation.

The following step required robustness checks, to prove the validity of the control variables (see *Appendix Table 3, 4, 5, 6*). The p-values did increase per removal of an independent variable, though not by a lot, thus showing the relevance pertaining to their inclusion in the regression. It was also noticeable that the R<sup>2</sup> line of best fit reduced with the removal of independent variables. Most noticeably we were able to conclude that that the World development indicators and World Governance Indicators showed the least influence on the p-value of FDI on HDI.

Finally, we proceeded with one last test, to enable us to interpret the results of the regression conclusively. The augmented Dickey-Fuller test, testing whether the variables are stationary or not, has proven for all indicators of measurement that the variables are stationary. We identified this through the p-value being below 0.05, allowing us to reject the null hypothesis of the test of there being a unit root (see *Appendix Table 7*).

With all statistical tests being completed and none of them being violated, we were now able to interpret the results of the regression model.

## 4.5 Interpretation of results

*Table 2.*

**Regression results: HDI**

perhdi	Coef.	Robust St.Err.	t-value	p-value	[95% Conf Interval]	Sig
fdi	.119	.036	3.28	.011	.035 .202	**
percontrol_confl	0	0	-3.12	.014	-.001 0	**
pergov_effective	-.002	.001	-3.42	.009	-.003 -.001	***
perreg_quality	-.001	0	-9.23	0	-.001 -.001	***
perruleoflaw	0	0	-2.35	.047	-.001 0	**
perpolit_stabil	0	0	-0.60	.568	-.001 0	
exportgdp	.003	.019	0.14	.895	-.042 .047	
pergdppc	.026	.009	3.09	.015	.007 .046	**
Constant	.857	.47	1.82	.105	-.226 1.94	
Mean dependent var		1.421	SD dependent var		1.317	
R-squared		0.244	Number of obs		162	
F-test		98.411	Prob > F		0.000	
Akaike crit. (AIC)		503.772	Bayesian crit. (BIC)		528.473	

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

From all variables combined, we were able to conclude that all independent variables, aside from “percentage change of political stability” and “export as percent of GDP” are statistically significant to our research as they have p-values above 0.05. It is also very important to note that though “percentage change control of conflict” and “percentage change rule of law” are statistically significant, their effect on human development is so marginal that it is assumed to be irrelevant. Their effect is so small that they did not pass the cut-off point of three places behind the decimal.

The main independent variable “Foreign Direct Investment Inflow as % of GDP”, yielded very promising results. Its p-value, 0.011 gave us sufficient evidence that the null hypothesis can be rejected (see Table 2.). Therefore, we can start our interpretation with the statement of the alternative hypothesis: “There is a significant relationship between the levels of foreign direct investment and human development in a select group of Sub-Saharan African countries”, which is in this case interpreted as societal development within the contextual frame of this research. Under control of various economic and institutional variables it became clear

that with a unit increase of 1% of FDI inflow as percent of the Sub-Saharan countries GDP, the HDI increases by 0.119 percentage points. This allowed us to infer primarily that FDI has a positive effect on human development, even more so quite a significant effect on human development.

Many of the control variables undoubtedly yielded surprising, yet informative results. The variable “*percentage change government effectiveness*” indicated that with a unit increase (1% point) in the effectiveness of the functioning of a domestic government, the human development index is reduced by -0.002 percentage points. A similar result was observed for “*percentage change in regulatory quality*”. With a one unit increase of this variable, the human development index was reduced by -0.001 percentage points. As the only two interpretable World Governance Indicators, we were able to observe a correlation between improved governance and institutions, and a decrease in societal development in Africa.

The final independent variable part of this regression was the economic indicator “*percentage change in GDP per capita*”. Here we observed that a one unit increase in the variable, leads to a 0.026 percentage point increase in human development.

#### 4.6 Alternative model specifications

According to current literature, the effects of FDI on human development often vary, depending on which indicator (from within the Human Development Index) is chosen as an independent variable. Therefore, we proceeded by testing the model specifications of *Equation 2, 3 and 4*.

The first alternative model specification was to test the effects of FDI on “*percentage change in life expectancy*”. As with the main model, robust standard errors of a fixed effects model were applied to account for autocorrelation and heteroscedasticity. The additional statistical tests to prove validity and interpretability of the model yielded the same results as for the previous regression model, and therefore allowed us to proceed without any assumption violations.

*Table 3.*

**Regression results: Life expectancy**

perli_expect	Coef.	Robust St.Err.	t-value	p-value	[95% Conf Interval]	Sig
fdi	.08	.03	2.72	.026	.012 .148	**
percontrol_confl	0	0	1.39	.201	0 .001	
pergov_effective	0	.001	-0.58	.578	-.002 .001	
perreg_quality	-.001	0	-7.73	0	-.001 -.001	***
perruleoflaw	0	0	0.17	.869	0 0	
perpolit_stabil	0	0	-1.26	.244	0 0	
exportgdp	.017	.015	1.12	.297	-.018 .052	
pergdppc	.012	.003	4.20	.003	.006 .019	***
Constant	.211	.413	0.51	.622	-.741 1.163	
Mean dependent var		0.937	SD dependent var		1.164	
R-squared		0.126	Number of obs		163	
F-test		145.892	Prob > F		0.000	
Akaike crit. (AIC)		483.527	Bayesian crit. (BIC)		508.277	

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

As with *Equation 1*, we have observed that the main independent variable, FDI has a significant effect on “percentage change of life expectancy”, which allowed us to reject the null hypothesis. In this case a one unit increase of FDI leads to a 0.08 percentage point increase on life expectancy (see *Table 3*). Much as with the main model, various interpretable variables have no effect on the dependent variable, while more than in the original model appeared to be significant. Furthermore, this regression also provides evidence that a percentage change in the regulatory quality reduces life expectancy at birth by -0.001 percentage points. Lastly, we can conclude from this model that a unit increase in “percentage change of GDP per capita” leads to a 0.012 percentage point increase on life expectancy, which is in accordance with economic theory.

*Table 4.*

**Regression results: GNI per capita**

pergnipc	Coef.	Robust St.Err.	t-value	p-value	[95% Conf Interval]	Sig
fdi	.175	.089	1.96	.085	-.031 .381	*
percontrol_confl	.001	.002	0.40	.702	-.004 .005	
pergov_effective	-.006	.003	-2.10	.069	-.013 .001	*
perreg_quality	-.004	.001	-3.21	.012	-.006 -.001	**
perruleoflaw	.001	.001	1.45	.184	-.001 .003	
perpolit_stabil	.002	.001	2.60	.032	0 .003	**
exportgdp	.07	.168	0.42	.686	-.317 .457	
Constant	.89	4.053	0.22	.832	-8.456 10.236	
Mean dependent var		2.968	SD dependent var		5.875	
R-squared		0.030	Number of obs		163	
F-test		107.710	Prob > F		0.000	
Akaike crit. (AIC)		1040.287	Bayesian crit. (BIC)		1061.943	

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

*Equation 3.* adapted the model to test the effects of FDI on GNI per capita. As all results proved to be interpretable as per the standard statistical tests, we were able to conclude from *Table 4.*, that less variables are significant on the HDI indicator GNI per capita (percentage change). Even more so, we were not able to reject the null hypothesis of this model, meaning there is so significant relationship between FDI and GNI per capita in the observed frame. Interestingly enough however, the previously insignificant factor “*percentage change of political stability*” was now significant and had a positive effect on GNI per capita with 0.002 percentage points increase per unit of change. However, as with the other specifications, the World Governance Indicator “*percentage change of rule of law*” led to a decrease in GNI by -0.004 reduction per unit increase.

*Table 5.*

**Regression results: Years of schooling**

perschooling	Coef.	Robust St.Err.	t-value	p-value	[95% Conf Interval]	Sig
fdi	.139	.054	2.60	.032	.016 .262	**
percontrol_confl	-.003	.001	-2.48	.038	-.006 0	**
pergov_effective	-.006	.002	-3.81	.005	-.01 -.002	***
perreg_quality	0	0	-1.27	.241	-.001 0	
perruleoflaw	-.001	0	-3.88	.005	-.002 -.001	***
perpolit_stabil	-.001	.002	-0.44	.675	-.004 .003	
exportgdp	.047	.041	1.15	.282	-.047 .142	
pergdppc	.018	.01	1.81	.107	-.005 .041	
Constant	.259	1.079	0.24	.817	-2.23 2.748	
Mean dependent var		1.913	SD dependent var		2.655	
R-squared		0.138	Number of obs		163	
F-test		1259.341	Prob > F		0.000	
Akaike crit. (AIC)		746.108	Bayesian crit. (BIC)		770.858	

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

Lastly, we specified the final alternative model according to *Equation 4*. Here we tested the effects of FDI on the HDI indicator “*expected years of schooling*”. Once the model surpassed the requirements of statistical validity, we were able to interpret the results conclusively. The main observation is that the effects of FDI on expected years of schooling is once again statistically significant with a p-value of 0.032, allowing us to reject the null hypothesis and claim that there is evidence for a significant relationship between FDI and expected years of schooling. Therefore, a one unit increase in “*FDI as percent of GDP*” leads to a 0.139 percentage point increase in expected years of schooling. Additionally, once again the World Governance Indicators “*control of conflict, government effectiveness and rule of law*” have a significant and negative effect on “*expected years of schooling*” with a one unit increase leading to a -0.003, -0.006 and -0.001 percentage point decrease in expected years of schooling respectively.

#### 4.7 Effects of the DRC Cobalt production on domestic FDI

The last regression of *Equation 5*. Specified a model to define whether the mining of the highly demanded mineral Cobalt leads to an increase in FDI in the DRC, which allows us



to infer about its importance in societal development as per *Equation 1*. As opposed to the other regressions, this model was a simple (non-panel) regression as it only focused on the DRC from 1996-2021. The hypotheses for this sub-question are as follows:

H0: There is no significant relationship between the levels of Cobalt production in the Democratic Republic of Congo and foreign direct investment.

HA: There is a significant relationship between the levels of Cobalt production in the Democratic Republic of Congo and foreign direct investment.

Once again, before analyzing the regression output, we had to verify whether statistical assumptions were violated. In order to correct for autocorrelation and heteroscedasticity, we once again applied robust standard errors. Further tests proved that the model yields interpretable results. We were able to graphically establish linearity. A test on multicollinearity by means of the Variance Inflation Factor (VIF) showed no VIF above 1.4 (see *Appendix Table 8*.) which allowed us to conclude that there is no multicollinearity. Furthermore, a test on correlation among the independent variables, by means of a correlation matrix depicted no correlation higher than 0.4 in either direction (see *Appendix Table 9*.) Therefore, no statistical assumptions were violated, and we were able to interpret the following output.

*Table 6.*

**Regression results: Cobalt production in DRC**

fdi	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
percobalt_prod	.006	.024	0.25	.806	-.046	.058	
percontrol_confl	-.347	.125	-2.78	.018	-.622	-.073	**
pergov_effective	.034	.074	0.46	.656	-.129	.197	
perreg_quality	-.037	.048	-0.77	.455	-.142	.068	
perruleoflaw	.142	.124	1.15	.275	-.13	.415	
perpolit_stabil	.074	.07	1.06	.313	-.08	.228	
exportgdp	.238	.113	2.11	.059	-.01	.486	*
Constant	-2.669	3.465	-0.77	.457	-10.297	4.958	
Mean dependent var		4.631	SD dependent var			3.547	
R-squared		0.657	Number of obs			19	
F-test		7.572	Prob > F			0.002	
Akaike crit. (AIC)		96.688	Bayesian crit. (BIC)			104.244	

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

According to the regression results in *Table 6.* we were able to infer that no independent variable, including the main independent variable “*percentage change of Cobalt production*” has a significant effect on the FDI inflow in the DRC, with the exception of “*percentage change in control of conflict*”. We were able to come to this conclusion as six out of seven independent variables had a p-value greater than 0.05. We were not able to reject the null hypothesis and must therefore assume that there is no significant relationship between the levels of Cobalt production in the Democratic Republic of Congo and foreign direct investment. However, “*percentage change of control of conflict*” yields a -0.347 percentage point change in FDI per increase in unit of measurement.

## 5. Discussion

The results strongly indicate that there is a significant and positive effect of FDI on HDI in 9 Sub-Saharan African countries, proving our alternative hypothesis to be correct. More importantly, contrary to existing literature (Gokmenoglu et al. (2018), even the alternative models regressed on the individual variables of the Human Development Index were positively affected by an increase in foreign direct investment, with the exception of the effect of FDI on GNI per capita, which proved to be insignificant. Most noticeably, in nearly all cases, the World Governance Indicators proved to be insignificant or irrelevant, which brought upon unexpected results. The result of the case B hypothesis indicated that Cobalt production in the Democratic Republic of Congo has no significant effect on the inflow of FDI and the only (negative) effect on domestic FDI being “*Control of conflict*”.

### 5.4 Interpretation of results

In line with the main hypothesis, we were able to suggest that there is a significant relationship between the levels of foreign direct investment in 9 Sub-Saharan African countries, and societal development measured by the Human Development Index. Not only is HDI directly and positively related to FDI in these countries, but the components of the HDI, apart from GNI per capita, undergo the same effect. This result is in line with common economic theory, as FDI creates a labor environment allowing for more employment, potentially leading to higher wages, which in turn lead to better quality of life as employees are more likely to be able to consume and acquire products which are required for a better standard of living. In line with literature focusing on health and education aspects, it becomes more affordable to seek medical aid and pursue an education if FDI creates wealth and employment, further justifying our findings.

The negative effects of the world governance indicators also provide us with interesting and significant insights. Though they were not the primary focus of our research, they prove to have a small but negative effect on human development within our model. Multiple aspects of these unexpected results are important here. Firstly, common international business theory predicts that internationalization, by means of FDI, requires a nurturing institutional framework for the company to be profitable. Though we have not specified data on productivity of individual companies, we can see that the Macroeconomic outcome of such FDI has a positive effect on human and economic indicators, despite the low-quality institutions of the specified African countries. This finding is in line with the short run and long run effects of institutional quality on financial and economic markets in underdeveloped nations (Olaniyi, 2021).

As stated, a previous piece of research by Gokmenoglu et al. (2018), found that in Nigeria, an increase in FDI leads to a decrease in HDI. Though this seems counterintuitive and is not the case in our research, the reason was the negative effects an increase in FDI has on life expectancy due to growing stress, and dangers of jobs in the invested industries. In the case of Nigeria, it is evident that labor laws do not provide employees with protection, which is required for an individual to maintain a high level of health. However, the 9 African countries chosen in our research often have labor laws in line with leading African economies such as Nigeria, leading to some questions with regards to the differing results of the two models. Based on the model specifications, we can assume that the main cause of this difference is the time frame. Our model was specified from 1996-2021, whilst Gokmenoglu's model was set from 1972-2013. It is obvious that safety in labor around that world has drastically improved in this time frame, even in less developed countries.

The results for **case B**, where we researched the effects of Cobalt mining in the DRC on FDI levels were not in line with our assumptions and indicated that there is no significant relationship between the two. As the DRC was in the observation group for the main research question **case A**, we can still conclude that also in DRC there is a positive relationship between FDI and HDI. The results for **case B** only showed that the promising and growing Cobalt industry in the DRC does not influence the levels of FDI. This result was certainly unexpected, as DRC holds the vast majority of the highly demanded mineral Cobalt, used for nearly all technological devices, but could be explained by the young nature of this industry.

## 5.5 Limitations

The data and methodology of this research is, as many are, subject to limitations for various reasons. In the following part we will discuss how the data availability limited model possibilities and therefore affected the interpretation of our results.

The primary limitation for this research was data availability. For **case A**, the relationship between FDI and HDI in 9 Sub-Saharan African countries the main data issue was finding data for a longer period. Many of the indicators used (such as the World Governance Indicators) are either young in their nature, or only had available data themselves starting in 1996 due to the complex development path of these nine countries. This greatly reduced the available set of observations to our model. Though the observed countries chosen could have been increased, it would have negatively affected our evaluation as the chosen economies all have similar trajectories based on similar industries and growth potential. Furthermore, some countries such as Ethiopia had some years of data missing due to internal conflict and lack of

reporting, which impeded the regression. With more observations the statistical significance and coefficients could potentially be more indicative. Yet similar research in this field draws conclusive evidence from similar numbers of observations, if not less.

For **case B** the effect of the DRC's Cobalt mining activities on its FDI inflow, the number of observations is even lower due to the inherent nature of the model. As with case A, the data availability for the DRC is rather low in quality. However, the fact that Cobalt is only in recent decades becoming as relevant as it is believed to be, makes a larger number of observations irrelevant as older data would not credibly affect the outcome of the model.

An additional limitation for both **case A** and **case B** is data credibility. According to Kinyondo and Pelizzo (2018) one of the biggest issues of research in Africa is data credibility. The lack of data credibility arises from a lack of domestic research, weak reporting systems, low incentive for governments to accurately report data and many more institutional and societal issues. Though individual organizations such as the World Bank often do their own research, they are at the mercy of domestic institutions in many cases. Therefore, the exact data inputs are not guaranteed to reflect the reality of the situation.

Lastly, for **case B** the interpretation of results is difficult, as the industries in which Cobalt is required are quite young in their nature. This limits the evidence of effects as influences on FDI and other factors can take years or decades to become observable.

Nevertheless, we can assume a correct processing and modelling of our data, in line with current literature researching similar factors and geographies. Furthermore, the output generated by our model is to a large extent in accordance with common economic theory and literature.

## 5.6 Recommendations

Though the output of our research allows us to infer credible conclusions in line with current theory, there are three main recommendations for future research on this topic.

The first recommendation for **case A**, but even more so for **case B** is to conduct similar research in five to ten years. FDI in general will greatly increase in Africa over the coming years as current developed markets are becoming saturated and are yielding lower returns on investment due to decreasing resources and increasing prices. Modern literature and investment activities from, among others, China, indicate that FDI will play a large role in future manufacturing in Africa. Therefore, the effects of FDI on human development will become

more evident and observable in coming years. Additionally, the data availability and credibility will improve in this time frame due to increased regulation, which goes hand in hand with economic growth. In **case B** the longer time period will lead to more observations, and the growing demand for Cobalt for electric vehicles and technological devices will greatly influence all indicators included in our model.

Our results indicated evidence contrary to international business theory, stating that institutional quality may have a negative effect on human development and potentially on the levels of FDI inflow. Though much research focuses on the correlations of these relationships, a longer observed time frame, similar to that of Olaniyi (2021), can explain the variance of coefficients over time when observing institutional quality effects on economic indicators. According to this research there is a threshold at which institutional quality positively affects these indicators but are destructive below the threshold. This paves a way for future research about existing thresholds which indicate the effect of institutional quality on HDI instead of purely economic indicators.

Lastly, and tying into the institutional quality, there is great potential for research on private contracts in a framework with weak institutional quality. As we can deduct from our research that FDI has positive effects on HDI despite the absence of institutional quality. Here it would be interesting to see research focused on MNE activities regarding private contracts with governments to protect themselves and their foreign operations, whilst enriching themselves and possibly the host country. This could provide an insight into how developing countries can benefit from FDI without having to undergo decades of development to foster such FDI, while companies can pursue profits in foreign developing markets without the standard risks from FDI.

## 6. Conclusion

This research aimed to find evidence for the relationship between foreign direct investment in nine Sub-Saharan African countries and the levels of human development, and the sub-relationship of Cobalt mining being an FDI driver in the Democratic Republic of Congo. The quantitative analysis provided us with conclusive indications that there is a strong positive relationship between FDI and HDI in this set of countries. However, no significantly observable effect was made clear for the effect of Congo's Cobalt mining on the FDI inflow levels. In both cases the results indicated that improving institutional quality in the defined countries led to a decrease in human development levels. Contrary to our initial expectations, economic indicators played a smaller, in some cases even an insignificant role on the levels of human development.

Despite the lack of available data and the credibility of the available country wide data, the panel data model employed for this research allowed us to accurately include various comparable countries over longer periods of time to correctly predict the effects of each variable on the HDI. The model parameters and included variables enabled us to find credible results in line with our hypothesis in the main model, based on common economic theory.

Based on our findings it is highly recommended that future researchers on the one hand conduct similar research once larger sets of observations become available. Specifically for case B, it is likely that in the near future the Cobalt industry in the DRC will become more significant. This will allow researchers to gain more specific access to certain data such as individual Cobalt production data from specific mining companies involved in FDI. This will not only lead to significant results concerning our specific research question but will also grant further knowledge in drivers of FDI in underdeveloped nations. The findings of this research and that of future researchers will aid practitioners in navigating markets with weak institutions, yet high yields of resources.

Despite the fact that fragments of our research have previously been done in different markets, our findings seemingly contribute significantly to the field of international business and development economics. According to common internationalization theory, there is strong evidence that existing infrastructure and higher quality institutions lead to higher levels of FDI. Nevertheless, the findings of our research and the framework of existing literature surrounding the effects of institutional quality on financial markets in Africa indicate that FDI not only increases, but positively affects human development indicators in the absence of such

institutions. Though there are various exogenous factors also affecting these variables, real world data shows how this theory is not consistent throughout all industries and geographical markets.



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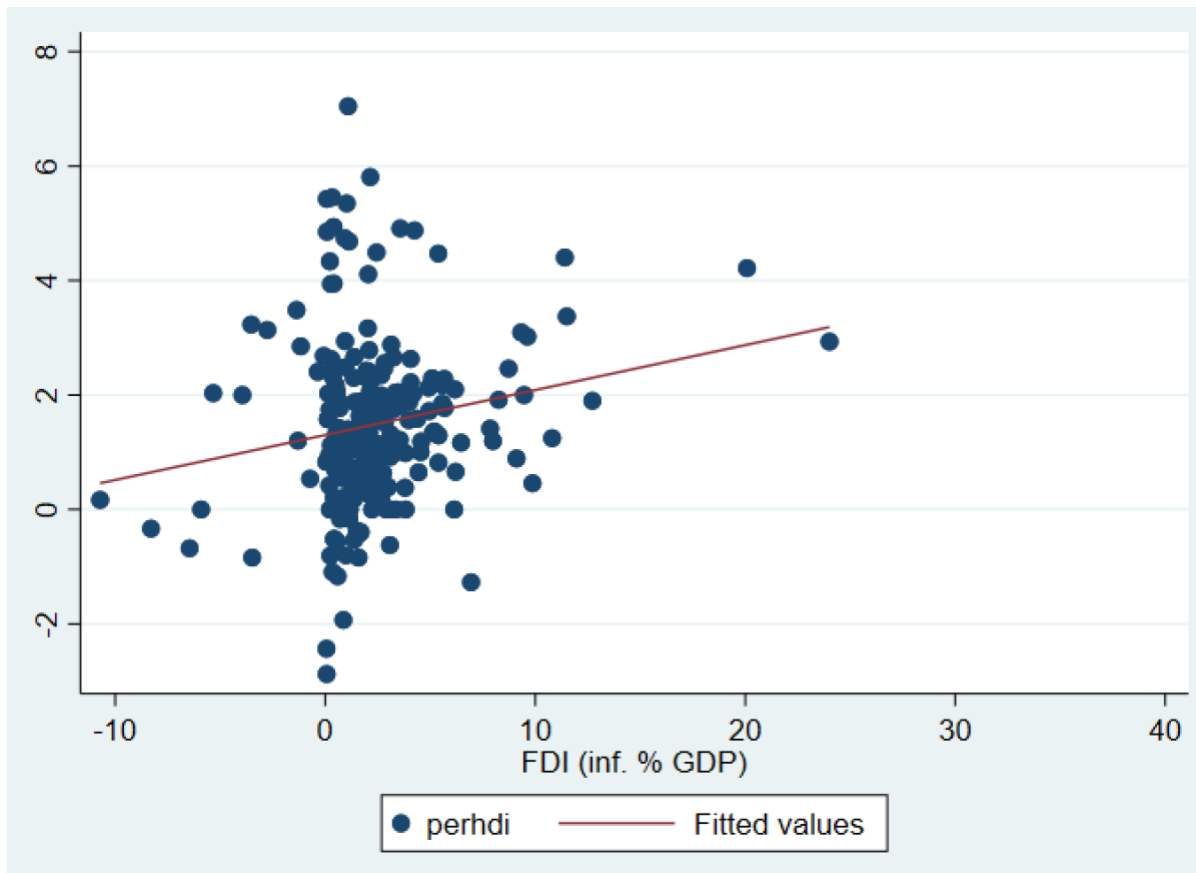
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## 8. Appendix

*Appendix Figure 1.*



*Appendix Table 1.*

VIF test for equation 1-4

Variable	VIF	SQRT VIF	Tolerance	R-Squared
fdi	1.02	1.01	0.9790	0.0210
percontrol_confl	1.02	1.01	0.9799	0.0201
pergov_effective	1.06	1.03	0.9436	0.0564
perreg_quality	1.01	1.00	0.9925	0.0075
perruleoflaw	1.02	1.01	0.9837	0.0163
perpolit_stabil	1.08	1.04	0.9285	0.0715
exportgdp	1.03	1.02	0.9696	0.0304
pergdppc	1.02	1.01	0.9757	0.0243

Appendix Table 2.

Hausman (1978) specification test

	Coef.
Chi-square test value	4.028
P-value	.855

Appendix Table 3.

Regression results

perhdi	Coef.	Robust St.Err.	t-value	p-value	[95% Conf Interval]	Sig
fdi	.1	.039	2.55	.034	.01 .19	**
percontrol_confl	0	0	-0.82	.434	-.001 .001	
pergov_effective	-.003	0	-6.57	0	-.004 -.002	***
perreg_quality	-.001	0	-10.01	0	-.001 -.001	***
perruleoflaw	0	0	-1.49	.173	0 0	
perpolit_stabil	0	0	-0.61	.559	-.001 0	
Constant	1.311	.094	13.87	0	1.093 1.528	***
Mean dependent var		1.527	SD dependent var		1.411	
R-squared		0.079	Number of obs		170	
F-test		249.167	Prob > F		0.000	
Akaike crit. (AIC)		571.608	Bayesian crit. (BIC)		590.423	

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

*Appendix Table 4.*

**Regression results**

perhdi	Coef.	Robust St.Err.	t-value	p-value	[95% Conf Interval]	Sig
fdi	.1	.039	2.57	.033	.01 .19	**
percontrol_confl	0	0	-0.80	.445	-0.001 .001	
pergov_effective	-0.003	0	-6.43	0	-0.004 -0.002	***
perreg_quality	-0.001	0	-11.86	0	-0.001 -0.001	***
perruleoflaw	0	0	-1.60	.147	0 0	
Constant	1.313	.094	14.04	0	1.097 1.528	***
Mean dependent var		1.527	SD dependent var		1.411	
R-squared		0.078	Number of obs		170	
F-test		270.818	Prob > F		0.000	
Akaike crit. (AIC)		569.656	Bayesian crit. (BIC)		585.335	

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

Appendix Table 5.

**Regression results**

perhdi	Coef.	Robust St.Err.	t-value	p-value	[95% Conf Interval]	Sig	
fdi	.1	.039	2.56	.034	.01	.191	**
percontrol_confl	0	0	-0.51	.626	-.001	.001	
perruleoflaw	0	0	-3.60	.007	0	0	***
Constant	1.285	.094	13.63	0	1.067	1.502	***
Mean dependent var		1.527	SD dependent var		1.411		
R-squared		0.051	Number of obs		170		
F-test		6.117	Prob > F		0.024		
Akaike crit. (AIC)		570.562	Bayesian crit. (BIC)		579.970		

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

Appendix Table 6.

**Regression results**

perhdi	Coef.	Robust St.Err.	t-value	p-value	[95% Conf Interval]	Sig	
fdi	.086	.028	3.04	.016	.021	.151	**
Constant	1.283	.068	18.77	0	1.125	1.441	***
Mean dependent var		1.491	SD dependent var		1.522		
R-squared		0.046	Number of obs		211		
F-test		9.269	Prob > F		.		
Akaike crit. (AIC)		719.436	Bayesian crit. (BIC)		722.788		

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

Appendix Table 7.

**Augmented Dickey-Fuller test**

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	Statistic	p-value
Inverse chi-squared(18) P	48.5826	0.0001
Inverse normal Z	-3.5294	0.0002
Inverse logit t(49) L*	-3.8797	0.0002
Modified inv. chi-squared Pm	5.0971	0.0000

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Appendix Table 8.

**Variance Inflation Factor**

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	VIF	1/VIF
percontrol confl	1.414	.707
percobalt prod	1.373	.728
exportgdp	1.333	.75
perpolit stabil	1.32	.758
perreg quality	1.318	.759
pergov effective	1.316	.76
perruleoflaw	1.213	.824
Mean VIF	1.327	.

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*Appendix Table 9.*

**Pairwise correlations**

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) percobalt_prod	1.000						
(2) percontrol_confl	0.006	1.000					
(3) pergov_effective	-0.112	0.030	1.000				
(4) perreg_quality	0.289	0.167	0.294	1.000			
(5) perruleoflaw	-0.103	0.399	-0.010	0.051	1.000		
(6) perpolit_stabil	0.303	0.116	-0.373	-0.126	0.018	1.000	
(7) exportgdp	-0.132	-0.353	0.188	0.159	-0.222	-0.068	1.000