

Master Thesis

Effects of World Bank and Chinese development aid on living standards in Sub-Saharan Africa

Master thesis - Radboud University

Abstract:

This thesis includes an empirical study of development aid from The Peoples Republic of China (PRC) and the World Bank (WB) on living standards in Sub-Saharan Africa. On various levels, this thesis distinguished itself from existing literature. Most research includes either Chinese or the World Bank development aid in their study. This makes it difficult to compare the two systems. In addition, most studies only look at the economic effects, while looking at health indication provides more insight.

Lastly, the role that institutional quality plays in the effect of development aid is overlooked in existing literature. By including data from AidData for Chinese development and data from the World Bank for World Bank development aid we investigate the effect it has on three dependent variables. Child mortality, years of education and malnutrition. For child mortality and years of education a significant effect can be indicated for World Bank aid, but not for Chinese aid. No effect can be indicated for malnutrition. In addition, no effect can be indicated for institutional quality as a moderator effect. The value of these findings can be found in the positive effect that development aid can have on living standards, but do not necessarily have.

Marten Coen Terlouw – s4631897

Master International Economics & Development

13-07-2021

Table of contents

Chapter I	3
<i>Introduction</i>	3
<i>Research problem & motivation</i>	3
<i>Research objectives</i>	4
<i>Research methodology</i>	5
<i>Thesis Outline</i>	6
Chapter II	7
<i>Literature review</i>	7
<i>Chinese development aid</i>	7
<i>World Bank development aid</i>	10
<i>Institutional quality</i>	12
Chapter III	15
<i>Data</i>	15
Chapter IX	21
<i>Results</i>	21
<i>Institutional quality</i>	26
<i>Robustness check</i>	30
<i>Hypotheses</i>	32
Chapter X	33
<i>Discussion</i>	33
<i>Institutional quality</i>	35
Chapter XI	36
<i>Conclusion</i>	36
Literature	38
Appendix	42
<i>Appendix A</i>	42
<i>Appendix B</i>	43
<i>Appendix C</i>	45
<i>Appendix D</i>	46

Chapter I

Introduction

In the year 2000 The Economist's headline proclaimed Africa as 'the hopeless continent'. Eleven years later that same journal provided an article that called Africa 'the hopeful continent' (Economist, 2000; Economist 2011). Comparing the two news articles indicates anecdotal evidence that the thinking about Africa shifted significantly in the first decade of the 21st century. Still, the question remains if this change has altered the lives of Africans in a positive way. Not too long ago, the People's Republic China, hereafter called China, was also considered a "developing country", a notion labelling the region of Sub-Saharan Africa and China in the same category (Horn et al, 2019). As developing countries, both nations were aid recipients in the 20th century. Nevertheless, China advanced in one of the largest emerging donors in the world. Especially in the Sub-Saharan African region, China has made name for itself as an acting donor (Morgan and Zheng, 2019).

In the first decade of the 21st century development aid attracted attention from various scholars. A study by Bräutigam (2010) shows the difference in attitude towards development aid from China on the one hand, and the Organization for Economic Cooperation and Development (OECD) countries on the other hand. China is not a member of the OECD, and is therefore not obliged to adhere to the OECD standards surrounding Official Development Aid (ODA). The OECD had standards on various topics such as transparency and management of sovereign debt, all of which are not respected by Chinese officials. Furthermore, norms on social and environmental protection and decreasing corruption are not in line with the standards of the OECD. Dreher et al (2019) observe that China provides substantially larger aid flows to birth regions of African political leaders. This could indicate that non-altruistic motives are the driver of China's development aid program. The way that development aid is provided is changing according to aid recipient countries. Kilama (2016) claims that China had an active role in attracting resources from aid recipient countries in order to strengthen their position and gain more influence in Africa. In addition to that, a positive relationship has been found between aid provided by Chinese officials and corruption. The study claims that people who live near a site where Chinese aid was provided experiences a higher corruption level compared to people living near sites where no aid was provided (Isaksson & Kotsadam, 2018).

Research problem & motivation

Most research conducted on development aid from both China and the World Bank are looking at economic factors (Rajan & Subramanian, 2008; Morgan and Zheng, 2019; Bluhm et al, 2018). Although,

in order to escape poverty, it is important to look at the relationship between development aid and health proxy's (World Bank, 2019). This is largely underexposed in current studies (Martorano et al, 2020). In addition to that, most studies are either focused on Chinese development aid or World Bank development aid. Recent studies such as Bluhm et al (2018) and Morgan & Zheng (2019) are for example focused on China's new role as an aid donor in the world. While on the other hand studies such as Alesina & Dollar (2000) focus on the effectiveness of traditional aid in the world. Since data for Chinese development aid has only become available in 2017, research on Chinese aid has only recently been possible (Aiddata, 2021). As mentioned earlier, since most research is focused only on either of the two systems (World Bank development aid or Chinese development aid), a comparative study will be an addition to the existing literature. In addition, an article by Page & Pande (2018) claims that in countries with a high institutional quality the effect of development aid will be larger than in countries with low institutional quality. Including institutional quality as a moderator effect cannot be found in recent literature.

Research objectives

Economic development in China has enlarged the role they play in the world of development aid. This led to an increase in studies with regard to Chinese development aid. Even though China's role within this field of study has gained popularity, studying development aid by 'the West' knows a longer tradition. In line with research that has been conducted on China, ambiguous findings arise for studies of OECD countries.

Alesina & Dollar (2000) show that European countries aid programs are mainly driven by political motives. Countries provide more development aid to former colonies than to other African countries. This is also the case even when these former colonies are non-democratic countries. It should be noted that the Nordic countries' motives are more altruistic driven. France has been named as the top country providing aid motivated by political alliances, while the United States is driven by enhancing influence in the Middle East, according to Alesina & Dollar (2000). The different approaches that Western countries and China have when providing development aid causes one of them to be favored over the other by African leaders. While the 'Washington consensus' follows a system of imposing conditionalities of liberalizing African economies, the 'Beijing consensus' is driven by a principle of non-interference (Babaci-Wilhite et al, 2013). Other conditionalities that the West imposes upon Africa in exchange for development aid are for example policies that tackle climate change and enhances women's rights (Tull, 2006). This same preference for Chinese development aid is also underlined by Kolstad & Wiig (2011), since Chinese behaviour is found to be similar to Africa compared

to the West. This difference between the two styles development aid can be seen as a more traditional style that is focused on the improvement of African policies, seen from a Western point of view (Montinola, 2010), while on the other hand the Chinese style has a stronger focus on trade incentives (Grimm, 2014).

The effects of development aid on the economies of African countries are studied by various scholars. This debate has not yet led to a conclusion since results are often conflicting. Rajan & Subramanian (2008) studied the effect of development aid on economic growth. However, they did not find a positive relationship. Bluhm et al (2018) found a positive relationship between Chinese development finance and the increase of economic activity within African regions. Despite the broad research on development aid to Africa most studies are focused on economic outcomes. A report by the World Bank (2019) highlights that additional investments to Sub-Saharan Africa are needed in order to reach the 2030 Sustainable Development Goals. One of these goals states that all people around the world need to receive the health care that they need. The report claims the positive effect that development aid has had on enhancing health services. Despite the process that has been made internationally, countries in Sub-Saharan Africa are still lacking behind. Another report by the World Bank (2010) provides information on the effect that development aid can have on increasing private health care facilities. For example, infrastructure and health facilities are lacking causing health services not be on minimum standards. Development aid has the possibility to enhance these situations, what in turn can increase people's health in Sub-Saharan Africa. In addition, the report shows how the improving economic performance of Sub-Saharan Africa led to an increase in demand for health care (World Bank, 2010). Hence, focusing on economic performance would not be sufficient to indicate the hardship of daily life in Sub-Saharan Africa.

This raised questions about what system is a better fit for Sub-Saharan Africa to enhance living standards. This leads to the following research question: *“What is the effect of Chinese aid and World Bank aid on the living standards in Sub-Saharan Africa?”*

Research methodology

As mentioned before, China's approach regarding development aid differs substantially from that of the OECD countries in terms of conditionality. Furthermore, data is hard to find regarding Chinese development aid (Martorano et al, 2020). Because of this lack of information, it has been difficult to assess aid effectiveness. However, this has substantially improved when the research lab 'Aiddata' released their dataset in 2017. This dataset covers a timespan from 2000 to 2012 and captures

approximately 5.500 projects in 50 countries which are measured in millions of dollars (Aiddata, 2021). Data covering aid under the Washington consensus will be derived from the World Bank. The same 35 countries that are present from the World Bank data are also present for the Chinese AidData dataset. In addition to that the World Bank data also covers the same years that are available for the aid data set from China. The data is also measured in millions of dollars (World Bank, 2021).

Three fixed effects regressions will be performed. This leads to three different dependent variables that will be tested. The first variable is child health, measured as child mortality of infants below the age of 5 per 1000 people. The dependent variable is education. This is measured as the average years of education of the population of that country. The last dependent variable is malnutrition. Malnutrition will be measured as stunting. Stunting is when a child's height under the age of 5 is over 2 standard deviations from the median as percentage of the total population. For these three regression analyses the effect of development aid from both the World Bank and China will be tested. In addition to this, an interaction effect with the variable corruption will be included in order to check whether a moderator effect can be detected. As control variables GDP per capita, the average household size and the percentage of the population between 0 and 14 will be included in the model. The control variables are expected to have a large influence on the dependent variables.

Thesis Outline

The thesis outline will be as followed. In the upcoming section an extensive literature review will be provided. Chinese aid and traditional aid will be elaborated upon by discussing the differences between the two systems. In addition, we will look at both the economic and health situation and what is needed to escape poverty and the role that institutional quality plays will be discussed. In chapter III the data will be discussed. In addition, the assumption will be tested. Chapter IX will include the results of the regressions. Chapter X will include a discussion of the results. In this chapter the results and the literature review will shed light on the findings. Chapter XI will include a conclusion.

Chapter II

Literature review

The upcoming section will provide an elaborated literature review. This literature review will focus on the various topics related to the research question. The literature review will lead to twelve hypotheses. The first section will include a discussion on Chinese development. At the end of this section, three hypotheses will be proposed. The following section will discuss World Bank development aid. This section will end with three hypotheses. The final section of this chapter will include a discussion in institutional quality in relation with development aid. This final section will end with six hypotheses.

Chinese development aid

China has been a development aid donor to Africa already since the 1950s, however until recently this has been a black box (Martorano et al, 2020). Development aid can affect the population of Sub-Saharan Africa in many ways. Various studies show the effect that aid can have on people's livelihood. Most studies are focused on economic outcomes (Dreher et al, 2016), however more recently the effect of development aid on social factors is gaining popularity (Martorano et al, 2020; Isaksson & Kotsadam, 2018; Gibson et al, 2015; Ndikumana & Pickbourn, 2017). The following part will discuss various articles that focus on social outcomes and economic outcomes.

According to Naim (2007), the increasing importance of China as a development aid provider is met with suspiciousness by the international community. Western countries who are operating together when it comes to development aid have questions toward China's intentions according to Naim (2007). He claims that China's motives are not in line what is needed in developing countries, but rather enhances national interest. For example, by providing development aid, China can form international alliances. In line with Naim (2007), Dreher & Fuchs (2015) investigated China's aid allocation in order to better understand China's motives. The study by Dreher & Fuchs (2015) includes a cross-country study to 132 countries that are recipient countries of Chinese aid. They have found that countries China is politically aligned with receive more aid than non-politically aligned countries. For example, countries that do not recognize Taiwan in the United Nations General Assembly receive more aid compared to countries that do recognize Taiwan (Dreher & Fuchs, 2015).

Isaksson & Kotsadam (2018) investigated in their study if Chinese development aid increases corruption in Sub-Saharan Africa. They compare the level of corruption experienced by individuals

living near development aid projects. They took surveys to gain information on how this was experienced. Development aid from China and the World Bank are being compared in their study. Their study uses data for Chinese development aid from the Aiddata dataset. They found empirical evidence that Chinese projects increases corruption, and projects from the World Bank however did not. An increase in corruption will make it harder for the population to escape poverty since it will hold back economic activity (Isaksson & Kotsadam, 2018). Gehring et al (2018) also looked at conflicts caused by Chinese development aid. They, however, did not find that Chinese development aid fuels conflict. This is in contrast to the study of Isaksson & Kotsadam (2018). Gehring et al (2018) used data for Chinese development aid from AidData. They used a fixed effects model to test if Chinese development aid fuels corruption at the regional level. Chinese development aid does not fuel corruption according to their study. In addition, they also investigated at specific project level. For no sector development aid provided by China is related to more corruption according to Gehring et al (2018). These conflicting results raise questions on whether or not Chinese development aid has a positive effect on the livelihood of people living in Sub-Saharan Africa.

A research of the Global Health Research and Policy highlights the vast amount of money that is involved in China its development assistance for health (Shajalal et al, 2017). The journal used data where it tracks development projects from various countries. China donated approximately 104 billion USD in the period between 2000 and 2013. This is shared over 2286 projects with around 500 projects that are health related. China's role in the implementation is active. Most of the projects are implemented by either a Chinese private company or a state-owned enterprise (Shajalal et al, 2017). This active engagement of China with respect to their development aid projects could explain the increasing corruption near project sites (Isaksson & Kotsadam, 2018). Shajalal et al (2017) argue that a gap is left now that Western countries are reducing their aid to Sub-Saharan countries. This gap can be filled by Chinese development assistance. The research of the Global Health Research and Policy shows greater engagement of Chinese foreign assistance project in; "infrastructure, equipment and medicine, training health professionals, as well as disease treatment" (Shajalal et al, 2017, p.1). But on the other hand, less investments in; "disease prevention, health promotion and awareness initiatives, and health education" (Shajalal, 2017, p.1). This leaves one questioning whether the effectiveness of development aid can be seen in health indications.

Martorano et al (2020) studied the impact of Chinese development aid on health outcomes in Sub-Saharan Africa. Their article utilized, in line with Isaksson & Kotsadam (2018), the dataset from Aiddata. 13 Sub-Sahara African countries are researched in the study. The increasing interest in social sectors within the field of economics is incorporated in their study. Martorano et al (2020) claim that

social sectors are essential in order to escape poverty. In order to grasp these social sectors, they examine education, infant mortality and nutrition. Their long-term analysis investigates the effect that Chinese development aid has on these three social sectors. They found that Chinese development has a positive impact on various social development outcomes at the regional level. The data incorporated for their dependent variables are from the Demographic and Health Surveys (DHS). In line with the study by Martorano et al (2020), the topic of interest of the article by Panda (2019) focusses on social sectors. Panda (2019) looked at the effect of trade on infant mortality. The article claims that looking beyond the economic factors, but rather to social outcomes, such as infant mortality, would provide a better understanding of the prosperity of a nation (Pande, 2019). The article used data from the DHS for infant mortality.

Morgan & Zheng (2019) investigated Chinese development aid from a more historical perspective, when comparing this study to others. Their study acknowledges that data on Chinese development aid is lacking. By using official and non-official sources, Morgan & Zheng (2019) have created a dataset from 1956 until 2014. Data from 1956 until 1999 is created through utilizing historic sources. Data from 1999 until 2014 is derived from the AidData dataset. They found that before 1990 China's initiative of providing aid to developing countries, despite being relatively poor itself, did not seek domestic economic gains. This changed after the mid 1990. In addition to that, Morgan & Zheng (2019) argue that health sectors have played a large role in China's aid program. These findings are in contrast with the study by Shajalal (2017) who argues that China's development aid program is lacking on enhancing the health sectors.

In line with the studies by Martorano et al (2020), Pande (2019), Morgan & Zheng (2019) and Shajalal (2017), looking at social sectors would better provide a better understanding of the livelihood of people in Sub-Saharan Africa than looking at economic outcomes. Therefore, in this study, three dependent variables will be chosen in line with previous research (Martorano et al, 2020; Panda; 2019; Öhler & Nunnenkamp, 2014). Based on previous research (Martorano et al, 2020; Panda; 2019; Öhler & Nunnenkamp, 2014), three dependent variables will be chosen in this study. The variables will be years of education, child mortality and malnutrition. This leads to the following hypotheses;

- H1.1: Chinese development aid will have a positive effect on the years of education
- H1.2: Chinese development aid will have a negative effect on malnutrition
- H1.3: Chinese development aid will have a negative effect on child mortality

The following section will include a literature review of World Bank development aid. At the end of this section the three hypotheses for World Bank aid will be provided.

World Bank development aid

Literature comparing the two aid systems, World Bank developmental aid and Chinese aid, is lacking. Knutsen & Kotsadam (2020) compared development aid from the World Bank with development aid from China. In their study, they investigated whether support for the incumbent leaders is increasing or decreasing on the subnational level. Knutsen & Kotsadam (2020) claim that development aid from the World Bank leads to an increase in the incumbents' support, but this effect is however not found by Chinese aid. Isaksson & Kotsadam (2018) also compared development aid from the World Bank with Chinese aid. They argue that Chinese aid fuels corruption but aid from the World Bank does not. In addition, they argue that World Bank aid stimulates economic activity, but Chinese aid does not (Isaksson & Kotsadam, 2018). Hence, a distinction can be made in the effect of Chinese development aid and World Bank development. This phenomenon is interesting, since African leaders prefer Chinese aid over World Bank development aid because there are less conditionalities for receiving Chinese aid (Tull, 2006). Tull (2006) argues that China's motives toward Africa differs from that of the West. By providing aid without preconditions, China has tried to be favored over Western development aid. In addition to that, Bräutigam & Knack (2004) claim that less conditionalities would lead to positive economic development. There are inconclusive results between scholars between Chinese aid and World Bank aid. However, there is a shortage in comparing the two systems. This shows the relevance of including both types of development aid in the study.

For literature on development aid from the World Bank economic outcomes are among the most prominent (Ravallion, 2016; Kopsinski & Sun, 2014; Humphrey & Michaelowa, 2019; Briggs, 2018). According to Ravallion (2016), the World Bank as an institution is lacking in many aspects for which it was created back in 1944. It was not successful in creating capital flows to developing countries that are capital poor, but where marginal returns would be higher. Next to a lending bank, the role of a knowledge bank was incorporated in their system. By trying to fill knowledge gaps in developing countries, next to lending, a greater advantage can be created. According to Ravallion (2016) there is still room for improvement, but the right steps have been taken. This idea of expanding the expertise of the World Bank to a more knowledge-based bank is also underlined in the article by Kopsinski & Sun (2014). The World Bank has to compete with Chinese development aid on the African continent since the beginning of the 00's. There is increasing critique of the African elite towards the ill-suited policies that are incorporated with loans of the World Bank. Therefore, Chinese aid is preferred. However, by providing knowledge together with the donations the World Bank has the potential to have a larger positive effect on African livelihood (Kopsinski & Sun, 2014). Although China's share in aid towards African countries has increased, according to a 2019 study in most concessional

countries the World Bank is still the largest contributor (Humphrey & Michaelowa, 2019). A study focusing on the subnational level suggests that aid by the World Bank has the tendency to flow to richer regions rather than poorer regions. Regions are created by dividing the continent in approximately 50kmx50km cells. In order to test this effect, infant mortality and child nutrition are taken into account. The richer cells benefitted more from the World Bank aid than poorer cells (Briggs, 2018).

The study of Gehring et al (2018) looked at the effect of World Bank development aid and the effect it has on corruption. This study compared World Bank development aid with Chinese development aid. Gehring et al (2018) argue that the two donors both represent different styles. On the one hand, they argue that the World Bank is concerned with human rights, and distinguishes itself as an expert of providing knowledge next to money. This is in line with the article by Ravallion (2016). On the other hand, China's approach is more focused on mutual benefits. This is in line with the article by Dreher & Fuchs (2015). Gehring et al (2018) did not find that World Bank development aid fuels corruption. As presented in the previous chapter, Gehring et al (2018) also did not find an effect between Chinese development aid and fueling corruption.

Looking at social outcomes, however, would provide better insight in the livelihood of people in Sub-Saharan Africa. Looking at social outcomes has only recently become the topic of interest of scholars. In addition to that, studying the effect of Chinese development aid over World Bank development aid has also increased popularity. Therefore, articles on World Bank development aid looking at social of health outcomes are scarce. The study of Ndikumana & Pickbourn (2017) is concerned about Sub-Saharan Africa not reaching the Sustainable Development Goals if development aid does not address social outcomes. According to their study, aid has the potential to enhance human development. The focus of their study is the effect of development aid from the World Bank on water and sanitation in Sub-Saharan Africa. An increase of development aid to Africa would increase the number of people that have access to water and sanitation. Ndikumana & Pickbourn (2017) also examined the spillover effects of aid to the well-being of the population. Better access to water reduced time that was spent fetching water. Also, less time was spent on taking care of sick family members. The study of Ndikumana & Pickbourn (2017) uses data from the World Development Indicators (WDI) on access to water and sanitation as a proxy for the health situation.

Öhler & Nunnenkamp (2014) investigated to what regions in countries development aid from the World Bank is flowing to. Their topic of interest is focused on health indicators in the region. The health indicators that were included in the study were infant mortality, maternal health and malnutrition. To investigate this, they used data from the World Bank at the regional level. This data

on the regional level was combined with information on regional conflict, regional poverty and the birth place of the incumbent political leader. Öhler & Nunnenkamp (2014) argue that World Bank development aid does not take regional need into account. They did find that the World Bank provides less development aid to regions with conflict. In contrast, the study of Kiross et al (2020) argues that development aid from the World Bank does have a negative effect on infant mortality. The study of Kiross et al (2020) used data from the World Bank to investigate the effect on infant mortality. 46 countries have been taken into account in their study. In addition, they found that the expenditure for health care is growing faster than GDP in Sub-Saharan Africa. Hence, in order to maintain the infant mortality reduction rates in Sub-Saharan Africa, it is crucial to provide development aid according to Kiross et al (2020).

Only a small portion of articles investigates the effect of World Bank development aid on health indicators. In addition to this, to our knowledge no articles compare World Bank development aid and Chinese development aid on health indicators. The following three hypotheses will be added to the thesis. In order to compare Chinese development aid with World Bank development aid, the same dependent variables are chosen. Following the studies of Ravallion (2016), Kopsinski & Sun (2014), Briggs (2018), Bräutigam & Knack (2004) and Kiross et al (2020) leads to three hypotheses;

- H2.1: World Bank development aid will have a positive effect on the years of education
- H2.2: World Bank development aid will have a negative effect on malnutrition
- H2.3: World Bank development aid will have a negative effect on child mortality

Institutional quality

To decrease the share of the world population living in extreme poverty, investments in public health are vital, according to Page & Pande (2018). The study of Page & Pande (2018) is not specifically focused on Sub-Saharan Africa. In their study, they provide information on how development aid has the potential to effectively raise people out of poverty. In order to end poverty, a redistribution of resources from wealthier countries to the poor ones is needed. The 'old fashioned' way of ending poverty is often characterized as handing money to the poor to secure economic growth. However, they show that looking at health, education and access to a secure financial system is much more effective. Literature focusing on economic outcomes (Dreher et al, 2016) would therefore not grasp the real issue. However, according to Page & Pande (2018), institutional quality can have a positive effect when institutional quality is higher. Isaksson & Kotsadam (2018) show that development aid might undermine institutional quality. Ndikumana & Pickbourn (2017) and Martorano et al (2020)

show positive effects of development aid on health indications. However, in these studies institutional quality is not incorporated as one of their variables.

The role that institutional quality plays on aid effectiveness and health indicators is almost not incorporated in recent literature. The effect of aid on democracy has been part of the discussion with regard to development aid for a long time. This has led to different, sometimes apposing, results. In countries with poor institutional development, development assistance can decrease a country its potential to democratize. Bad institutions would be the result of a country being aid dependent according to Bräutigam & Knack (2004). On the other hand, Wright (2009) claims that development aid does help a country to democratize. Authoritarian regimes respond to aid by democratization (Wright, 2009). Bourguignon & Sundberg (2007) argue that we should not look at the aid effectiveness on the democratization process but on how aid would lead to effective policy. This effective policy would enhance the livelihood of the population in Sub-Saharan Africa. Hence, institutional quality should be taken into account when one wants to understand if aid can have a positive effect on health indications (Page & Pande, 2018).

An article including institutional quality in their analysis is Dreher & Fuchs (2015). They investigate whether China is biased in their aid allocation. They claim that China has the reputation of providing aid mainly to authoritarian regimes. They find that China's aid allocation is not dependent on the institutional quality of the country. In order to strengthen the claim, they compared Chinese development aid with other donors. Chinese aid is also in comparison not bias to more autocratic regimes argue Dreher & Fuchs (2015). This would indicate that China provides aid to countries regardless of their institutional quality. In line with Page & Pande (2018), one would expect that countries with higher institutional quality development aid would have a larger effect on health indicators than in countries with less institutional quality. However, this is lacking from current literature. Therefore, Chinese development aid and World Bank development aid are being compared in this thesis. Therefore, the moderator effect between development aid and institutional quality will be tested on data from both the World Bank and China. This leads to the following hypotheses;

H3.1: The positive effect of Chinese aid on years education will increase when institutional quality will increase.

H3.2: The negative effect of Chinese aid on malnutrition will increase when institutional quality will increase.

H3.3: The negative effect of Chinese aid on child mortality will increase when institutional quality will increase.

H4.1: The positive effect of World Bank aid on years education will increase when institutional quality will increase.

H4.2: The negative effect of World Bank aid on malnutrition will increase when institutional quality

will increase.

H4.3: The negative effect of World Bank aid on child mortality will increase when institutional quality will increase.

In conclusion, current literature on development aid to Sub-Saharan Africa has been a topic of research for a long time. However, until recently studies were mainly focused on economic outcomes (Briggs, 2018). The idea that the economic position of an individual reflects their livelihood is obsolete. In order to reach the Sustainable Development Goals, it is important to invest in, and look at human development (Ndikumana & Pickbourn, 2017; Martorano et al, 2020). Other proxies rather than economic outcomes might better reflect the livelihood of the population of Sub-Saharan African. What is proposed by Page & Pande (2018) is that various social indications would capture livelihood better. These social indications are child health, nutrition and education (Page & Pande, 2018). The effects of how development aid from the World Bank affects social indicators is also lacking in recent literature (Ravallion, 2016; Kopsinski & Sun, 2014). China is increasing its donation spending toward health-related industries. However, the investments are limited to just some health indicators (Shajalal et al, 2017). The comparison of the two versions of development aid, World Bank and Chinese, is rare. When they are compared, a difference can be found in how it effects the population of Sub-Saharan Africa (Isaksson & Kotsadam, 2018). This has not been part of recent literature. The quality level of institutions might play a role in the effectiveness of development aid on the country, but however is often overlooked (Page & Pande, 2018). The level of institutions should be part of the study when one study argues that Chinese development aid increases corruption, while World Bank aid increases economic activity (Isaksson & Kotsadam, 2018).

Chapter III

Data

The following chapter will include information on the data that will be used in this thesis. In addition to this, the Ordinary Least Square (OLS) assumptions will be tested, and the research design will be presented. At the end of the chapter, the choice for a fixed effects model will be elaborated.

Until recently, development aid was mainly provided by large multilateral development banks and governments of Western countries. Rapid changes in this landscape have occurred in the recent decades. Nowadays, many actors outside this selected group of Western players have entered the market of development aid. The system that was created to report on these aid flows, such as the OECD's Creditor Reporting System, did not have insight in the procedure of these new actors. This has led to many billions of dollars that was provided as aid that was not reported. In order to address the issue of transparency AidData has created an open-source dataset of aid flows by Chinese officials (AidData, 2015). The dataset provides information of official finance of China. China does not report to global reporting systems. To create this dataset, scholars such as political scientists, economists and sociologists have used open source and media-based methods to map the aid flows by China. This has led to 5.464 projects that are available in the dataset. The dataset contains different flow type aid classes. Approximately 53 percent of these projects are official development assistance (ODA). These are flow types that have the intention to promote welfare and boost economic development. To be characterized as an ODA this flow should consist of at least a grant of 25%. In the dataset ODA-like flows are defined as; "grants, technical assistance, interest-free loans, in-kind contributions of goods and services, and debt relief." (Aiddata, 2015, p.45). Other flows are the other official flows (OOF). These OOF-like flows make up for approximately 5 percent of the dataset. These are flows with mainly a commercial purpose but could not meet the definitions of ODA-like flows. The last category are vague flows. The vague flows miss sufficient information in order for them to be included in one of the other categories. This is an umbrella category that includes all the flows that cannot be in the ODA-like or OOF-like flows (AidData, 2015). 43 percent of the finances are in the form of loans.

The unit that will be observed in this thesis is at the country level. The term *project* will be used to identify one of the 5.464 projects. In the data set that is provided by AidData, detailed information is given on projects: the precise location, the start of the project, the amount of money that is involved and the flow type. There is also information provided on the status of the projects. This can fall into three different categories. A project can either be classified as 'completed' or 'implemented', or it can

be classified as 'in the pipeline'. 'In the pipeline' means that the project has been planned but has not been started yet. It is evident that projects that have not been started yet cannot have had an impact on health indicators. Hence, the projects that are still in the pipeline will be excluded from the data set. In addition to that, the dataset contains projects for which there is no information on total costs, due to lack of (additional) information. The dataset is measured in current US dollars. In order to enhance the interpretation of the dataset the data is altered so that it is measured in millions of dollars. The dataset contains 35 countries measured over a 13-year period. This leads to 455 possible observations. The Aiddata dataset contains 97 missing's. The dataset was created without the Chinese government reporting the global reporting systems. Due to this lack of transparency, not all development aid that was provided is incorporated in the dataset. Therefore, for the missing data the average amount of the data that is present for that particular country will be added. Due to this alteration in the dataset all 455 observation are taken into the regression. In order to take the assumption of normal distribution into account the logarithmic function of the variable for Chinese development aid is taken.

Data for development aid by the World Bank is in line with the AidData dataset. The dataset is also measured in current US dollars. Where the AidData dataset is made up of various flows, mainly due to lack of information, the World Bank data only consists out of ODA flows (World Bank, 2021). The World Bank defines ODA as a loan or a grant that was made in accordance over the repayment terms by the providing and receiving countries. In line with Chinese development aid the goal of ODA flows are to enhance welfare and promote economic development. The countries that are participating in the World Bank ODA flows are members of the Development Assistance Committee (DAC). (World Bank, 2021). The DAC is a committee of the OECD and includes 30 members with various observers such as the IMF. All the countries that are in the AidData dataset are present in the World Bank dataset. Like AidData the dataset is measured in current US dollars. Also, this dataset is altered to millions of dollars to enhance the way the output is interpreted. After that a logarithmic function is taken in for the assumption of normal distribution.

Since looking at health proxies provides a better insight to living standards in Sub-Saharan Africa this will be included in the model. The key part of development aid should be to strengthen social infrastructure. Social infrastructure are opportunities for the poor to escape their situation. Page & Pande (2018) point out that various aid investments have been successful in enhancing the social infrastructure. They claim that aid might have a positive relationship with social services like child health, education and malnutrition. Increases in these proxies will provide a better opportunity to escape poverty. This is in line with the World Bank (2010) report.

Data for education will be retrieved from the Human Development Reports from the United Nations (Human Development Report, 2021). Data displays the average number of years of schooling by people ages 25 and older. The data of education does not show any missing's. Data for child health is derived from the World Bank. It is measured as child mortality of infants below the age of 5 per 1000 people. It is measured with surveys in Sub-Saharan Africa. For this proxy there is one country missing from the dataset. There is no data for Togo (World Bankb, 2021). The last dependent variable of malnutrition is measured as stunting among children under the age of 5. It is measured as a child under the age of 5 height that is over 2 standard deviations from the median as percentage of the total population. Stunting is the term used for a child that is too short for its age as a result of chronic malnutrition (World Health Organization, 2021).

Data for the variable institutional quality is retrieved from the corruption perceptions index (CPI) (Transparency International, 2021). The dataset is available for all 35 countries and for all the years between 2000 and 2012. The index provides a score between zero and one hundredth. In order to enhance the interpretation of the output, the dataset is altered so that it provides a score between zero and ten. A score on zero would indicate that a country is very corrupt, while a score of ten would be perfectly incorrupt. The CPI is being calculated by 13 various external institutions. These institutions calculate how corrupt the private sector is. It should be noted that it is not the opinion of corruption of the general public, but rather the business environment.

A number of control variables are added to the regression. These control variables are expected to have an influence on the three dependent variables. The control variables are in line with the article by Martorano et al (2020). The first control variable is average household members. The data for household size is retrieved from the Global Data Lab (Global Data Lab, 2021). The Global Data Lab creates datasets and instruments with a focus on low- and middle-income countries. Data on household size is available for all countries in the dataset and for all years between 2000 and 2012. The size of a household is expected to have an influence on the dependent variables (malnutrition, average years of education and child mortality). When the members of a household are increasing, one would expect that it will have a negative relationship with the dependent variable years of education and a positive relationship with child mortality and malnutrition and. The second control variable is the percentage of people in that country between the years 0 and 14. Data for this control variables is retrieved from the World Bank (World Bankc, 2021). For this control variable all the 35 countries are available without any missing's for the years between 2000 and 2012. One would expect that when a country has a large number of people living between 0 and 14, it will have a negative relationship with average years of education and a positive relationship with malnutrition and child

mortality. The last control variable is GDP per capita. One would expect that a higher GDP per capita would have a positive effect on years of education and a negative relationship with malnutrition and child mortality. The data is retrieved from the World Bank and does not contain missing's (World Bankd, 2021). The logarithmic function is taken from the variable GDP per capita. In Table 1 a summery is provided with information on the variables that will be included in the regression.

VARIABLES	(1) N	(2) mean	(3) sd	(4) min	(5) max
Child mortality	442	108.9	40.73	14.50	227.7
Years of education	455	4.215	1.789	1.100	9
Malnutrition	455	37.84	9.657	9	62.30
Log Chinese aid	455	3.611	2.177	-5.133	8.923
Log World Bank aid	455	6.021	1.174	2.951	9.344
Institutional quality	455	2.754	0.926	1	6.400
Household member	455	6.965	1.456	5.370	13.80
Age 0 tm 14	455	43.04	4.650	20.78	50.25
Log GDP	455	6.543	0.899	4.718	9.137
Number of countries	35	35	35	35	35

Table 1: summary variables

Table 1 shows the summery of the dependent, independent and control variables. For the variable of child mortality one country is missing from the dataset. Because of this missing, the total number of observations is lower than the other variables. Child mortality has a mean of 108.9 deaths children below the age of 5 per 1000 children. The highest value is in Sierra Leone in 2000 with 227.7 deaths. The average years of education has a mean of approximately 4.2 years. The variable malnutrition, measured as children with stunting as percentage of the population, has a mean of 37.84 percent. The highest value of 62.3 percent is Burundi in the year 2000. For the data for Chinese aid and

World Bank aid the logarithmic function is taken. For development aid from both the World Bank and China also the logarithmic function is taken. The variable institutional quality has a score of approximately 2.7. This variable is measured between zero and ten, with zero being total corrupt. The most corrupt country with a score of 1 is Nigeria in 2001. The least corrupt country in the dataset is Botswana in 2002. The average household members in the dataset is 6.9 members. The percentage of the population between the age 0 and 14 has a mean value of 43.04 percent. The last variable, GDP per capita, has a mean value of 1.125.

Before we run the regressions, the data has to be checked on assumptions. The assumptions will be tested for the dependent variables. The first assumption tested is multi-collinearity and heteroskedastic. The test that was performed is shown in Appendix A. For multi-collinearity a vif test was performed. The test is lower than the threshold of 3. We can indicate that the assumption of multi-collinearity is not violated. The test for heteroscedasticity is also shown in Appendix A. For the dependent variables' child mortality and malnutrition the p value is lower than the threshold of 0.05. This indicates that there is heteroscedasticity. For the dependent variable years of education, we can indicate that there is no heteroscedasticity and the assumption is not violated. To test if the errors are normally distributed a plot of the residuals is shown in Appendix B. For all the dependent variables, we can indicate that the residuals are normally distributed around zero. Therefore, this assumption is not violated. The assumption or normal distribution of the observations a graph is shown in Appendix C. We can indicate that the observations are normally distributed. The assumption for linearity is shown in Appendix D. We can indicate that the assumption for linearity is not violated. The assumption of autocorrelation is violated since we work with panel data. Hence, observation will correlate with each other. In order to control for heteroscedasticity and autocorrelation a cluster will be added to the regression.

When using panel data various methods are applicable to run regressions. In order to test whether to use a pooled OLS, a fixed effects or a random effects a hausman test is performed. The hausman test shows that for the dependent variables child mortality and malnutrition a fixed effects model is preferred over a pooled OLS and a random effects model. For the variable average years of education a random effects model is preferred over a fixed effects model and a pooled OLS. Theoretically, a fixed effects model would be sufficient. Since the panel that is used in the model is at the country level it is expected to have mainly within variation, instead of between variation that was tested with the random effects model. In addition to that, no time invariant variable is included in the model, making random effects unnecessary. However, since the values of the findings between the two models do not differ much, and the hausman test recommended a random effects for the variable

average years of education, both models are performed. The random effects can be seen as a robustness check for the fixed effects model.

Chapter IX

Results

In the upcoming section the results of the regression analyses are shown. The first row in the table will include the fixed effects model and the second row the random effects model. For the fixed effects model, the variation is at the country level. A one unit increase of the independent variable within a country will cause the effect within that country on the dependent variable. For the random effect, this effect is not only within a country, but also between countries.

VARIABLES	FE Years of education	RE Years of education
Log Chinese aid	0.00653 (0.00782)	0.00586 (0.00790)
Log World Bank aid	0.135** (0.0529)	0.127** (0.0517)
Institutional quality	0.0530 (0.0674)	0.0623 (0.0661)
Log GDP	0.363*** (0.0629)	0.366*** (0.0629)
Household member	-0.223*** (0.0768)	-0.256*** (0.0698)
Age 0 tm 14	-0.0618** (0.0286)	-0.0663** (0.0285)
Constant	5.073*** (1.683)	5.498*** (1.694)
Observations	455	455
R-squared	0.621	
Number of countries	35	35

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 2: fixed effect and random effects on years of education

Table 2 is related to the hypotheses **H1.1** and **H2.1**. Hypothesis H1.1 states; “Chinese development aid will have a positive effect on the years of education”. In the first column we can indicate the effect of the logarithmic function of Chinese development aid on the average years of education. A one percentage increase in Chinese development aid will increase the average years of education with 0.00653. Hence, the effect is in line with the stated hypothesis. However, this effect is not significant at the threshold level.

Hypothesis H2.1 states; “World Bank development aid will have a positive effect on the years of education”. This effect can be indicated in the second column. This shows the effect of the logarithmic function of World Bank development aid on the dependent variable, average years of education. We can indicate a positive effect. A one percent increase of World Bank development aid will increase the average year of education with 0.135. This effect is in line with the stated hypothesis and is also significant at the threshold level of 0.05. In the second row the random effects regression is added in order to have a robustness check. We can indicate minor changes in the effect size, and no effect in the significance.

VARIABLES	FE Years of education	RE Years of education
Log Chinese aid	0.000954 (0.00592)	0.000636 (0.00606)
Log World Bank aid	0.0716* (0.0399)	0.0700* (0.0391)
Institutional quality	0.0372 (0.0633)	0.0509 (0.0629)
Log GDP	-0.0621 (0.111)	0.000519 (0.108)
Household member	-0.0739 (0.0930)	-0.134 (0.0840)
Age 0 tm 14	-0.0200 (0.0302)	-0.0324 (0.0321)
2001.year	0.0767*** (0.0179)	0.0754*** (0.0183)
2002.year	0.149*** (0.0219)	0.140*** (0.0236)
2003.year	0.199*** (0.0327)	0.180*** (0.0349)
2004.year	0.266*** (0.0521)	0.236*** (0.0541)
2005.year	0.338*** (0.0692)	0.296*** (0.0698)
2006.year	0.400*** (0.0860)	0.348*** (0.0851)
2007.year	0.461*** (0.106)	0.398*** (0.104)
2008.year	0.525*** (0.129)	0.449*** (0.127)
2009.year	0.594*** (0.131)	0.516*** (0.130)
2010.year	0.684*** (0.155)	0.598*** (0.153)

2011.year	0.736*** (0.157)	0.640*** (0.154)
2012.year	0.848*** (0.165)	0.746*** (0.162)
Constant	5.053*** (1.531)	5.620*** (1.638)
Observations	455	455
R-squared	0.710	
Number of countries	35	35

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3: fixed effects and random effects on years of education with dummy for year

In Table 3 the same two regression analyses are performed as in Table 2. A dummy variable is added for the years in the panel data. We can indicate that the effect of variation over time has a strong effect on the dependent variable years of education since all the dummy variables are significant at the threshold level of 0.01. With regard to the hypotheses H1.1 we can indicate that the initial effect from table 2 has decreased. However, the effect remains positive in line with the stated hypothesis. The effect of World Bank development aid on years of education remains positive but has decreased from 0.135 to 0.0716. The effect remains significant at the threshold level of 0.1.

VARIABLES	FE	RE
	Malnutrition	Malnutrition
Log Chinese aid	-0.0435 (0.0570)	-0.0458 (0.0562)
Log World Bank aid	-0.358 (0.273)	-0.290 (0.275)
Institutional quality	-0.421 (0.506)	-0.467 (0.476)
Log GDP	-5.188*** (0.583)	-5.335*** (0.553)
Household member	0.418 (0.666)	-0.0976 (0.550)
Age 0 tm 14	-0.161 (0.169)	-0.0724 (0.177)
Constant	79.27*** (12.27)	79.74*** (11.78)
Observations	455	455
R-squared	0.719	
Number of countries	35	35

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 4: fixed effect and random effects on malnutrition

In Table 4, we can indicate the regressions analyses with regard to hypotheses **H1.2** and **H2.2**. Hypotheses H1.2 states: “Chinese development aid will have a negative effect on malnutrition”. In the first column, we can indicate the effect of Chinese development aid on malnutrition in Sub-Saharan Africa. The variable for Chinese development aid is the logarithmic function. A one percent increase in Chinese development aid will decrease the variable for malnutrition with 0.0435. This negative effect is in line with the hypothesis. The effect is however not significant. In the second column we can indicate the effect of World Bank development aid on malnutrition. H2.2 states: “Word Bank development aid will have a negative effect on malnutrition”. We can indicate a negative effect. A one percentage increase in World Bank development aid will decrease the value for malnutrition with 0.358. This is in line with the stated hypothesis. However, this effect is not significant. The second row shows the random effects model as a robustness check. The changes in Table 4 between the fixed effects model and random effects model are minimal. There is no change in the significance level for Chinese development aid and World Bank development aid for the fixed effects model and the random effects model.

VARIABLES	FE	RE
	Child mortality	Child mortality
Log Chinese aid	-0.266 (0.294)	-0.254 (0.304)
Log World Bank aid	-4.351* (2.483)	-4.507* (2.373)
Institutional quality	-4.523 (3.489)	-5.122* (3.034)
Log GDP	-37.11*** (3.966)	-34.91*** (3.813)
Household member	0.477 (5.019)	3.099 (3.633)
Age 0tm14	-1.014 (1.616)	-0.379 (1.192)
Constant	432.4*** (85.31)	374.9*** (68.81)
Observations	442	442
R-squared	0.686	
Number of countries	34	34

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 5: fixed effects and random effects on child mortality

In Table 5 we can indicate the regression analyses that are related to **H1.3 and H2.3**. The first hypothesis related to the variable child mortality states: “Chinese development aid will have a negative effect on child mortality”. We can indicate this effect in the first column. A one percentage increase in Chinese development aid will decrease child mortality with 0.266. This negative effect is in line with the stated hypothesis. This effect is however not significant. In the second column we can indicate the effect of World Bank development aid on the variable of child mortality. The hypothesis states: “World Bank development aid will have a negative effect on child mortality “. The logarithmic function is taken from the aid variable. Hence, a one percentage increase in development aid will decrease child mortality with 4.351. This effect is in line with the hypothesis H2.3. Moreover, the effect is significant at the threshold level of 0.1. In the second row the random effect regression is taken as a robustness check. There can no major changes be indicated between the fixed effect and random effects regression.

VARIABLES	FE Child mortality	RE Child mortality
Log Chinese aid	0.0315 (0.292)	0.0808 (0.281)
Log World Bank aid	0.998 (1.623)	1.280 (1.788)
Institutional quality	-4.356 (3.495)	-6.137** (3.080)
Log GDP	-6.333 (5.298)	-10.84** (4.712)
Household member	-9.949*** (3.582)	-2.913 (3.033)
Age 0 tm 14	-4.083*** (1.471)	-2.368** (1.019)
2001.year	-6.353*** (0.663)	-6.170*** (0.738)
2002.year	-12.06*** (1.022)	-11.10*** (1.102)
2003.year	-18.14*** (1.757)	-16.36*** (1.899)
2004.year	-23.54*** (2.515)	-20.72*** (2.531)
2005.year	-29.19*** (3.259)	-25.40*** (3.176)

2006.year	-34.02*** (4.055)	-29.26*** (3.959)
2007.year	-38.90*** (4.755)	-33.15*** (4.460)
2008.year	-43.22*** (5.499)	-36.42*** (5.086)
2009.year	-48.57*** (5.866)	-41.45*** (5.449)
2010.year	-52.69*** (6.416)	-44.72*** (5.879)
2011.year	-55.49*** (7.032)	-46.71*** (6.397)
2012.year	-58.51*** (7.449)	-49.13*** (6.772)
Constant	433.7*** (63.01)	338.9*** (51.79)
Observations	442	442
R-squared	0.817	
Number of countries	34	34

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 5: fixed effects and random effects on child mortality with dummy for year

In Table 5, the same regression analysis is performed as shown in Table 4. However, a dummy variable for year is added to the fixed effects and random effects regression. These dummies are added as a robustness check. We can indicate that the effect of World Bank development aid and Chinese development aid changed from a negative effect to a positive effect. In addition to this, the effect of World Bank development aid changed from a significant effect to a non-significant effect. The effects of the robustness check of Table 5 are not in line with the stated hypothesis H1.3 and H2.3.

Institutional quality

The following section will include the regression analysis with regard to the interaction term between Chinese and World Bank development aid and institutional quality. The same order will be followed as in the previous section. First, the variable years of education will be shown. After that, the variable of malnutrition. The section will close with the regression analysis of child mortality. In line with the previous section, both the fixed effect and random effects regression will be included. As mentioned in chapter III, the fixed effects model is main indicator due to the hausman test and is theoretically closer in line with the research. The random effect is included as a robustness check.

VARIABLES	FE Years of education	RE Years of education
Log Chinese aid	0.0380 (0.0270)	0.0387 (0.0273)
Log China aid * Institutional quality	-0.0104 (0.00873)	-0.0110 (0.00872)
Log World Bank aid	0.0312 (0.114)	0.0427 (0.115)
Institutional quality	-0.155 (0.210)	-0.0933 (0.211)
Log World Bank aid * institutional quality	0.0394 (0.0345)	0.0315 (0.0343)
Log GDP	0.365*** (0.0640)	0.367*** (0.0640)
Household member	-0.202** (0.0772)	-0.240*** (0.0681)
Age 0 tm 14	-0.0538** (0.0223)	-0.0609*** (0.0236)
Constant	5.112*** (1.618)	5.561*** (1.670)
Observations	455	455
R-squared	0.632	
Number of countries	35	35

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 6: fixed effects and random effects with interaction term for institutional quality

The regression analyses in Table 6 relates to the hypotheses **H3.1** and **H4.1**. The first hypothesis states: “The positive effect of Chinese aid on years education will increase when institutional quality will increase”. To interpret the interaction effect, we first indicate the initial effect of Chinese development aid on years of education. This shows a positive effect of 0.0380. This is the effect of Chinese aid on years of education when the variable for institutional quality is 0. A score of 0 on institutional quality indicates that that particular country has the lowest possible score on institutional quality. The interaction term between Chinese aid and institutional quality is negative, with a score of 0.0104. This indicates that when institutional quality is increasing, the positive effect of Chinese aid on years of education decreases. This is not in line with the hypothesis H3.1. This effect is not significant at the

threshold level. The second hypothesis for years of education, H4.1, states: “The positive effect of World Bank aid on years education will increase when institutional quality will increase”. The initial effect of World Bank aid yields a positive effect of 0.0312. This is the effect for with a score of 0 on institutional quality. The interaction term shows a positive effect of 0.0394. This indicates that when institutional quality will increase, the initial effect of World Bank aid on years of education will increase. This is in line with the hypothesis H4.1. This effect is however not significant at the threshold level. There are no major alterations between the fixed effects regression analysis and the robustness check random effects model.

VARIABLES	FE Malnutrition	RE Malnutrition
Log Chinese aid	-0.0435 (0.111)	-0.0678 (0.114)
Log Chinese aid * institutional quality	-0.00195 (0.0279)	0.00667 (0.0290)
Log World Bank aid	-0.0393 (0.480)	-0.0973 (0.513)
Institutional quality	0.362 (0.944)	-0.0562 (1.129)
Log World Bank aid * Institutional quality	-0.125 (0.131)	-0.0712 (0.164)
Log GDP	-5.195*** (0.578)	-5.346*** (0.548)
Household member	0.366 (0.634)	-0.145 (0.542)
Age 0 tm 14	-0.189 (0.167)	-0.0787 (0.182)
Constant	78.88*** (11.89)	79.30*** (11.58)
Observations	455	455
R-squared	0.720	
Number of countries	35	35

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 7: fixed effects and random effects with interaction term for institutional quality

Table 7 shows the regression analyses that are related to **H3.2 and H4.2**. H3.2 states: “The negative effect of Chinese aid on malnutrition will increase when institutional quality will increase”. Before interpreting the interaction term, we need to indicate the initial effect of development aid of China on

malnutrition. We can indicate a negative effect with a value of 0.0435. This is the effect of Chinese aid on malnutrition with a score 0 for institutional quality. The interaction term yields an effect of -0.00195. This means that when institutional quality will increase the negative effect of Chinese development aid on malnutrition will increase. This is in line with the hypothesis. The effect is however not significant at the threshold level. Hypothesis H4.2 states: “The negative effect of World Bank aid on malnutrition will increase when institutional quality will increase”. First, we need to indicate the initial effect of World Bank aid on malnutrition. This yields a negative effect of 0.0393. This is the score for World Bank development aid with a score of 0 for institutional quality. The effect of the interaction term shows a negative effect of 0.125. This indicates that the initial negative effect of World Bank development aid will increase when institutional quality will increase. This is in line with the hypothesis. There are no major changes between the fixed effects model and the robustness check with the random effects.

VARIABLES	FE Child mortality	RE Child mortality
Log Chinese aid	-1.199 (0.983)	-1.090 (0.983)
Log Chinese aid * institutional quality	0.326 (0.344)	0.295 (0.343)
Log World Bank aid	-4.341 (4.493)	-5.146 (4.441)
Institutional quality	-5.870 (8.357)	-7.762 (8.351)
Log World Bank aid * Institutional quality	0.0306 (1.384)	0.269 (1.401)
Log GDP	-37.10*** (3.936)	-34.98*** (3.814)
Household member	0.309 (4.993)	2.939 (3.654)
Age 0 to 14	-0.976 (1.575)	-0.358 (1.157)
Constant	435.2*** (85.96)	382.5*** (72.85)
Observations	442	442
R-squared	0.687	
Number of countries	34	34

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 8: fixed effects and random effects with interaction term for institutional quality

Table 8 shows the regression analyses regarding **H3.3** and **H4.3**. H3.3 states: “The negative effect of Chinese aid on child mortality will increase when institutional quality will increase”. In order to check this hypothesis, we first need to indicate the initial effect between Chinese development aid and the variable of child mortality. The initial effect of Chinese development aid on child mortality shows a negative effect of 1.199. This is the score of Chinese development aid on child mortality with a score of 0 for institutional quality. The interaction term shows a positive effect on child mortality. This indicates that when institutional quality will increase, the initial negative effect will decrease. This is not in line with the hypothesis H3.3. This effect is not significant at the threshold level. For the effect of World Bank aid the hypothesis states: “The negative effect of World Bank aid on child mortality will increase when institutional quality will increase”. First, we indicate the initial effect between World Bank aid and child mortality. This shows a negative effect with a score of -4.341. This is the score of World Bank development aid on child mortality with a score of 0 for institutional quality. The interaction term shows a positive effect with a score of 0.0306. This indicates that when institutional quality will increase, the initial negative effect of World Bank development aid will decrease. This is not in line with the hypothesis. This effect is not significant at the threshold level. There is no major difference between the fixed effect model and the robustness check random effects model.

Robustness check

As a robustness check, a regression analysis will be added where to check reverse causality. A new variable is generated where the dependent variables are put one years before their actual year. Hence, the year 2001 will be 2000. Money takes time to reach its goal, think about the time it takes before money is implemented in a project. In order to check whether this is present for the dependent variables in this thesis the robustness check is included.

VARIABLES	(1) Year of Education	(2) Malnutrition	(3) Child mortality
Log Chinese aid	0.000323 (0.00443)	-0.0230 (0.0482)	0.0565 (0.256)
Log World Bank aid	0.0508 (0.0339)	-0.366 (0.296)	1.269 (1.411)
Institutional quality	0.0532 (0.0662)	-0.388 (0.549)	-3.666 (3.326)
Log GDP	-0.0831 (0.107)	-3.631*** (0.751)	-6.111 (5.412)
Household member	-0.0691	0.182	-9.844***

	(0.101)	(0.651)	(3.417)
Age 0 tm 14	-0.0134	-0.307*	-3.761***
	(0.0300)	(0.162)	(1.365)
2001.year	0.0887***	-0.611***	-6.551***
	(0.0147)	(0.190)	(0.690)
2002.year	0.126***	-0.893***	-12.35***
	(0.0210)	(0.261)	(1.115)
2003.year	0.213***	-1.016***	-18.30***
	(0.0341)	(0.352)	(1.938)
2004.year	0.282***	-1.061**	-23.74***
	(0.0557)	(0.454)	(2.709)
2005.year	0.347***	-1.246**	-29.10***
	(0.0732)	(0.512)	(3.451)
2006.year	0.421***	-1.329**	-33.74***
	(0.0912)	(0.610)	(4.255)
2007.year	0.492***	-1.402*	-38.35***
	(0.112)	(0.739)	(4.955)
2008.year	0.563***	-1.457*	-42.66***
	(0.131)	(0.849)	(5.745)
2009.year	0.655***	-2.131**	-47.55***
	(0.148)	(0.907)	(6.047)
2010.year	0.701***	-2.536**	-51.23***
	(0.153)	(0.955)	(6.567)
2011.year	0.818***	-2.747**	-53.83***
	(0.164)	(1.049)	(7.107)
Constant	5.011***	77.86***	409.1***
	(1.517)	(11.62)	(62.12)
Observations	420	420	408
R-squared	0.690	0.761	0.820
Number of countries	35	35	34

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 9: Robustness check

With the robustness check, we can indicate that the initial significant effects disappear. Both Chinese aid and World Bank aid do not show a significant effect of the dependent variables of last year. We can indicate that there is a significant effect of variation over time on the new dependent variable. This might indicate that changes over time have the largest effect on the dependent variables. The following section will include a comprehensive discussion. In this discussion answers will be provided to explain the regression analyses from this chapter. In addition, a link will be made with the literature review in chapter II.

Hypotheses

H1.1: Chinese development aid will have a positive effect on the years of education	Rejected
H1.2: Chinese development aid will have a negative effect on malnutrition	Rejected
H1.3: Chinese development aid will have a negative effect on child mortality	Rejected
H2.1: Word Bank development aid will have a positive effect on the years of education	Supported
H2.2: Word Bank development aid will have a negative effect on malnutrition	Rejected
H2.3: Word Bank development aid will have a negative effect on child mortality	Supported
H3.1: The positive effect of Chinese aid on years education will increase when institutional quality will increase.	Rejected
H3.2: The negative effect of Chinese aid on malnutrition will increase when institutional quality will increase.	Rejected
H3.3: The negative effect of Chinese aid on child mortality will increase when institutional quality will increase.	Rejected
H4.1: The positive effect of World Bank aid on years education will increase when institutional quality will increase.	Rejected
H4.2: The negative effect of World Bank aid on malnutrition will increase when institutional quality will increase.	Rejected
H4.3: The negative effect of World Bank aid on child mortality will increase when institutional quality will increase.	Rejected

Table 10: Hypotheses rejected or supported

Chapter X

Discussion

In the previous section, the twelve hypotheses stated in chapter II were either accepted or rejected. This section will include a discussion connecting the answers on the hypotheses to the literature review. First, the six hypotheses, without the interaction term, will be discussed. After that, the last six will be discussed.

Until the 1950s, China was an aid receiving country. This has changed when China became wealthier over time. At this moment in time, China is one of the largest contributors of development aid over the world. China finds itself in a position where they can compete with Western countries when it comes to development aid. However, there are major divisions between development aid provided by Western countries and by China. A division can be found in the conditionalities (e.g., enhance woman's rights and climate change) that have to be taken into account before receiving development aid from the World Bank, while this is lacking for Chinese aid (Tull, 2006). Another division between Chinese aid and aid from the World Bank can be found in how and where aid is provided. While Chinese state-owned companies tend to be actively engaged in project sites, this is not the case for World Bank development aid (Shajalal et al, 2017). In addition to this, development aid from the World Bank has the tendency to flow to richer regions rather than to poor regions in Sub-Saharan Africa (Briggs, 2018). Even though this clear distinction between the two types of aid can be found in literature, there are few papers including both versions of development aid to test the different effects. Studies that do include both versions (Isaksson & Kotsadam, 2018), find a difference in the effect of development aid on regions in Sub-Saharan Africa.

If Sub-Saharan Africa ought to reach the Sustainable Development Goals (SDGs) in 2030 major investments in social development and human development are needed. Non-economic factors reflect the livelihood position of an individual better rather than looking purely at the economic position (World Bank, 2010). Ndikumana & Pickbourn (2017) are concerned about Sub-Saharan Africa not reaching the SDGs. Therefore, they investigate the effect of Chinese development aid on non-economic dependent variables such as access to water and sanitation. Hence, dependent variables that are non-economic variables are included in this thesis.

The direction of the effect for Chinese development aid are all in line with the proposed hypotheses (H1). These effects are however not significant. This indicates that we cannot indicate a significant effect of Chinese development aid on years of education, malnutrition and child mortality. These findings are not in line with the study of Martorano et al (2020). Their study looked at Chinese

development aid and they found a significant effect on two dependent variables. They did not find a significant effect of Chinese development aid on malnutrition. It is important to note that the study by Martorano et al (2020) only included 13 countries in Sub-Saharan Africa instead of the 35 countries that are included in this thesis. This might have an effect on the significance. In order to deal with missing's in this thesis, the average development aid for a country was calculated with the data that was available. 97 observations were missing on a total of 455. It is possible that the article by Martorano et al only included countries without missing's.

The direction of the effect of World Bank development aid are also in line with all the proposed hypotheses (H2). This effect shows a significant effect of World Bank development aid for child mortality and years of education. This effect is however not significant for malnutrition. The article by Isaksson & Kotsadam (2018) show that development aid from China fuels corruption near the project sites, while they do not find this effect near project sites of the World Bank. This could explain why Chinese development does not show a significant effect while World Bank aid does. Chinese development aid might not reach its ultimate goal of being invested in society, but rather end up in pockets of project managers. This is in line with the article of Shajalal et al (2017). They show that Chinese development aid is preferred over development from the World Bank due to less restrictions. These less restrictions could indicate why Chinese development aid does not reach its ultimate goal of increasing the livelihood in Sub-Saharan Africa while World Bank development aid does.

In order to check what would happen to the effect of both Chinese development aid and World Bank development when we include a dummy variable for time, two extra regression analyses are included in chapter IX. Table 3 and Table 5 show this effect with a dummy variable for time for the dependent variable years of education and child mortality, respectively. The effect for years of education remained significant even though the threshold level decreased from 0.05 to 0.1. The effect for child mortality changed from significant to not significant. This indicates that some of the initial variation of the dependent variables might not only be effect due to development aid, but also due to increases over time. Bear in mind that this is only the case for World Bank development, since Chinese development initially did not show a significant effect and after including the dummy variable the effect also remains insignificant. The decrease in the significance levels is in line with the articles by Ravallion (2016) and Kopsinski & Sun (2014). Both articles claim that the World Bank has expended its expertise from a purely lending bank to also a knowledge bank. This is not the case for development aid provided by China according to Ravallion (2016). By providing additional knowledge together with money, aid from the World Bank has an advantage over Chinese development aid (Ravallion, 2016; Kopsinski & Sun; 2014). The initial effect, the regression analysis without the dummy variable for time,

shows that World Bank development aid has a significant effect. However, this effect is somewhat incorporated into the continuing development of time. Keep in mind that development aid from the World Bank also includes providing knowledge to the people in Sub-Saharan Africa. This additional knowledge in Sub-Saharan Africa might show itself for example as having better teachers or better nurses. This will take on some of the effect of the development aid money on the dependent variables since knowledge is included into this variable.

Institutional quality

The effect that institutional quality has on the effect of development aid is largely overlooked according to a study by Page & Pande (2018). Therefore, institutional quality is taken as an interaction term in this thesis. The role that institutional quality plays on aid and health indications cannot be found in recent literature. According to Bräutigam & Knack (2004), development aid can help to democratize a country. However, being aid dependent might stop institutions from developing. Bourguignon & Sundberg (2007) claim that development aid would lead to effective policy, but can only be realized in countries where money does not end up in the pockets of corrupt leaders.

The interaction term is included in the hypotheses H3 and H4. Table 6, 7 and 8 show the regression analyses for the dependent variables years of education, malnutrition and child mortality, respectively. For all the six hypotheses, regarding the interaction term the regression analyses do not show a significant effect. Some directions of the effect are in line with the stated hypotheses. The direction of the interaction term between World Bank development aid on years of education is in line with the stated hypothesis. Also, for both Chinese development aid and World Bank development aid on malnutrition the direction of the effects are in line with the stated hypotheses. This indicates that a higher level of institutional quality does not increase the effect size on the dependent variables significantly. This is not in line with the article by Page and Pande (2018). However, Page and Pande (2018) argue in their article in general that institutional quality is lacking from recent literature. They claim that development aid can have a larger positive effect when institutional quality is higher. However, this claim does not specially go into the effect on Sub-Saharan Africa. Sub-Saharan Africa is a region in the world where institutional quality is rather low compared to the rest of the world. Also, compared to other regions receiving development aid. Differences between countries are therefore marginal. This low difference in the quality of institutions might explain that no significant effect can be indicated. Bräutigam & Knack (2004) claim that countries who are aid dependent will have bad institutions. If countries in Sub-Saharan Africa are aid dependent, this could explain why the large sums of development aid that they receive might keep their institutions from enhancing.

Chapter XI

Conclusion

At the beginning of this thesis, the cover of the journal 'the Economist' on how Africa changed from the hopeless continent to a hopeful continent at the beginning of this millennium was stated. Did Africa actually endure growth, and if so, how has this altered the lives of the people living in Sub-Saharan Africa? For a long time, China was alongside Africa labeled as a developing country. Both Sub-Saharan Africa and China were aid receiving countries in the 20th century. Nevertheless, China has evolved itself into one of the largest aid contributors to the African continent. China and the World Bank are at this point the largest aid providing entities in the world. With Sub-Saharan Africa still being an aid receiving country, this raised questions on if China and the World Bank have played a role in possible development on the continent. This had led to the research question of this thesis; *"What is the effect of Chinese aid and World Bank aid on the living standards in Sub-Saharan Africa?"*. Until recently, topic of interest for research on development aid looked at the effect on economic factors such as GDP. However, in order to check if individuals have the possibility to escape poverty, it is more insightful to shed light on living standards. This is in line with the proposed Sustainable Development Goals. In line with earlier research, dependent variables child mortality, years of education and malnutrition have been chosen. Most research is either focussed on development aid by the World Bank or China. This thesis includes both. Lastly, this thesis also includes the role that institutional quality plays on aid and its effectiveness. By including institutional quality as an interaction term we can indicate if aid has a larger effect in countries with high institutional quality. This research has not been conducted yet. Since we look at the effect of two types of aid, and an interaction term, on three dependent variables twelve hypotheses are included in this thesis.

The results of the regressions shown in chapter IX indicate that there is no effect of Chinese development aid on years of education, child mortality and malnutrition. The hypotheses on Chinese development aid on the dependent variables are therefore rejected. For development aid from the World Bank, a significant effect can be indicated on the dependent variables years of education and child mortality. There is no significant effect of development aid from the World Bank on malnutrition. The hypotheses related to development aid from the World Bank and China with the moderator effect of institutional quality on the dependent variables are all rejected. These regression analyses in chapter IX do not show a significant effect.

The significant effect of World Bank aid on years of education and child mortality decreases when we insert a dummy variable for time. This indicates that some of the effect is included in

development over time. We can conclude that, in addition to the money that the World Bank provides as aid, also the benefit on knowledge transmitting is included. This is in line with earlier research.

The research that has been conducted in this thesis faces several limitations. The first limitation would be the missing's in the data for Chinese development aid. The dataset of AidData is created through open-source information. Several scholars, such as political scientists, economists and sociologists have used open-source data based to create the dataset. Because of this, the dataset is potentially biased. It could be possible that China only reports through media certain development aid projects. In addition to this, the dataset contained quite some missing's. In order to deal with the missing's, the average value for that particular country was calculated. This could potentially lead to biased results for Chinese development aid. Furthermore, the interaction term on institutional quality did not show significant results. Since Sub-Saharan Africa was the region of research, only these countries were included in the regression. Most countries in Sub-Saharan Africa share that they have a low score for institutional quality. However, many more countries receive development aid. When the region of research will be expended, more countries, potentially with a higher score in institutional quality, they can be included in the regression. This could potentially lead to significant results for the interaction term. For further research, we therefore would recommend to mainly look at development aid from the World Bank and include more countries outside of Sub-Saharan Africa. This could lead to interesting results on institutional quality and development aid. In addition to that we recommend to look at the regional level. The role that corruption plays at the regional level could also lead to an interaction effect between corruption and aid effectiveness.

Literature

AidData. (2015). AidData's Methodology for Tracing Underreported Financial Flows. Retrieved at; http://docs.aiddata.org/ad4/pdfs/TUFF_codebook_Version1.2.pdf

AidData. (2021). AidData's Global Chinese Official Finance Dataset, 2000-2014, Version 1.0. Retrieved at; <https://www.aiddata.org/data/chinese-global-official-finance-dataset>

Alesina, A., & Dollar, D. (2000). Who gives foreign aid to whom and why?. *Journal of economic growth*, 5(1), 33-63.

Babaci-Wilhite, Z., Geo-JaJa, M. A., & Shizhou, L. (2013). China's aid to Africa: competitor or alternative to the OECD aid architecture?. *International Journal of Social Economics*.

Bornmann L., Butz A., & Wohlrabe K. (2018) What are the top five journals in economics? A new meta-ranking, *Applied Economics*, 50:6, 659-675

Bräutigam D., Knack S.(2004) Foreign aid, institutions, and governance in sub-Saharan Africa. *Economic Development and Cultural Change*, 52, 2, 255-285

Brautigam, D. (2010). China, Africa and the international aid architecture. African Development Bank Group Working Paper, 107.

Briggs, R. (2018). Poor targeting: a gridded spatial analysis of the degree to which aid reaches the poor in Africa. *World Development*. 103, 133, 148

Bluhm, R., Dreher, A., Fuchs, A., Parks, B., Strange, A., & Tierney, M. J. (2019). Connective financing: Chinese infrastructure projects and the diffusion of economic activity in developing countries.

Bourguignon F., Sundberg M. (2007) Aid Effectiveness – opening the black box. *The American Economic Review*, 97, 2, 316- 321

Dreher, A., & Fuchs, A. (2015). Rogue aid? An empirical analysis of China's aid allocation. *Canadian Journal of Economics/Revue canadienne d'économique*, 48(3), 988-1023.

Dreher, A., Fuchs, A., Hodler, R., Parks, B., Raschky, P., & Tierney, M. J. (2016). Aid on demand: African leaders and the geography of China's foreign assistance. *Centro Studi Luca d'Agliano Development Studies Working Paper*, (400).

Economist. (05-13-2000). The hopeless continent.

Economist. (12-03-2011). The hopeful continent.

Global Data Lab. (2021). Average household size. Retrieved at;

<https://globaldatalab.org/areadata/hhsize/>

Gehring, K. S., Wong, M. H., & Kaplan, L. (2018). *Aid and conflict at the subnational level: Evidence from World Bank and Chinese development projects in Africa* (No. 657).

Grimm, S., (2014), “*China-Africa Cooperation: Promises, Practice and Prospects*”, *Journal of Contemporary China* 23:90, 993-1011

Horn, S., Reinhart, C. M., Trebesch, C. 2019. China's Overseas Lending (No. w26050). National Bureau of Economic Research.

Human Development Report. (2021). Mean years of schooling (years). Retrieved at;

<http://hdr.undp.org/en/indicators/103006>

Humphrey, C., Michaelowa, K. (2019). China in Africa: Competition for traditional development finance institutions? *World Development*. 120, 15, 28

Isaksson, A. S., & Kotsadam, A. (2018). Chinese aid and local corruption. *Journal of Public Economics*, 159, 146-159.

Kilama, E. G. (2016). The influence of China and emerging donors aid allocation: A recipient perspective. *China Economic Review*, 38, 76-91.

Kiross, G. T., Chojenta, C., Barker, D., & Loxton, D. (2020). The effects of health expenditure on infant mortality in sub-Saharan Africa: evidence from panel data analysis. *Health economics review*, 10(1), 1-9.

- Knutsen T., Kotsadam A. The political economy of aid allocation: Aid and incumbency at the local level in Sub Saharan Africa, *World Development*, 127, 2020
- Kolstad, I., & Wiig, A. (2011). Better the Devil you Know? Chinese Foreign Direct Investment in Africa. *Journal of African Business*. 12, 31-50
- Kopiński, D., & Sun, Q. (2014). New Friends, Old Friends? The World Bank and Africa When the Chinese Are Coming. *Global Governance*, 20(4), 601-623.
- Martorano, B., Metzger, L., & Sanfilippo, M. (2020). Chinese development assistance and household welfare in sub-Saharan Africa. *World Development*, 129, 104909.
- Montinola, G.R., (2010), “*When Does Aid Conditionality Work?*”, *Studies in Comparative International Development*, 45:3, 358-382
- Morgan, P., & Zheng, Y. (2019). Old bottle new wine? The evolution of China’s aid in Africa 1956–2014. *Third World Quarterly*, 40(7), 1283-1303.
- Naim, M. (2007). Rogue aid. *Foreign policy*, (159), 96.
- Ndikumana L., Pickbourn L. The Impact of Foreign Aid Allocation on Access to Social Services in sub-Saharan Africa: The Case of Water and Sanitation, *World Development*, 90, 2017, 104-114
- Öhler, H., & Nunnenkamp, P. (2014). Needs-based targeting or favoritism? The regional allocation of multilateral aid within recipient countries. *Kyklos*, 67(3), 420-446.
- Page, L., & Pande, R. (2018). Ending global poverty: Why money isn't enough. *Journal of Economic Perspectives*, 32(4), 173-200.
- Panda, P. (2019). Does trade reduce infant mortality? Evidence from sub-Saharan Africa. *World Development*. 2019(128).
- Rajan, R. G., & Subramanian, A. (2008). Aid and growth: What does the cross-country evidence really show?. *The Review of economics and Statistics*, 90(4), 643-665.
- Ravallion, M. (2016). The World Bank: Why It Is Still Needed and Why It Still Disappoints. *The Journal of Economic Perspectives*, 30(1), 77-94.

Shajalal, M., Xu, J., Jing, J. et al. China's engagement with development assistance for health in Africa. *glob health res policy* 2, 24

Transparency International (2021). Corruption Perceptions Index. Retrieved at; <https://www.transparency.org/en/cpi/2020/index/nzl#>

Tull, D. M. (2006). China's engagement in Africa: scope, significance and consequences. *The Journal of Modern African Studies*, 44(3), 459-479.

World Bank. (2010). The business of health in Africa : partnering with the private sector to improve people's lives. Retrieved at; <https://documents.worldbank.org/en/publication/documents-reports/documentdetail/878891468002994639/the-business-of-health-in-africa-partnering-with-the-private-sector-to-improve-peoples-lives>

World Bank. (2019). Primary Health Care on the Road to Universal Health Coverage. Retrieved at; <https://apps.who.int/iris/bitstream/handle/10665/328913/WHO-HIS-HGF-19.1-eng.pdf?ua=1>

World Banka. (2021). New official development development assistance and official aid received (current US\$). Retrieved at; <https://data.worldbank.org/indicator/DT.ODA.ALLD.CD>

World Bankb. (2021). Mortality rate, under-5 (per 1000 live births). Retrieved at; <https://data.worldbank.org/indicator/SH.DYN.MORT>

World Bankc. (2021). Population ages 0-14 (% of total population). Retrieved at; <https://data.worldbank.org/indicator/SP.POP.0014.TO.ZS>

World Bankd. (2021). GDP per capita (current US\$). Retrieved at; <https://data.worldbank.org/indicator/NY.GDP.PCAP.CD>

World Health Organization. (2021). Stunting prevalence among children under 5 years of age (% (JME). Retrieved at; <https://www.who.int/data/gho/data/indicators/indicator-details/GHO/gho-jme-stunting-prevalence>

Wright, J. (2009). How Foreign Aid Can Foster Democratization in Authoritarian Regimes. *American Journal of Political Science*, 53(3), 552-571

Appendix

Appendix A

. vif

Variable	VIF	1/VIF
age0tml4	2.57	0.388546
lngdp	2.03	0.493654
cpi	1.76	0.568441
lnaid_wb	1.43	0.698441
lnaid_china	1.28	0.781325
household_r	1.12	0.892129
Mean VIF	1.70	

. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of child_mor

chi2(1) = 13.11
Prob > chi2 = 0.0003

Vif test and heteroskedasticity test child mortality

. vif

Variable	VIF	1/VIF
age0tml4	2.57	0.389274
lngdp	2.02	0.495750
cpi	1.76	0.568762
lnaid_wb	1.42	0.704994
lnaid_china	1.27	0.786495
household_r	1.12	0.892534
Mean VIF	1.69	

. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of years_edu

chi2(1) = 0.06
Prob > chi2 = 0.8143

Vif test and heteroskedasticity test years of education

. vif

Variable	VIF	1/VIF
age0tml4	2.57	0.389274
lngdp	2.02	0.495750
cpi	1.76	0.568762
lnaid_wb	1.42	0.704994
lnaid_china	1.27	0.786495
household_~r	1.12	0.892534
Mean VIF	1.69	

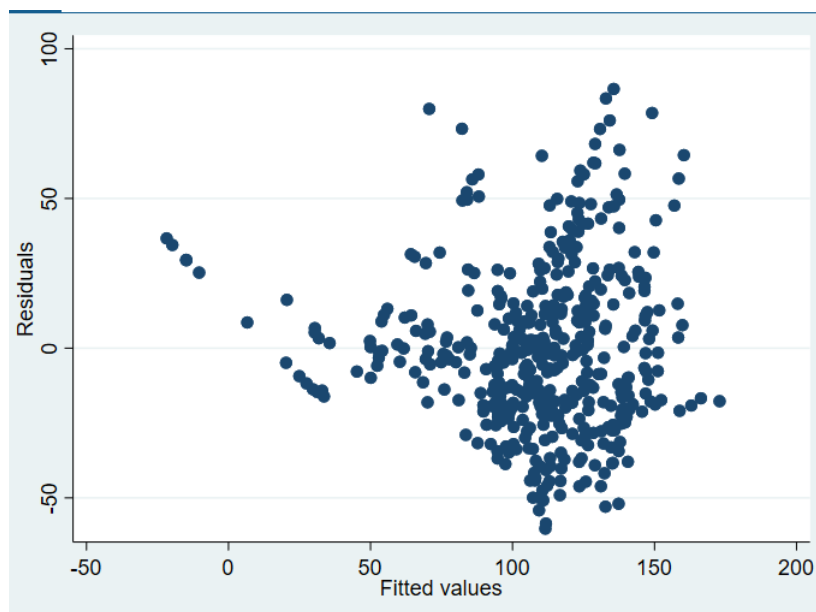
. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of nutrition

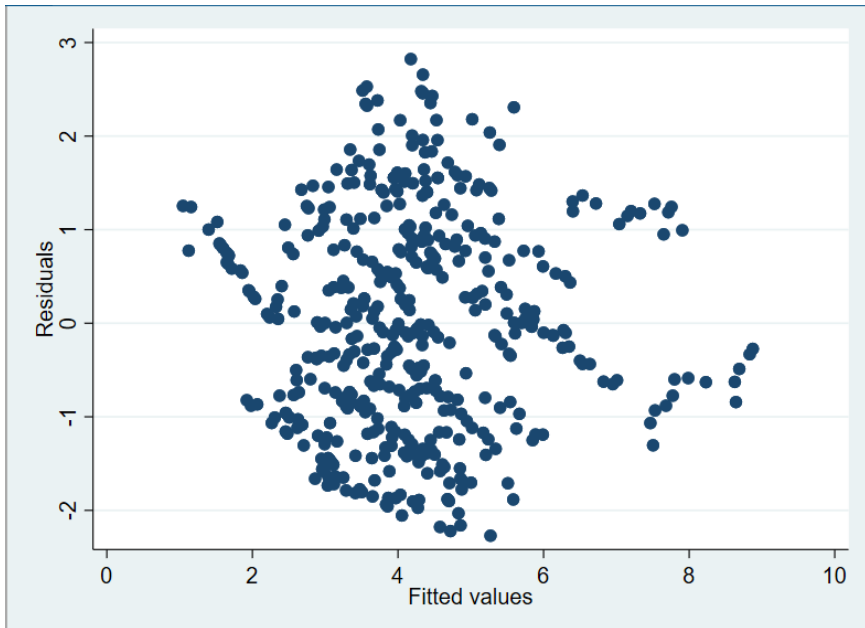
chi2(1) = 8.52
Prob > chi2 = 0.0035

Vif test and heteroskedasticity test malnutrition

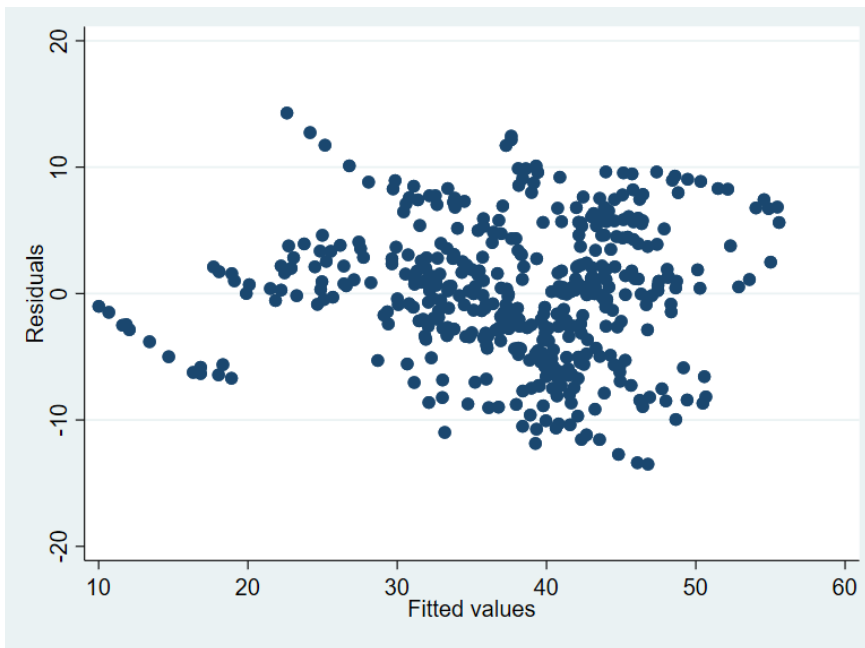
Appendix B



Residuals child mortality

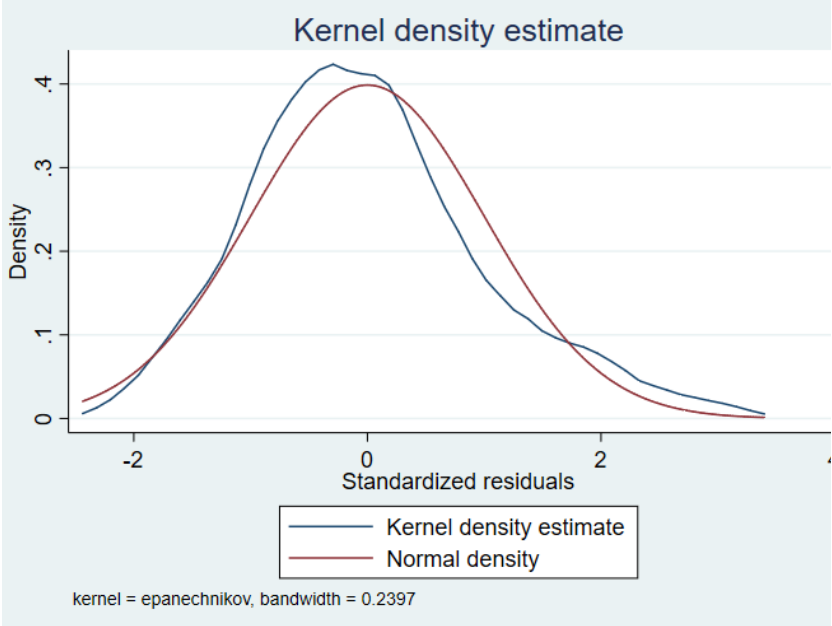


Residuals years of education

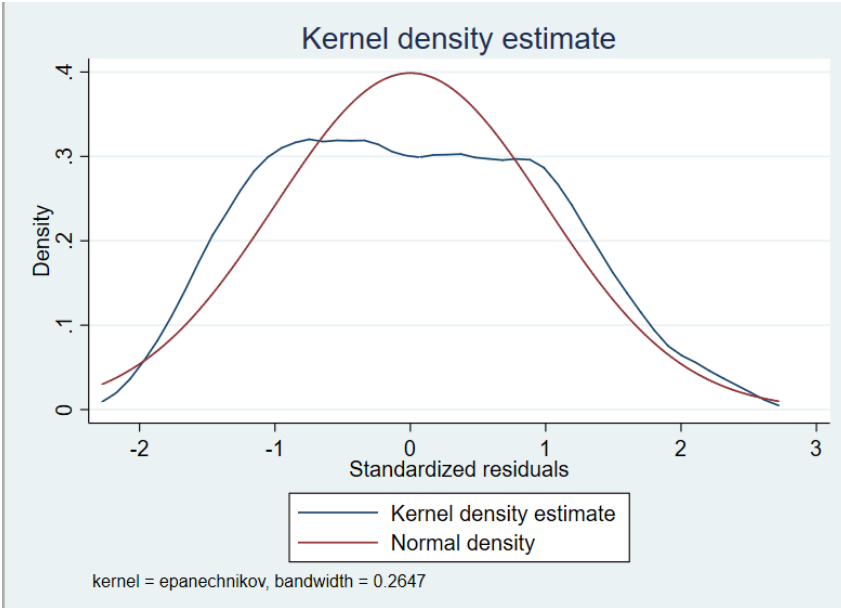


Residuals malnutrition

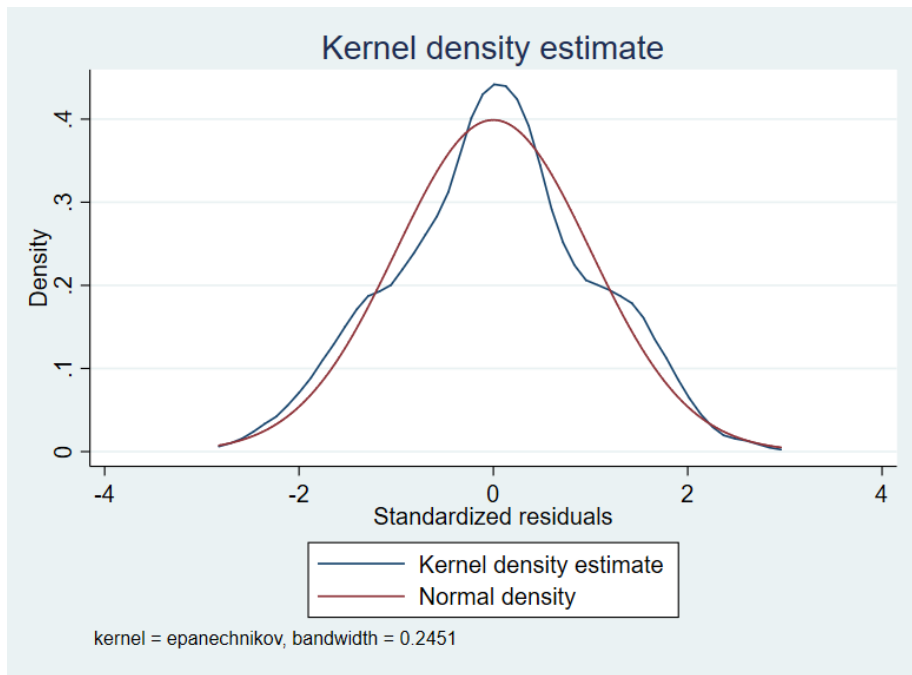
Appendix C



Normal distribution child mortality

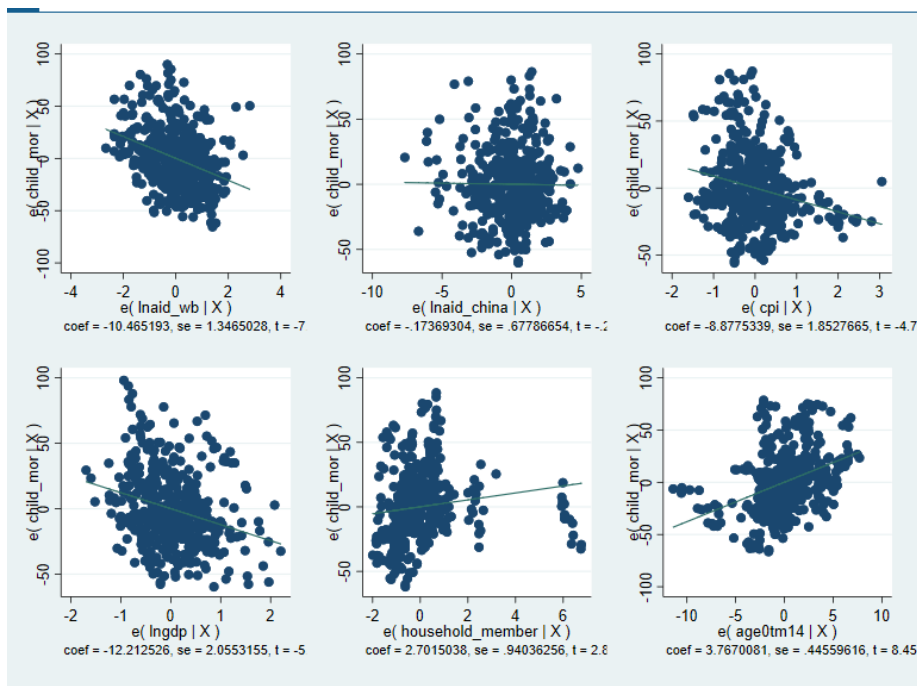


Normal distribution years of education

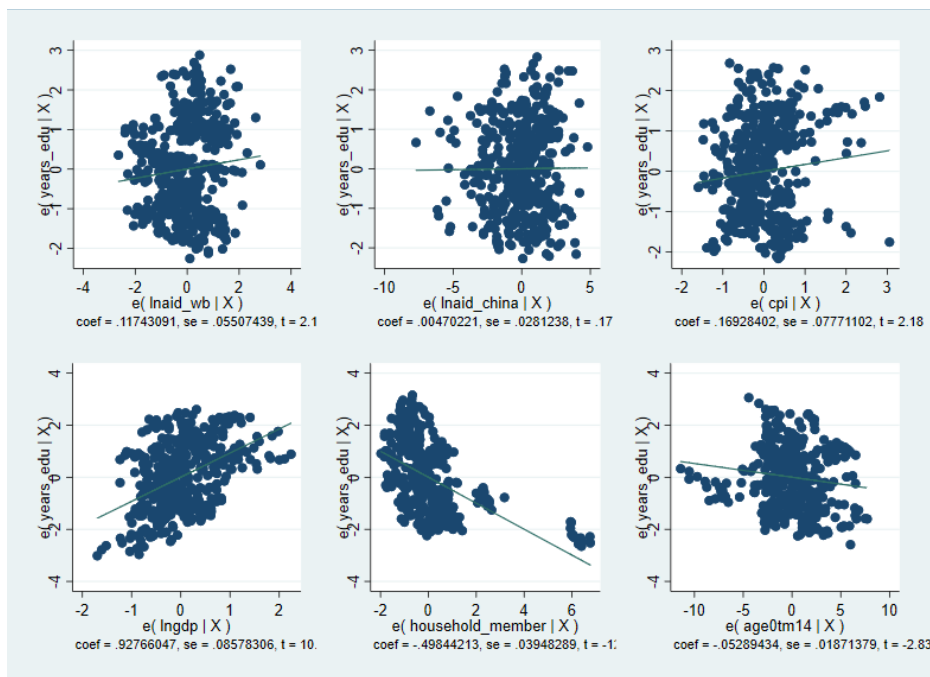


Normal distribution malnutrition

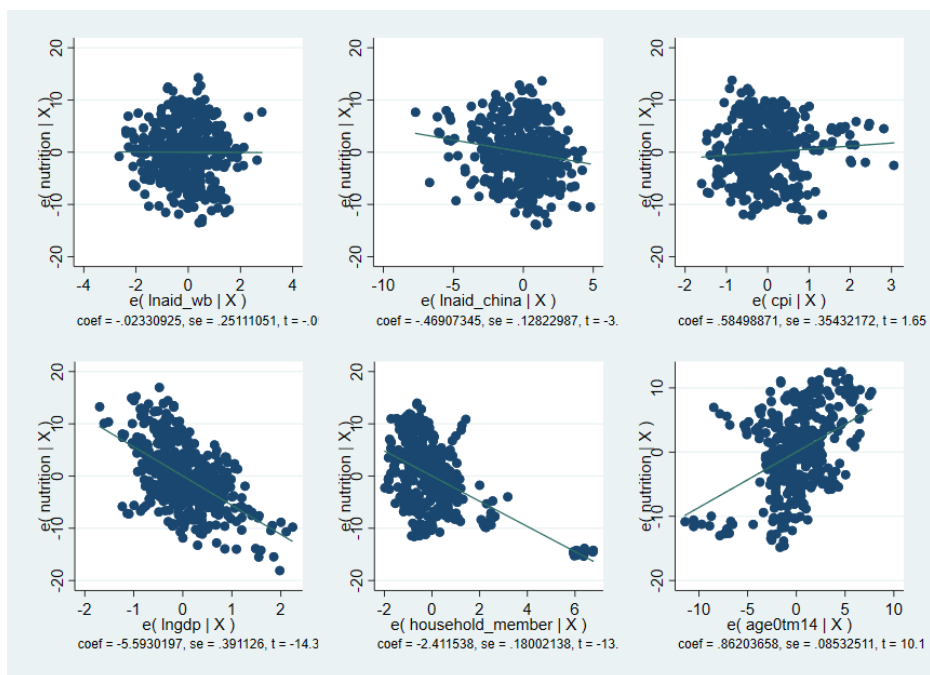
Appendix D



Linearity child mortality



Linearity years of education



Linearity malnutrition