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China's Development Aid Effectiveness in Africa

ANALYZING THE EFFECTS OF CHINESE ODA ON RECIPIENT AFRICAN COUNTRIES'
SOCIOECONOMIC WELFARE (2000-2014): A PANEL DATA ANALYSIS.

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ABSTRACT

Following the publication of the AidData database on Chinese financial flows in 2016, it has become possible to differentiate between Chinese commercial and humanitarian financial flows. Based on the assumption that Chinese aid differs from traditional ODA, many studies have tried to identify its impact on economic growth, corruption, and the environment. However, there is no final consensus on its impact on socioeconomic welfare in recipient countries. Employing the African continent as the main unit of analysis, since it represents the major recipient of Chinese ODA-like aid, this research has attempted to uncover the effects on the socioeconomic welfare dimension. For this purpose, the impact of Chinese ODA-like aid on HDI and its component dimensions Health, Education, and Income has been analyzed from 2002 to 2016. The findings indicate that in recipient African countries Chinese ODA-like aid has a positive effect on HDI and its component dimensions: however, investment and are shown traditional ODA to fare better than Chinese aid.

Key Words: Chinese Aid, HDI, socioeconomic welfare, ODA, Africa.

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LIST OF ABBREVIATIONS

CRS: Creditor Reporting System

DAC: Development Assistance Committee

DRC: Democratic Republic of Congo

FE: Fixed-Effects

FDI: Foreign Direct Investment

GDP: Gross Domestic Product

GNI: Gross National Income

HDI: Human Development Index

IMF: International Monetary Fund

LDCs: Least Developed Countries

MDGs: Millennium Development goals

MOFCOM: Chinese Minister of Commerce

OBOR One Belt One Road

ODA: Official Development Assistance

OECD: Organization for Economic and Commercial Development

OOF: Other Official Flows

PPP: Purchasing Power Parity

R4I: Resources for Infrastructures

RE: Random-Effects

SAS: Sub Saharan Africa

SDGs: Sustainable Development Goals

UNDP: United Nations Development Program

WGIs: Worldwide Governance Indicators

1   CHAPTER 1 - INTRODUCTION

The aim of this first chapter is to introduce the topic of the research, and explain how the central research question and the sub-questions were ultimately developed. In section 1.1, a brief introduction portrays the controversies developed around Chinese Official Developmental Assistance (ODA). Furthermore, a first assessment of Chinese ODA distribution in the African continent is presented. Afterwards, the studies conducted on its effectiveness are preliminarily explored, and their limitations addressed. In section 1.2 the central research question and the sub-questions are developed. Section 1.3 lays the foundation for the research methodology, with an initial description pf the approach. In section 1.4 the academic and societal relevance are respectively addressed. Ultimately, in section 1.5 the outline of the research is introduced.

1.1   RESEARCH CONTEXT

In the course of the last 20 years the People's Republic of China (from here on simply referred to as China) has emerged as a foreign aid donor (Welle-Strand & Kjøllesdal, 2010), and has subsequently secured its position among the largest aid providers in the world, reaching close to US$ 6.6Bln in 2015[1] alone. Nonetheless, this rapid increase of aid provision, associated with the expansionist characteristics of Chinese economy, has attracted a lot of criticism around the globe. The main critiques regard the reasons and modalities of Chinese foreign aid towards African countries (Bräutigam, 2015; Camba, 2017). Some of the criticism is grounded in empirical evidence, inasmuch as it has been demonstrated that development aid is complementary to the establishment of Chinese enterprises on foreign territories, alongside other financial flows (Power et al, 2012). On the other hand, sources for additional critiques, namely the claims of resource-grabbing neocolonialism (Cheru & Obi, 2011), has been more controversial. In this regard, the initiation of vast infrastructures projects, such as the Belt Road Initiative (带一路), has stimulated the suspicions around Chinese aid, as it is argued that it may only be instrumental to China's worldwide economic expansion and not effective in fostering development (The Guardian, 2018) . More attention has been given, however, to the motives underlying Chinese foreign aid, and little has been said about its effectiveness: when this happened, the focus has been economic growth rather than social development. On the other hand, this research intends to investigate whether Chinese ODA has any effect on the socioeconomic welfare of recipient African countries.

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[1]Data retrieved from: China Africa Research Initiative (2017). Chinese Global Foreign Aid Expenditure. Johns Hopkins.

Despite the different and often contrasting theories formulated in the attempt of understanding the aforementioned trend, it is a shared belief that China's identity as aid donor is rather "unconventional" (Bräutigam, 2009). Firstly, China has not joined the Creditor Report System (CRS) set up by the Development Assistance Committee (DAC), the Organization for Economic Co-operation Development (OECD) organ tasked to collect and to analyze development assistance data. Therefore it is rather problematic to identify what share of Chinese Aid corresponds to the Official Developmental Assistance (ODA) definition convened by DAC members in 1972. ODA cannot correspond to aid devolved towards military causes, nor assistance targeting primarily commercial objectives. (Zhang & Smith, 2017; OECD, 2018). According to the white paper on foreign aid published in 2014 by the State Council Information Office (SCIO) of the Chinese Government, aid does not have to meet these distinctive criteria, but it aims to "not impose any political conditions, not interfere in the internal affairs of the recipient countries and fully respect their right to independently choose their own paths and models of development (…) in the effort to help other developing countries, especially the least developed countries (LDCs), to reduce poverty and improve livelihood" (SCIO, 2014). However, as Chapter 2 will delineate, this absence of conditional ties is only apparent (Xuefeng, 2012).

The difficulty in identifying the nature of Chinese aid, in conjunction with the obstacles associated to tracking it, has greatly hindered the evaluation of its effectiveness (Grimm, Rank, Schickerling, & McDonald, 2011). Despite the aforementioned obstacles, in 2017 AidData[2] has published the most complete dataset to date, covering the 2000-2014 period. The organization developed a methodology to discriminate the ODA from Other Official Flows (OFF), which are mainly directed towards economic investment[3], by taking into consideration sources the targeted countries rather than official documents. In fact, the Chinese government does not make distinctions between the two kinds of aid, which are reported under the same category in official documents (IMF, 2018). From the dataset it emerges that the main targets of China's ODA are indeed African countries, capturing 58.36% of all Chinese ODA from 2000 to 2014. On the other hand, the large majority of OOF is directed towards the neighboring countries Russia (US\$ 36.6Bln) and Pakistan (US\$ 16.3Bln), in the same period.

Secondly, according to UN guidelines, China does not figure among the developed economies, despite its rapidly growing size in the last decades. Instances of ODA outflows from developing countries to least developed ones are rare. In fact, financial aid in South-South cooperation practices is often targeted towards the establishment of economic relations (Woods, 2008), following the principle of mutual

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[2] AidData is a research lab located at the College of William and Mary, active since 2009. Its mission is to improve the transparency, effectiveness and accountability of development finance (AidData.org)

[3] OOF include: grants to developing countries for commercial purposes; official bilateral transactions intended to promote development with a grant element of less than 25%; and, official bilateral transactions, whatever their grant element, that are primarily export-facilitating in purpose. (OECD)

benefit. Not surprisingly China has, in the last years, become Africa's largest trading partner. The volume of trade between the two parties has been overall increasing since the 90s, surpassing the US-Africa volume of trade in 2009, and amounting to US$ 128Bln[4] in 2016[5]. This trend coincides with the guidelines established by the Go out policy (走出去战), developed in 1999 by the Chinese Government in order to achieve larger amounts of private investment towards foreign countries. Indeed, the African continent is rich of natural resources essential to the Chinese manufacturing sector, ranging from cotton used in textile production to rare materials utilized in high tech industry. China provides in turn a bulk of final goods to the African market, often outclassing the western goods in terms of price and availability. Chinese enterprises invest large sums in Africa, which result in job-creation and improved macroeconomic welfare (Pannell, 2008). Large-scale initiatives have also been launched to close the cultural and technological gap between the two parties, the most notable being the Mutual Learning (相互学习) initiative (Ministry of the Foreign Affairs of the People's Republic of China, 2018) which envisions the exchange of technical professionals and cooperation in education and research. The objective is to enrich the knowledge and enlarge the capabilities of both parties, widening the horizon of future cooperation.

Therefore it is important to discriminate among Foreign Direct Investment (FDI), ODA and OOF. This research is going to focus solely on ODA, as social development promotion falls within its objectives. According to the data released by AidData, in the period 2000-2014 China has devolved US$ 47.3Bln to Africa. In Figure 1.1 the distribution over the years is shown: even if the amounts devolved are fluctuating, the overall trend observed is positive.

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[4]All amounts are adjusted to US$2014

[5] Data retrieved from: China Africa Research Initiative (2019).China-Africa Trade. (Johns Hopkins)
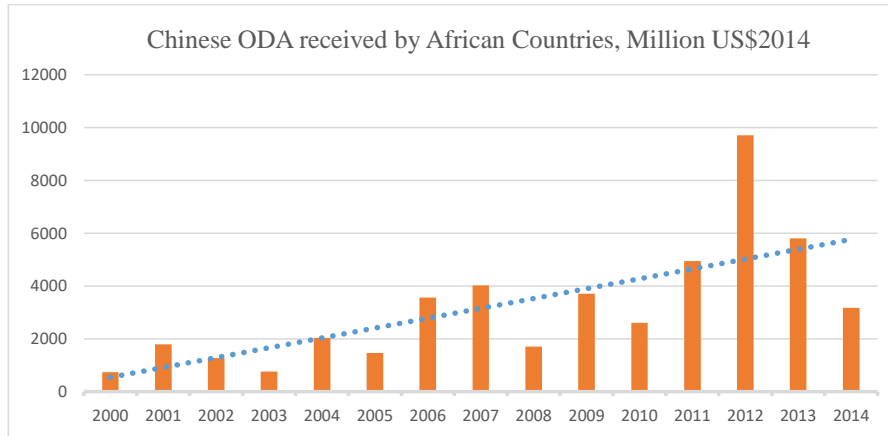
Fig 1.1. *Foreign Aid devolved by China to African Countries, 2000-2014. The dotted line represents the upward trend of Chinese aid's amounts (angular coefficient). Source: AidData*

It is worth mentioning that in terms of amount received, the distribution of Chinese Aid in Africa is very uneven throughout the continent (See Fig 1.2). From 2000 to 2014 Cote d'Ivoire has been the country that received most Chinese ODA (US\$ 3.96Bln)[6] followed by Ethiopia (3.66), Zimbabwe (3.6), Cameroon (3.4), Nigeria (3.08), and Tanzania (3.02). On a regional level, Northern African[7] countries are the bottom receivers of Aid, with an average of US\$ 273Mln received, along with Southern African countries, where the average ODA received by each country amount to US\$ 284Mln; in comparison, the average Western African country has received US\$ 1.11Bln. More surprisingly, the sub-Saharan countries of Democratic Republic of Congo (DRC), the Central African Republic (CAR), and Somalia, which rank bottom of the list in a number of human development indicators, are also among the countries which received less Chinese ODA. While the figures portray the general distribution of Chinese foreign aid in Africa, this data representation suffers from some clear limitations. It shows the amount of ODA received in absolute terms, not adjusted to the characteristics of the recipient countries. In fact, the countries considered differ in many respects, most markedly the development categories to which they belong and their population size. For example, the comparison between the absolute aid received by Nigeria, which has 154 million inhabitants[8], and Tanzania, populated by 57 million, is not very descriptive, given that the amount of aid received by the two countries is very similar. Likewise, comparing an upper middle-income country such as Algeria and a least developed country likes Chad

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[6] Figures retrieved from: *Aid, China, and Growth: Evidence from a New Global Development Finance Dataset*. AidData Working Paper #46 (2017). US\$ are adjusted to US\$2014 to facilitate comparison.

[7] Regions classified accordingly to the Standard country or area codes for statistical use (M49) published by the UN Statistics Division

[8] Population figures refer to 2018 levels (World Bank)

is not helpful. Moreover, it is an aggregate of ODA inflows over the totality of the considered period, therefore there is no indicator of variation over time. A more thorough description and analysis of data will be offered later in Chapter 4, where the Chinese ODA is primarily considered on a per capita level.
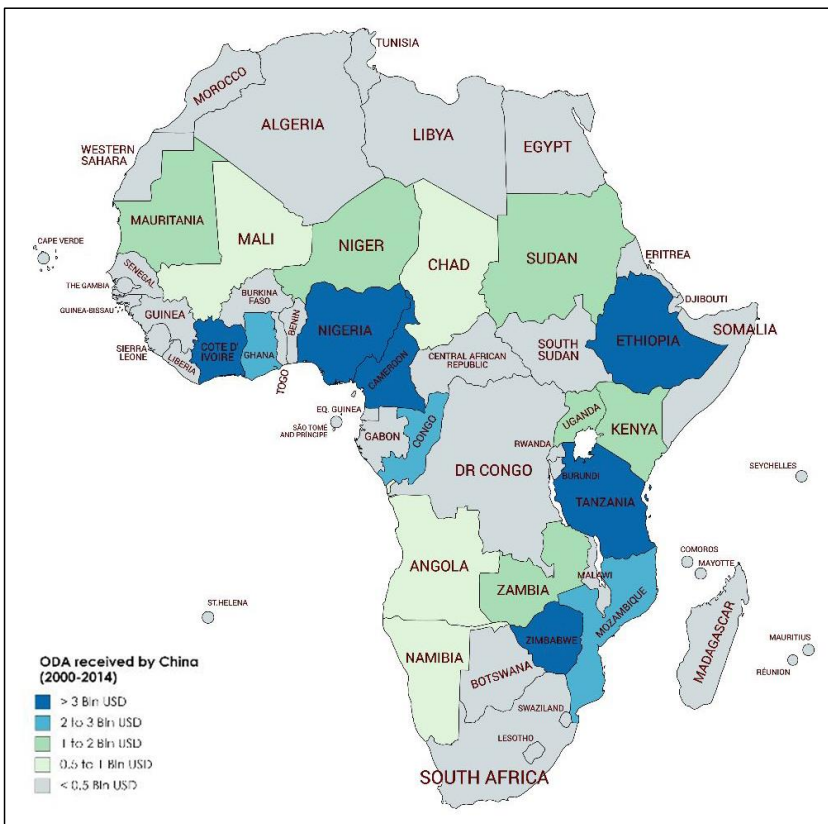
Fig 1.2 *Chinese ODA received by country (2000 -2014). Source: AidData*

Unlike previous studies conducted on the social effects of ODA, this research defines socioeconomic welfare as individual and societal well-being, in line with Kosack (2003). In this context, indicators such as social expenditure, are considered only an intermediate variable, as they do not reflect the effective quality of life enjoyed by people. The quality of life definition follows the guidelines developed by Amartya Sen and Martha Nussbaum in the homonymous groundbreaking publication "*The Quality of Life*" (1993), where they advocated for a paradigmatic shift from a quality of life in terms of mere financial well-being by introducing the concepts of life satisfaction and capabilities. While it has been demonstrated that efficient government expenditure in health and education improves human development (Prasetyo and Zudhi, 2013), there is no evidence that aid always works via government expenditure (Gomanee et al, 2015). It is more appropriate in this sense to employ an "outcome" indicator, such as the Human Development Index (HDI), modeled by Mahbub ul Haq in 1990 following Sen's theories. The indicator has been effectively used to portray human development for almost three decades, and despite the critiques it attracted due to its simplicity, it has been widely utilized as an indicator for policy purposes by international organizations and countries (Kovacevic, 2010). The three dimensions that compose HDI, namely Education, Health, and Income, are also taken into account individually.

1.2   RESEARCH QUESTION

Following the background information explored, alongside the works of crirical literature, the central research question has been developed.

What is the effect of Chinese Official Developmental Assistance on recipient African countries' socioeconomic welfare?

The aim of this research paper is to identify the causal relationship between Chinese Official Development Aid and the socioeconomic Welfare of recipient African countries. Moreover, in order to investigate the effect of ODA on socioeconomic welfare indicators, two additional sub-questions have been developed.

1) According to the existent body of literature, does Chinese Official Developmental Aid affect socioeconomic Welfare in recipient countries?

2) What is the empirical evidence about the effects of Chinese developmental aid on socioeconomic Welfare in recipient African countries?

1.3   RESEARCH APPROACH

The objective of this research is to find whether Chinese ODA has influenced the socioeconomic Welfare in recipient African countries, covering the period 2002-2016, due to data availability on Chinese ODA flows. In order to investigate the causal relationship between the two phenomena, a quantitative analysis is carried out. Panel Data Analysis allows for a longitudinal and cross-sectional examination of the observed data, therefore it is considered the most appropriate tool for the task at hand (Hsiao, 2007). The data presented in the AidData database will serve as the main independent variable, after an accurate selection of the observations suitable for research. The entirety of African countries (54) are taken into consideration, with the exception of South Sudan due to its recent independency, the Kingdom of eSwatini, Burkina Faso, São Tomé and Príncipe, and Gambia, as they have never received ODA from China. Moreover Somalia and Eritrea are excluded due to data unavailability. The total sample therefore consists of 47 African countries, with an adequate level of representation from each African region (See Appendix A). This research intends to investigate not only the effects of Chinese ODA on HDI as an aggregate index, but also to identify ODA's consequences on HDI's relevant individual components: life expectancy at birth, expected years of schooling, and GNI per capita, which will serve as additional dependent variables. As it is unlikely to observe variation of its values, the variable mean years of schooling will not be examined on its own. Moreover, the review of econometric studies about Chinese foreign aid effects will be helpful in the selection of the control variables that are employed in the quantitative analysis.

1.4   THEORETICAL AND SOCIETAL RELEVANCE

1.4.1   Theoretical Relevance

A number of studies has been conducted on the effects of foreign aid in Africa. *Welfare in Africa*, edited by Dixon (2016), has carried out an in-depth analysis of the effects of foreign aid on individual welfare in the continent, on a country-by-country qualitative basis. Other studies, such as Bräutigam & Knack (2004), set out to explore the relationship between foreign aid and institutional quality. However, in the aforementioned studies, and the ones that are going to be summarized in Chapter 2, Chinese aid is not individually analyzed. In fact, prior to Dreher et al (2017), data on Chinese aid was scarce, and therefore its analysis rather inconclusive. On the other hand, this research conducts a quantitative assessment of Chinese aid's influence on socioeconomic welfare indicators. There are therefore two main sources of theoretical relevance. Firstly, this study takes under examination an unconventional donor country, China, whose development assistance policies and conditions differ from any other country (See 2.1). Secondly, among all previous studies that actually conducted research about China's developmental aid assistance in Africa, the effects on welfare are seldom mentioned (Asongu & Nwachukwu, 2016; Bräutigam, 2011a), while on this research socioeconomic welfare is the main point of inquiry.

1.4.2 Societal Relevance

The results of the research will offer significant insights on the aid and economic relations China and the African continent have developed through the first leg of the 21st century. Firstly, determining whether there is a relationship between Chinese development assistance and socioeconomic welfare development in the target country is unquestionably advantageous for policymakers in donor countries, when considering coordination with Chinese aid efforts. These advantages can be helpful not only for donor countries in designing foreign aid, but by recipient countries in building realistic expectations about the aid effectiveness. The academic discussion on the effectiveness of aid is still very open, and examining how one type of unconventional aid may be beneficial towards the achievement of socioeconomic welfare development could provide a valuable alternative to ongoing practices. Countries around the world are currently engaged in reaching the Sustainable Development Goals (SDGs): the research will help identify whether Chinese aid positively contributes towards the accomplishment of the SDGs. In this regard, the conclusions of this research will help future cooperation among international aid donors and China.

1.5 RESEARCH OUTLINE

The research will be developed as follows. Firstly, a thorough literature review is conducted, in order to examine the previous studies performed on the effect of ODA on socioeconomic welfare. The nature of Chinese ODA is examined, and the theoretical framework on aid effectiveness on socioeconomic welfare is developed (Chapter 2). Moreover, the relevant econometric studies are taken into consideration. This will be helpful both for the definition of the main concepts and to set up the theoretical basis for the selection of control variables. The results of this analysis will provide an answer to the first sub-question. Secondly, the methodology of the research is addressed. It will entail a study of the dimensions, the reasons behind their selection, why they are the most appropriate for the research, and how they will be employed in the panel data regression via their operationalization (Chapter 3). Then the quantitative analysis, a fixed-effect panel data model, will finally be run, in order to produce the answer to the second sub-question and the main research question (Chapter 4). The results obtained from the analysis are later discussed in the conclusive chapter of the research (Chapter 5), where they are examined in light of the hypotheses.

2 CHAPTER 2 – THEORETICAL FRAMEWORK AND LITERATURE REVIEW

The chapter is composed as it follows. Firstly, the characteristics of Chinese Aid, accompanied with a brief history of Chinese Foreign Aid in Africa are presented (2.1). Secondly, the theories supporting and dismissing foreign aid's effect on socioeconomic welfare development are explored (2.2). Three main streams are identified, according to their conclusions about foreign aid effectiveness: (I) Theories claiming that Foreign Aid has a positive effect on socioeconomic welfare development, (II) Theories dismissing the effects of Foreign Aid on socioeconomic welfare development, and (III) Theories claiming that Foreign Aid has a conditionally positive impact on socioeconomic welfare development. Afterwards, the empirical studies examining the effects of ODA on welfare indicators are reported (2.3). The comparison among the employed methodologies will contribute towards the selection of relevant control variables for the research's analysis. Lastly, the central hypothesis is developed (2.4).

2.1 CHARACTERISTICS OF CHINESE FOREIGN AID

The new role assumed by China in the African continent has attracted the interest of many scholars: the large-scale devolvement of unconventional aid has provided a starting point for exploration. While it has been shown in Chapter 1 that a number of studies on the impact of Official Development Aid in Africa has been conducted, the role of Chinese Aid in the continent is still highly debated. Scholars have been focusing on the distributional and developmental implications of Chinese foreign aid in Africa, in order to understand whether local leaders use the money to protect their ethnic groups (Dreher et al, 2017), but the socioeconomic welfare dimension has not been explored yet. Since Chinese Aid has been frequently described as unconventional, it is reasonable to expect that the conclusions of previous studies on aid effectiveness will not necessarily be applicable to Chinese ODA as well. In the following paragraphs, Chinese foreign aid is explored, with a focus on modalities and conditionality issues. Afterwards, a brief history of the development of Chinese aid policies is presented in order to correctly understand why Chinese Aid differs from traditional ODA. Finally, drawing from Chinese aid history and characteristics, expectation of its effectiveness on socioeconomic welfare are elaborated.

2.1.1 Modalities of Chinese Foreign Aid

Foremost, it is important to state that Chinese aid is rarely given in form of money transfer to recipient governments, exception made for pressing humanitarian emergencies (Bräutigam, 2009). Most often, Chinese aid programs are devolved in form of complete projects, implemented by Chinese actors, with a preference towards the infrastructure and agriculture sectors. Local governments do not have much decision-making power over aid allocation and the project management. Rather, the terms of the projects are contracted beforehand. On other accounts, aid takes the form of goods and materials, technical cooperation and human resources development cooperation, medical teams and volunteers, emergency humanitarian aid, and debt relief (State Council, 2014). China devolves most of its developmental aid mainly via four main instruments (Bräutigam, 2011b), hereby described:

Concessional loans. Loans that are granted on terms substantially more generous than market loans. The concessionality is achieved either via granting interest rates below market, or alternatively by grace periods (OECD, 2003). Since 1995, when they were first introduced, concessional loans represent the biggest share of China's ODA. Concessional loans aim to finance the medium and large sized projects, with the condition that the projects must involve at least 50 percent of Chinese goods and services (Bräutigam, 2011b).

Zero interest loans. Zero interest loans are loans which repayment obligations do not accumulate over time. They are mainly used to help recipient countries construct public facilities, and launch projects to improve people's livelihood. In recent times there has been a shift from zero interest loans to concessional loans: nonetheless, zero interest loans are still widely used.

Grants. Grants help financing little and medium sized programs to improve the welfare, either by the construction of infrastructures or by launching programs in sectors relevant to development, e.g. agriculture, health, and education (State Council, 2014).

Debt relief. This type of aid includes debt cancellation programs. However, if the debt cancelled concerns the restitution of zero-interest loans, the amount is not counted twice in the ODA (Strange et al, 2017). Operations of debt relief conducted by China do not happen in the context of the Highly Indebted Poor Country (HIPCs) debt relief program but instead they are enacted autonomously by China, with little coordination with other countries.

China's Ministry of Commerce (MOFCOM) is responsible for grants and zero-interest loans devolvement, but two banking institutions provide the majority of Chinese development aid (Bräutigam, 2011b). The policy bank China's Export-Import Bank manages concessional loans, but also disburses large sums of money overseas for commercial purposes (Varrall, 2016). It is subsidized by MOFCOM, and being a policy bank it reports directly to the State Council. The Chinese Developmental Bank supposedly devolves its findings to strictly developmental causes, even if loans are given out at

commercial rates (Zhang & Smith, 2017). Other financing channels have been established between Africa and China, most notably the China-Africa development fund, which aim is to support African small and medium enterprises (SMEs) via the devolvement of US$ 1Bln. However, since these channels are business-focused, they do not count towards ODA (Zhang & Smith, 2017). The implementation is often left to Chinese companies, like Huawei Technologies, the China Machinery Engineering Corporation (CMEC), and Weihai International among many others (Strange et al, 2017). Local companies are almost never involved, and only internationally established organizations, like the Red Cross or the WHO, are taken into consideration in this stage. The Chinese International Development Cooperation Agency (CIDCA) carries out the task of supervising of the implementation of aid. It also conducts program evaluations, in order to offer advice for future aid ventures. China does not only devolve foreign aid bilaterally. However, its contributions to the IMF, the World Bank and other multilateral organizations are far smaller than its bilateral commitments. According to an estimation conducted by Kitano (2016), prior to the release of the AidData database, in the period 2011-2014 the ODA channeled via multilateral international organizations amounts to only 7% of Net Chinese ODA. Moreover, Chinese aid is often government-to-government, meaning that the civil society of either China or the recipient country is rarely involved.

It has been said by previous studies that a key characteristic of Chinese aid is the non-conditionality, meaning that there are no conditions, which the recipient countries would have to meet, attached to the aid. While that may hold true according to traditional meaning of conditionality, since recipient countries are not asked to initiate policy reforms or reach determinate standards, according to experts China imposes precise conditions to its recipients. Other than the use of Chinese goods and services precondition for the deployment of concessional loans, two types of conditional ties have been highlighted (Xuefeng, 2012). Firstly, every recipient country has to accept the "One China" policy, which entails breaking up diplomatic relations with Taiwan, and recognize the Mainland as China in the context of international relations. Secondly, it has been shown that recipient countries develop a form of dependency in strategic sectors of the economy: this phenomenon has been defined by scholars as "emergent conditionality". When Chinese enterprises eventually become dominant in a strategic sector of a recipient country, they achieve more decision-making power, to the point they may override national laws, as it happened in the mining and fishing sectors of West Africa (The South African, 2019; The Washington Post, 2018). Finally, Chinese banking institutions gain more leverage over the recipient countries, and can decide to stop the aid flow when additional conditions, not specified in the initial agreement, are not met. For example, in 2009 China allegedly threatened to stop aid flows to Indonesia, since the country withdrew from purchasing a Chinese aircraft (Xuefeng, 2012). A number of critiques has been moved towards the conditions required by the Chinese government, especially towards the type connected to concessional loans (Harrison, 2006).

2.1.2 Brief History of Chinese Foreign Aid

The official guidelines of Chinese foreign aid are contained in two documents, both released under Zhou Enlai's government and Mao's presidency. The "Five Principles of peaceful co-existence", formulated in 1954 as the Panchshell Agreement between China and India, were initially intended as guidelines for relations between the two countries. They soon became the point of reference for Chinese relations with newly independent states in Asia, South America, and Africa, and they were established as the universal grounds for Chinese inter-state relations, as China sought to actively export these norms in international organizations and general diplomatic relations (Zhengqing & Xiaoqin, 2015). The principles are: mutual respect for sovereignty and territorial integrity, mutual non-aggression, non-interference in each other's internal affairs, equality, and mutual benefit (United Nations, 1954). According to ex Chinese Prime Minister Wen Jiabao (2004), it is under the Five Principles that "China has provided economic and technical aid with no political strings attached to other countries in Asia, Africa and Latin America, strengthening the friendship between China and these countries" (Jiabao, 2004; p. 364)

In 1964, during a visit to Ghana, Zhou Enlai outlined what will become known as "Eight Principles for Economic Aid and Technological Assistance to Other Countries". Drawing from the norms of the Five Principles, and China's first-hand experience with international foreign aid programs, the former president states that Chinese Aid operations will be characterized by: 1) Mutual benefits; 2) Respect of sovereignty; 3) Interest-free or low-interest loans as modalities of economic aid; 4) Avoiding the development of recipient country's dependency on Chinese foreign aid; 5) Priority to short term projects, which yield quicker results; 6) Equipment provided by the Chinese government, subject to quality standards; 7) Training of local personnel in the best technique available; 8) Granting equal living standards between local and Chinese personnel (Enlai, 1964).

In post-colonial Africa, the competition over the influence on newly independent countries was raging between the US and the Soviet Union. While the two superpowers were confronting each other, China signed many cooperation agreements with African leaders, often behind the scenes of the international stage. In its development aid effort, China insisted that the aim was to create "self-relying, independent countries", free from capitalist and soviet influences (Taake, 1994). The first instances of Chinese Aid in Africa were therefore ideologically dominated, as it is reflected by the recipient countries in this period. In fact, Chinese aid was mainly targeted to countries led by socialist governments like Mozambique and the Republic of Congo. The tendency to oppose outsiders' influence has led China to build relationships with controversial leaders during the 20th century, in the likes of Zairean President Mobutu (Bräutigam, 1998). At the time, aid programs overwhelmingly involved infrastructure projects and small scale agricultural schemes. Already by the end of the 1975, China could count more launched projects in Africa than the US.

After the economic reform of 1978, Chinese aid programs became decidedly more market-oriented, prioritizing economic investment and practical results. In this period, the concept of mutual benefit truly achieved a central role in Chinese cooperation efforts. Aid programs were often accompanied by economic agreements with the African countries, where China mostly provided technical assistance in the construction of big infrastructural projects, the most famous being the Tanzania-Zambia Railway (TAZARA) of 1975. During the 80s and the 90s China continued extending its influence in the African continent, with a mixture of foreign aid and investment projects, typical of Chinese external assistance. By the end of the 90s, Chinese firms had signed over 5000 contracts for the delivery of labor, engineering, and other services (Bräutigam, 1998)

In 2003 the international community directly experienced the new role of China among the international aid players. The Angolan government, longing for reconstruction after years of civil war, approached the International Monetary Fund (IMF) in search of funding. However, a series of policy reforms to fight corruption was required for the loan to be awarded, in order to enhance the effectiveness of aid according to IMF's view. China stepped in, offering the African country a colossal US$ 10Bln loan for the period 2003-2010, disbursed by China EximBank. The only condition was the oil and mining contracts that Angola would have had to guarantee China: because of this, this kind of foreign aid could not be classified as ODA, even if it was described as "deeply concessional" (Bräutigam 2011c). This modality, where key infrastructure projects are carried out by China in African countries in exchange of natural resources (Resources for infrastructure; R4I) eventually became known as the "Angolan Model" (Zongwe, 2010).

Nowadays, the Angola Model seems to have ceased, as China tends to separate foreign aid from resource-backed contracts. Instead, China focuses on the financing of turn-key infrastructural projects. As Bräutigam (2011a) claims "The Chinese emphasis on local ownership can lead to 'prestige' projects that do not appear to be poverty-reducing: a new government office building, a sports stadium or a conference center. They rarely give budget support, and they have not contributed to common pool 'basket financing' of sectors, which is a growing trend among the DAC donors." This is in line with Hwang et al (2016; p.2), which found that from 2000 to 2014 the three largest sectors financed by Chinese commercial and concessional loans to Africa were transportation at US$ 24.2bln, energy at US$ 17.6bln, and mining at US$ 9bln. The construction or renovation of railways, roads, harbors, and airports is included in the transportation loans.

Chinese donor behavior across recent history seems to support the central concept of the country's aid philosophy, namely the principle of mutual benefit. However, the benefits enjoyed by the local business and civil society are in practice very limited, as aid programs are implemented by Chinese-only companies, with scarce involvement of the local population (Bräutigam, 2009). Furthermore, these programs are often targeted to the opening or development of new markets in recipient African countries,

to the extent that Chinese companies eventually dominate strategic sectors, such as energy, telecommunications, and mining. The aid dependency that is developed is expected to offset any potential benefit for the recipient country (Bräutigam, 2000). In fact, Chinese aid is often accompanied with commercially targeted investment, following the development of the Go out policy. Since the end of the 1990s, the Chinese government strongly encourages private enterprises to invest abroad, in order to foster international trade and improve business relations. Foreign aid programs targeting the development of infrastructures are therefore considered to be instrumental in making the country more attractive to Chinese enterprises (Wang, 2016). More recently, the establishment of the One Belt One Road (OBOR) initiative has also represented a main driver for the development of auxiliary infrastructures in the countries involved. In conclusion, the analysis of Chinese aid characteristics and history does not seem to support any positive effect in recipient countries' socioeconomic welfare.

2.2   DOES FOREIGN AID IMPROVE SOCIOECONOMIC WELFARE?

The effectiveness of foreign aid still divides the academics to this day. Many theories have been formulated to understand the causal connection between aid and development, with varied and often contradictory conclusions. Although Foreign Aid theories are not per se a branch of studies, different development and economic theories provide useful insights in predicting the role of foreign aid. In this context, three main streams are distinguished[9], in regard to their conclusions about aid effectiveness:

1. Foreign Aid has a positive impact on socioeconomic welfare development;
2. Foreign Aid has a negative impact on socioeconomic welfare development;
3. Foreign Aid has a conditionally positive impact on socioeconomic welfare development.

The concept of aid effectiveness may prove to be confounding, as it can be argued that aid is effective when it accomplishes the aims intended by the donor countries. For the purpose of this study effectiveness is intended as the degree to which aid improves socio-economic situation in the target recipient country. As asserted in the previous chapter, for the purpose of this research socioeconomic Welfare is defined as quality of life: it is not only an indicator of economic well-being. However, Halleröd & Larsson (2008) demonstrates in their study that poverty is strongly associated with welfare problems, namely social exclusion, sickness, and inability to access basic services. Moreover, Sen (1999) famously states that poverty "is not just a lack of money, it is not having the capability to realize one's full potential as a human being". Hence, in this research rising above the poverty gap is considered a proxy for socioeconomic welfare improvement. The following studies on the effects of foreign aid on poverty reduction are therefore relevant for the research. Similarly, theories that describe the influence of foreign aid on education and infant mortality are taken into account, since the two dimensions are taken into consideration when analyzing welfare.

2.2.1   Foreign Aid has a positive impact on socioeconomic welfare development

Different school of thoughts have found in foreign aid the solution to erase inequalities and kick start social development in least developed countries. Many of them base their assumption upon consolidated economic models, as in the case of liberalism. Classical liberalism prescribes capital as the key element for economic development. Starting with Adam Smith's theory of economic development, labor growth and capital accumulation were identified as the main engine of economic growth. This is important because, by the end of 19th century, social liberalism has shifted the focus from sole economic development to social development, at the time concentrated on the extension of human rights. Precursor to this school of thought was John Stuart Mill, who combined the liberal economics with social and

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[9] The three categories distinguished are an adaptation of Dreher et al (2017)

political theories when he formulated his theory of wealth and income distribution (Jensen, 2001; Mill, 1965a & 1965b).

Although these classical thinkers did not write about foreign aid, they established a clear connection between capital, economic growth, and social development. They first explored the role of capital in forwarding the economic and technological improvement in a developing country, especially thanks to the attraction power it has towards investment. Following a similar reasoning, in the early days of foreign aid up until the 70s it was believed that economic growth per se would be the driver of development, and that it would be able to eliminate social inequalities in newly independent least developed countries through modernization. In this sense, the use of GDP as a measure of development was widespread, and recipient countries' economic growth was considered the main objective of foreign aid. The established common view was that even though GDP growth did not represent the most appropriate assessment of welfare, it provided valuable insights on the human conditions.

Development theories that best represents this school of thought are the "Balanced Growth" Theory (Nurske, 1953) and the "Big Push" theory (Rosenstein-Rodan, 1943). The economic balanced growth theory prescribes for governments to make large investments in many industries of the agricultural and industrial sectors simultaneously. This will eventually attract private investors by enlarging the size of the market (Nurske, 1953). In the context of underdeveloped countries, funds are expected to be domestically raised to the largest extent possible. The possibility of foreign aid is still considered as a last resort option, in an attempt to avoid the emergence of aid dependency. Following a similar "kick starting" approach, but with a more optimistic view towards aid, the big push theory describes the benign effect of capital inflows in a country's economy. Building on the concept of economies of scale, Rosenstein-Rodan's theory predicts that industrialization is most likely to happen when an entire sector is the target of investment, and firms' expectations that the industry will grow as a result are high. Both theories do not account for differences between GDP growth and development, and prescribe capital flows to underdeveloped countries in order to foster their development.

Referring to this period, MacGillivray & Noorbakhsh state: (2007) "The focus on growth is appropriate. A requirement for the promotion of human well-being, including poverty reduction, is rapid and sustained growth. But it must be recalled that growth is a means to an end, but not an end in its own right." In fact, while Foreign aid may foster economic growth, it does not necessarily act towards poverty reduction. In this context, the term "pro-poor economic growth" has been created, to describe economic growth that does also contribute towards poverty alleviation. However, the fundamental paradigmatic shift from economic growth to poverty alleviation happened only in the 1990s. In his 1998 annual report, The World Bank remarked that "the main aim of aid is to reduce poverty" (World Bank, 1998; p. 38). During the following years the concept of development became more and more associated with poverty

reduction than with economic growth, especially when the target were Sub-Saharan African countries (Sindzingre, 2008).

In the book "The end of poverty: economic possibilities of our time" (2005) Jeffry Sachs delineates the characteristics of his foreign aid theory, which heavily borrows from the "Big Push Theory". He elaborates on the causes of poverty in Sub-Sahara Africa, claiming that the absence of income-generating investment, due to little capital availability, is the main obstacle to development, leaving countries in a "poverty trap". A similar concept was explored by Nurkse (1952) with the "vicious poverty circle", where "a country is poor because it is poor" (Nurske, 1952; pg.1): its poverty impedes any development. To overcome the trap, Sachs prescribes foreign aid packages to kick-start foreign investment by making the market more attractive to foreign private and public entrepreneurs.

2.2.2   Foreign Aid has a negative impact on socioeconomic welfare development

The effectiveness of aid has often been criticized on the basis of Principal Agent Theory. Firstly introduced by Jensen and Meckling (1976), the theory describes how principal and agent's divergent interests could lead to a sub-optimal outcome, compared to initial objectives. This mainly happens because of moral hazard, i.e. the fact that the agent's actions do not reflect the principal's objectives, in conjunction with of asymmetry of information between players. In the context of aid, a number of principal-agent relationships are established. While the theory was initially conceived to describe behavior in a working environment, its implications have reverberated across many fields of studies, most notably in models of institutional behavior within international organizations (Hawkins et al, 2006).

Aerni (2006) describes the obstacles posed by Principal Agent Theory in foreign aid implementation, where the principal is the donor country and the agents are the contractor organizations and the local authorities. The author claims that the top-down approach around which aid operations are typically developed may lead to sub-optimal development outcomes. Because of a two-step delegation system, where the international organizations devolve its funds to a contractor agent (NGOs, national agencies), and in turn the contractor establishes local partners to implement its projects, issues related to asymmetry of information and moral hazard are likely to arise. In fact, the preferences of the local partner may differ from the international organizations' ones, and priority could be given to different objectives. Moreover, local partners may engage in adverse selection, being more expert than the contractors, and therefore only devolve the strictly necessary information needed to maximize their individual interests, i.e. enlarging their operational budget. Therefore, the author concludes that the divergent interests and the possibility of asymmetric information are very likely to lead to outcomes far from the ones initially envisioned, especially when no accountability and no monitoring systems are in place.

Another concept that dismisses the positive effect of foreign aid, being a negative externality that stems from it, is aid dependency. Drawing on Bauer's (1982) argument, who affirms that aid disincentives the

recipient country to take a policy reform path, Bräutigam (2000) claims that aid dependency hinder the recipient government's functions, therefore weakening its institutional capabilities and limiting the distribution of public services. When no foreign aid expertise or funding is present, recipient's institutions will likely struggle to provide services, that are similar in quality and availability to those services provided when aid is instead given. The end result is that institutions in recipient countries are only able to operate when aid funds are available. Therefore, aid dependency and also accounts for aid ineffectiveness, by describing what happens when high amounts of aid are not corresponded by any form of development in the recipient country. Furthermore, Stanford (2015) adds that compared to the past donor countries have become more and more entwined in the recipient countries politics in order to better monitor internal aid allocation. This is described as being detrimental to the recipient's autonomy, especially in the implementation of long-term strategies, since the donor's interest is likely to model the political environment of the recipient country.

One of the fiercest detractors of foreign aid is the developmental economist William Easterly. In his provoking publication "The white man's burden: why the West's efforts to aid the rest have done so Much Ill and so Little Good" (2006) he discusses that aid has had a negative effect in recipient countries, as bad effects largely outweigh the accomplishments. Drawing from his experience working in the World Bank, he states that the donor/recipient relationship does not starkly differ from the colonizer/colony rapport. In support of his argument he berates the use of top down interventions such as foreign aid, and he claims that true change can only happen via the coordinated efforts of local entrepreneurs and political reforms. Easterly claims that otherwise donor countries' interests would be perpetrated, and aid dependency would more likely arise. In a second time, Easterly proposed to revolutionize the concept of aid, in order to combat poverty more effectively (Easterly, 2008). Despite his change of mind, his critique of traditional aid instruments still stands; in fact, he suggests a profound revolution of main multilateral aid organizations, in order to give more representation to recipient countries, and "de-westernize" the policy process.

2.2.3 Foreign Aid has a conditionally positive impact on socioeconomic welfare

Dollar and Pritchett's "Assessing Aid: what works, what doesn't and why" (1998) World Bank's report represented a groundbreaking publication in the field of development theories. The effect of its implications in future aid policies is so stark that it has been discussed as "a manifesto for aid in the 21st Century" (Lesink & White, 2001). Its main conclusion is that aid can have a positive impact on development indicators such as economic growth and infant mortality, given that the recipient countries follow good policies. Therefore, the authors stress the importance of policy reform in recipient countries, in order to achieve "sound management" of aid finance.

De Mesquita and Smith (2007) elaborate on the obstacles posed by the Principal Agent Theory. In their theory of aid allocation in different government systems, they predict that in autocracies the effect of

foreign aid on socioeconomic welfare is rather limited. The authors write that aid allocation by recipient country's leader depends on the political system of accountability to the general population, and how the population's preferences matter in a given political system. Autocratic leaders' rule does not depend on democratic elections, but on the size of their coalition and their "selectorate", i.e. their inner circle of relatives and collaborators. The members of the selectorate are less likely to invest the received resources in public goods and more inclined to retain the aid to increase their private wealth, engaging in practices of moral hazard. In fact, since they are not accountable to the voters, they will likely forward their personal interest over the public ones. On the other hand, democratically elected leaders are accountable to their electorate, therefore in democratic recipient countries "Aid given to such systems is likely to promote economic growth and enhance welfare" (De Mesquita & Smith, 2004; p. 40). Where an accountability system is present, aid has greater chances in reaching its objectives.

On a similar vein, Boone describes the failure of foreign aid in underdeveloped countries as a result of recipient government's political behavior. In non-democratic countries, the governments tend to privilege the elites by introducing distortionary taxes and by financing public goods that maximize the welfare of the elite, neglecting redistribution practices and ultimately worsening the social inequalities. Under these conditions, foreign aid does in fact worsen the poverty in recipient countries. However, the author claims that a political shift might be the solution to what he defines "elitism", and aid conditionality may be the right instrument to drive the political change in the underdeveloped country. Nowadays, the international community convenes that underdevelopment is mainly a result of policy failures and/or incorrect political behavior (Paul, 2006), and that conditional aid, paired with monitoring, is the most likely solution to inspire policy reform and improve the quality of political processes in recipient countries.

2.3 EFFECTS OF FOREIGN AID ON SOCIOECONOMIC WELFARE: EMPIRICAL EVIDENCE

While numerous studies have been conducted to assess the effects of foreign aid on economic growth indicators, primarily employing GDP per capita growth as the dependent variable, the literature about effects of foreign aid on HDI is much smaller. As expected, these econometric studies differ on many aspects, most notably by choice of dependent variables, methodologies employed, samples under examination, and conclusions drawn from the results. Across these characteristics the selected literature will be analyzed in the next paragraphs. Priority will be given to studies that include into their examination African countries. Due to the issues described in 2.1, the literature about effectiveness of Chinese aid on welfare dimensions is very scarce and inconclusive: therefore it is not taken into consideration.

However, the Dreher et *al* (2017) research about Chinese aid effectiveness on economic growth will be mentioned. The authors introduce a new dataset of Chinese official aid, including in the analysis 138 recipient countries over the period 2000-2014. Employing a fixed-effects panel data analysis, they conclude that aid has a positive effect on economic growth, boosting economic production in recipient countries. Dreher's study's relevance is twofold. Firstly, the researchers use in their analysis the same dataset that will be employed for the main independent variable in Chapter 4 of this research. Secondly, it represents one of the first studies about Chinese aid, whereas previous studies have focused on Official Development Aid. Furthermore, the results of Dreher's analysis already reveals a positive effect of Chinese ODA on GDP, therefore it already explores the income dimension of HDI.

One of the first attempts of measuring the effects of foreign aid on HDI is represented by Kosack (2003). The author sets out to explore the interactions between aid, democratization, and HDI in the period 1974-1985. The objective of the research is to examine the repercussion of aid interventions on quality of life, and whether differences can be registered by comparing democratic and autocratic countries. Controlling for openness to international trade (Sachs & Warner, 1995), budget surplus, inflation, terms of trade (World Bank, 2001), arms imports, and institutional quality indices (Knack & Keefer, 1995), the author concludes that generally aid is not effective on its own. However, in conjunction with a democratic system, aid is shown to have a positive and highly significant impact on HDI growth. On the other hand, in autocratic governments Aid is shown to have the opposite effect, slowing down HDI growth.

Gomanee et *al* (2003) employ a generated coefficient of aid induced pro-poor public expenditures as the main independent variable, and examine its effect on HDI and infant mortality on a panel of 39 countries across the world over the period 1980-1998, using a random effects method. The authors select public expenditures on social services, education, and healthcare for the construction of a Pro-poor Public Expenditure (PPE) indicator. They conclude that aid contributes to HDI improvement only when it

operates via social public expenditure, while they find a stronger positive effect on infant mortality. The authors also find out that positive effects on HDI are higher in recipient countries starting with high GDP levels, and lower in Sub-Saharan Africa countries. Therefore the findings suggest that the composition of public expenditure greatly influence welfare development.

MacGillivray & Noorbakhsh (2007), sampling from 94 developing countries around the world, attempt to draw the relation between foreign aid and HDI. They run a multivariate regression for the year 2001. Their realm of research is extended by using conflict as an interaction variable, in order to discriminate whether ODA has the same effect on HDI when the recipient country is at war. Controlling by governance and democracy indicators, alongside FDI, the authors find that in 2001 both aid and conflict are negatively associated with HDI. They conclude that aid is unable to counterbalance the negative effects of conflict on HDI in developing countries. Moreover, they find that the impact of aid does not change between conflict and non-conflict scenarios.

Okon (2012) focuses on the effect of ODA on HDI and GDP per capita in Nigeria. In his two-stage OLS model, the author takes into consideration 50 years (1960-201.0) of development aid recipiency. In examining the effects on HDI, he controls for Gross fixed capital formation and the Discomfort Index, which is a combination of inflation and unemployment. The author concludes that developmental aid has a negative effect on HDI in Nigeria, and therefore it worsens human development. He also finds evidence for a negative relation between ODA and GDP per capita. Moreover, he suggests that the cause may be found in political misbehavior maintained by former Nigerian governments, which missed the opportunity to set up a functional administrative framework, so that the received aid could be spent effectively.

Asongu (2014) examines the effect of foreign aid on three dependent variables: GDP growth, GDP per capita growth, and HDI in a sample of 22 countries from 1996 to 2006. Foreign aid is measured as Total Net ODA (NODA), which is used as the independent variable. In his panel data analysis, he controls for institutional quality (democracy and governance), trade openness, inflation, private and public investment, population growth., openness to sea, income-level and legal origin. From the results, the author concludes that NODA has a positive effect on GDP growth and GDP per capita growth, while he finds support for negative association between NODA and HDI. To explain this phenomenon, he resorts to the explanation offered by the Micro-Macro Paradox, where Macro growth is not necessarily corresponded by Micro development, e.g. less poverty, better distribution of resources, and median GDP per capita increase.

Staicu and Barbulescu (2017) conduct a panel data analysis to examine the effects of ODA on welfare indicators with a sample of 43 African countries, in the period 1976-2015. As dependent variable, they include the HDI components of Expected years of schooling and life expectancy, and they control for democracy (Polity) and economic freedom (Economic Freedom Index). They find that ODA has a

negative relevant effect on expected years of schooling, concluding that ODA does not solve the problems regarding education in Africa. Furthermore, they hypothesize that education development may require homegrown reforms, rather than external intervention. Concerning life expectancy, they find a positive relation with ODA, claiming that the pharmaceutical innovations and technological know-how brought by foreign aid contribute to improve healthcare availability and quality.

Asongu & Nwachukwu (2017) employ three different models, OLS panel, fixed effects panel, and a system GMM technique, to explore the effects of ODA on HDI in 53 African countries, over the period 2005-2012. They differentiate both for sectorial aid, i.e. to which sector is aid devolved, and for modalities of aid. In their selection they only include sectors with high degrees of local substitution, meaning sectors where foreign aid projects may likely substitute local administration or private enterprises. They find that aid devolved towards social infrastructure, economic infrastructure, and the productive sector has a significant positive effect on HDI, while the influence of humanitarian assistance appears negative. Finally, they conclude that the effects of program assistance and action on debt are ambiguous, as they vary across the three models.

The panel data analysis conducted by Alves and Couto (2018) over the period 1990-2014 sought to research the effect of foreign aid on aggregated welfare indicators across 28 developing and least developed countries. In order to explore intra-variation, the authors separate the countries in low- and middle-income groups. They employ HDI and infant mortality as dependent variables, and ODA as independent one, controlling for income, military spending, and non-aid-induced social spending. In contrast to their hypotheses, they find no significant evidence that ODA leads to lower levels of infant mortality, and they also conclude that ODA does not contribute towards HDI growth. In Table 2.1, a summary of the aforementioned is presented, highlighting the control variables employed, the populations considered, and the time periods of analysis.

	Effect of ODA	Time Period considered	Sample	Control Variables
Kosack (2003)	Positive Effect on HDI growth in democratic countries, Negative effect on HDI growth in autocracies	1974 - 1985	48 developing countries	Trade openness (+) Budget surplus (+) Inflation (-) Terms of trade (+) Arms imports (+) Democracy (-)
Gomanee et al (2003)	Positive Effect on HDI when it operates through social expenditure.	1980 - 1998	39 countries	Government social spending (+)
MacGillivray & Noorbakhsh (2007)	Negative effect on HDI. No differences in countries under conflict.	2001	94 developing countries	Institutional quality (+) FDI (+)
Asongu (2014)	Negative effect on HDI. On the other hand, ODA is shown to increase GDP.	1996 - 2006	22 African countries	Institutional quality (+) Trade openness (+) Inflation (-) Private investment (+) Public investment (+) Population growth (+) Openness to sea (+) Income (+) Legal origin (\\)
Okon (2012)	Negative effect on HDI, negative effect on GDP per capita.	1960 - 2010	Nigeria	Unemployment (-) Inflation (-) Capital formation (+)
Staicu and Barbulescu (2017)	Positive effect on life expectancy and negative effect on expected years of schooling. Overall, ambiguous effect on HDI.	1976 - 2015	43 African countries	Democracy (+) Economic openness (+)
Asongu & Nwachukwu (2017)	Positive effect of ODA directed to highly substitutive sectors. Negative effect of Humanitarian Assistance.	2005 - 2012	53 African countries	The paper differentiates between differently target aid
Alves and Couto (2018)	No effect on HDI growth, no effect on infant mortality.	1990 - 2014	28 developing countries and LDCs	Income (+) Military Spending (+) Non-aid-induced Social Spending (+)

Table 2-1. *Summary of empirical studies.*
(+): a positive effect on the dependent variable is reported.
(-): a negative effect on the dependent variable is reported.
(\\): a conditional effect on the dependent variable is reported.

2.4   CONCLUSIONS

Firstly, the presentation of Chinese aid characteristics does not seem to corroborate the hypothesis that China's aid improve socioeconomic welfare in recipient countries, for the simple reason that socioeconomic welfare improvement is not the priority of aid programs (Bräutigam, 2011a). While in a first period the objective was helping countries to be independent and non-relying on foreign aid by enhancing their capabilities, the more recent history of Chinese aid has shown that aid is often associated with economic ventures that targeted the exploitation of natural resources. The "mutual benefit" principle is in practice intended mostly in economic terms. Bräutigam (2011c) supports this line of reasoning when she states that Chinese projects are not directly focused on poverty alleviation. At the same time, it cannot be dismissed that Chinese foreign aid may have produced positive externalities which ultimately improved socioeconomic welfare.

Following the sub-questions: *According to the existent body of literature, does Official Developmental Aid affect Socioeconomic Welfare in recipient countries?,* Chapter 2 has attempted to summarize the relevant theories and empirical studies on the subject. Three contrasting streams have been explored: (1) Foreign Aid has a positive impact on socioeconomic welfare development; (2) Foreign Aid has a negative impact on socioeconomic welfare development; (3) Foreign Aid has a conditionally positive impact on socioeconomic welfare development. Poverty has been employed as a proxy of socioeconomic welfare due to the lack of literature about the aid effects on welfare. Supporting the positive effects of foreign aid on welfare, Social Liberalism has shown that economic growth can be associated with socioeconomic welfare betterment. However, when foreign aid is not complemented by the improvement of institutional quality in recipient countries, the received aid may be mishandled, and therefore not be corresponded by poverty alleviation. To avoid the issues brought about by the Principal Agent framework, supporters of aid conditionality prescribe policy processes reform and strict monitoring in order to ensure positive effects on welfare (Paul, 2006). This is partially confirmed by the empirical evidence explored (Okon, 2012; Staicu and Barbulescu, 2017; MacGillivray & Noorbakhsh, 2007). While there is no definitive conclusion about the effects of aid on socioeconomic welfare, the authors conclude that indicators of good governance, such as the presence of democracy, policy processes quality, and targeted homegrown reforms are positively associated with the improvement of socioeconomic welfare indicators.

Analyzing the relevant literature, there is no definitive saying on the effects of Chinese aid, except for the macroeconomic dimension (Dreher et al, 2017). While the theories point towards positive effects of ODA, they prescribe that aid should be followed by institutional reforms and its objectives better perpetrated thanks to strong monitoring and accountability systems. According to the exploration previously conducted about the characteristics of Chinese aid, which at its core follows the principle of Mutual benefit, similar conditional ties are not present. Moreover, the majority of the programs regard

Chinese interventions on infrastructures which are not directly targeted towards education and health development, e.g. telecommunications, railroads, and prestige projects, and there is no evidence to justify the positive effect of Chinese ODA on socioeconomic welfare. Additionally, as Chinese aid is for the most part devolved via Chinese-led projects, where the majority of workers and resources comes from the Mainland, the positive externalities produced by the newly instituted aid programs are expected to have little to no effect. In conclusion, drawing from developmental theories on traditional aid effectiveness, and taking into consideration the characteristics of the "non-traditional" Chinese aid, the following hypotheses are formulated.

H1: Chinese ODA has no effect on HDI in recipient African Countries.

This research will also set out to analyze the effects of Chinese ODA on the three dimensions composing HDI: income, health, and education. While Chinese ODA may promote GDP growth in recipient countries (Dreher et al, 2017), there is no conclusive evidence about the other two dimensions of socioeconomic welfare considered in this research, namely health and education. Following the same reasoning that developed H1, the effects on individual components are estimated. The additional hypotheses are hereby presented:

H2: Chinese ODA has positive effect on Income in recipient African countries

H3: Chinese ODA has no effect on Health in recipient African countries

H4: Chinese ODA has no effect on Education in recipient African countries

The four hypotheses will be tested in Chapter 4. Before that, Chapter 3 presents the methodology employed, the operationalization, and the data selected for the analysis.

3 CHAPTER 3 – RESEARCH DESIGN AND METHODOLOGY

Chapter 3 is structured as it follows. Firstly, the research design is justified, as the model employed is thought to offer the best ground for the analysis at hand. Therefore, the method is presented (3.1.1.), namely a longitudinal non-experimental large-N design, along with the sample and the population (3.1.2). Afterwards, the selection of control dimensions is tackled (3.1.3), and the most appropriate model for the analysis is chosen (3.1.4). Thereafter, the operationalization is described, with a focus on the dependent variables (3.2.1), the main independent variable (3.2.2), and the control variables (3.2.3). Ultimately, the reliability and validity of the research are discussed (3.2.4).

3.1 RESEARCH DESIGN

3.1.1 Longitudinal Non-experimental Large-N design

As previously explained in Chapter 1, the research takes the form of a quantitative study, with longitudinal non-experimental Large-N design connotations. Hereby, these characteristics are described, alongside the explanation pf why a similar design was chosen for the research.

Studies that examine both the variance of indicators over the time and space dimension similarly to this thesis, as 47 countries are taken into account over the period 2002-2016, are often referred as longitudinal, or panel data, to express their cross-sectional and inter-temporal characteristics. The advantages of longitudinal data are aplenty. Firstly, a longitudinal study enjoys a great level of generalization, since the results are derived from a very large number of observations, which span across time and individuals. In fact, panel data potentially encompasses a greater level of variability than cross-sectional or time-series studies, as it focus on the subjects over time. Secondly, in the context of econometric studies such as this one, panel data has shown to have "greater capacity for capturing the complexity of human behavior than a single cross-section or time series data" (Hsiao, 2007: p.4). In fact, panel data allows to test more complex hypotheses, and to better control for the impact of omitted variables. On the other hand, one of the biggest obstacles of longitudinal analysis is data availability. However, as noted by Hsiao (2007), the longitudinal design has become more and more viable in recent years, and not only in developed countries: "Panel data have also become increasingly available in developing countries" (Hsiao, 2007: p. 3). Thanks to the work of several international organizations, either publicly or privately-owned, the capacity of data collection over a multitude of sectors has been significantly enhanced. This observation particularly resonates with the research, as a similar analysis could not be conducted prior to the release of the AidData database on Chinese official financial flows (Strange et al, 2017).

"An experimental design is a plan for assigning experimental units to treatment levels and the statistical analysis associated with the plan" (Kirk, 1995: 1). Moreover, according to Kirk, any experimental design

should account for independent variable manipulation, and careful observation on its impact over one or more dependent variables. For the nature of the sample, and the purpose of this research, it is not possible to employ an experimental design. The nature of the sample (countries) and the environment in which the analysis is conducted makes it impossible to manipulate or control independent variables. In conclusion, it is impossible to set up an experiment in which the effect of foreign aid is completely isolated from the influence of other variables. Therefore, a non-experimental design is chosen. It has been demonstrated in previous studies that the independent variables employed in this kind of research are not modifiable due to the nature of the sample (Price, Jhangiani & Chiang, 2015).

The Large-N design is dictated by the purpose of this research, which is to analyze the effect of Chinese ODA on recipient African countries socioeconomic welfare. Since China has devolved ODA to the quasi-totality of African countries, it would be dismissive to analyze only a share of them: "inferences made from single-country studies are necessarily less secure than those made from the comparison of several or many countries" (Landman, 2008: p. 28). Large-N studies do however suffer from limitations: while their results tend to be more generalizable, they do not offer the same in-depth information of small-N studies. This means that large-n studies sacrifice precise causal stories typically unearthed by small-N studies in exchange for better generalization of trends. Moreover, a large-N design is better suited for the confirmation or rejection of a hypothesis, while small-N studies are generally more exploratory (Johns, 2013). Small-N studies are usually better at describing the causal mechanisms between the independent and dependent variable; however, this is not the purpose of this research, which on the other hand only intends to find whether there is any causality, its magnitude, and whether it is positive or negative.

3.1.2 Sample and Population

The population consists of 54 African countries, i.e. the whole African continent. Thanks to the database provided by AidData, and the HDI indicators provided by the World Bank, it was possible to include 47 countries in the sample. The full sample is presented in Appendix A. The sample comprises the almost entirety of African countries. The Kingdom of eSwatini, Burkina Faso, São Tomé and Príncipe, and Gambia have been excluded, since they have not received ODA from China in the chosen period. Moreover, Somalia and Eritrea have been left out due to data availability, and the country of South Sudan was excluded because of its late obtainment of independence only in 2012. Discarding countries because they never received Chinese aid does not compromise the variation in the sample, as many countries taken into consideration received no aid for one or more years. The choice to extend the sample to all African countries was made to maximize the external validity of this study, and was made possible by the availability of data. The time frame considered for the research is from 2002-2016, considering that the AidData database spans from 2000 to 2014, and Chinese Aid is operationalized with a 2 years lagged effect (See 3.2.2).

3.1.3 Selection of Control Dimensions

The main independent variable, Chinese ODA, and the dependent variables, namely Welfare and its components Health, Education, and Income, will undergo operationalization in the next section. However, in order to capture the influence of Chinese ODA on these welfare dimensions, it is quintessential to provide a selection of relevant control dimensions. These are derived from the empirical literature explored in Chapter 2. The recurrence of dimensions among studies has been the main criteria of selection. Additional dimensions relevant to previous studies were initially considered for the research, such as government and military spending, but problems posed by data unavailability halted this more inclusive approach.

Trade openness

According to international economics, open market practices that foster trade are believed to be beneficial for the economic welfare in the countries involved, as portrayed in the Standard Trade model, the Heckscher-Ohlin model, and the Ricardian model (Krugman, 2008). This conclusion is justified by higher degrees of specialization achievable by countries which have a comparative advantage in the production of certain goods, and therefore are free to better allocate their resources while satisfying consumers' demand via trade. When the tariffs are low, which boost trade, consumer enjoys goods and services at a lower price. Moreover, thanks to trade, multinational companies can engage in practices of vertical and horizontal production, and lower the overall cost of products available to consumers. In fact, studies have shown that trade openness is indeed positively associated with HDI increase (Kabadayi, 2013; Razmi & Yavari, 2012).

Inflation

Macroeconomic theories predict that high levels of inflation hinder general welfare, inasmuch as they reduce consumers' purchasing power of goods and services. Moreover, high inflation can greatly reduce the benefits derived from income increase. A number of studies has highlighted the significant positive correlation between inflation and poverty increase (Yolanda, 2017; Hassan et al, 2016). However, it has been proven that inflation can be positively correlated with HDI (Yolanda, 2017). Despite the contrasting conclusion about its effects, Inflation has been included in many indicators of welfare, such as the Discomfort Index (Okon, 2012).

ODA inflows

In order to isolate the effect of the main independent variable, i.e. Chinese ODA, it is fundamental to leave out the other Official Development Aid directed towards African Countries. Unfortunately, not all countries subscribe to the Creditor Report System, meaning that they are not required to report their development data: countries like Brazil, India, Mexico, and South Africa fall into this group. However, the collective development finance devolved by non-reporting countries is estimated to be far smaller

than aid provided by reporting countries, multilateral organizations, and other private donors. According to OECD estimates, this aid amounts to ca. 4.4% of total aid flows (OECD, 2016)[10]

Investment

The impact of investment on social indicators such as HDI has been analyzed before in a number of studies (Gohou & Soumaré, 2012; Sharma & Gani, A., 2004), and while overall it has been concluded that it has an ambiguous effects on human development, its relation to it has always shown to be significant. The main justification relies on the argument that investment is among the main drivers of economic growth in most African countries. Therefore, poverty alleviation and increase of socioeconomic welfare are believed to be positive externalities of investment otherwise directed towards commercial objectives. In the studies examined in Chapter 2, investment has been employed as control variable by Asongu (2014).

Institutional Quality

For the purpose of this research, institutional quality is not only defined as the existence of a resilient and fair rule of law, but also as its application via practices of good governance. In this regard, institutional quality has been often correlated with better socioeconomic welfare, mostly with positive causality registered between the two dimensions. Part of the empirical studies previously analyzed select institutional quality as a control variable, finding overwhelmingly positive correlation with the socioeconomic welfare dimension (Kosack 2003, MacGillivray & Noorbakhsh, 2007).

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[10]OECD estimates made by gathering bilateral figures of the latest available year for bilateral co-operation and the 2016 data on multilateral flows.

3.1.4 Fixed Effects Panel Data Regression

A Panel Data Analysis allows to meet the conditions previously delineated, i.e. cross-sectionalism, inter-temporality, and large-N design. The most widespread models of panel data are: Pooled OLS, Random Effects (FE) model, and the Fixed-Effects (RE) model. The Fixed effects model has been chosen after the data underwent the Durbin-Wu-Hausman test, to determine whether the random effects model or the fixed effects model were the most appropriate for the analysis at hand. The option –sigmamore- as it specifies that the covariance matrices be based on a common estimate of disturbance variance, accounting for the negative observations present in the dataset (StataCorp, 2013). The rejection of the null hypothesis ($p<0.05$), which states that a Random Effects model would be more appropriate for the data analysis, determines the choice of a Fixed Effect estimation model (Appendix B). The typical fixed effects model equation takes the following form:

[3.1]

$$y_{i,t} = \beta_1 \times x_{i,t} + a_i + u_{i,t}$$

for $t = 1,\ldots,$ T and $i = 1,\ldots,$N

Where $y_{i,t}$ is the dependent variable, β_1 is the estimated regression coefficient, a is the unobserved, time invariant fixed effect, and u is the error. The parameter t indicates time, while i denotes the subject. Differently from the RE model, the FE model takes into account a time-invariant unobserved effect a_i While in RE the unobserved effect is assumed to behave randomly, in FE a_i is specific to the each individual in the sample. Therefore, FE models rely on the assumption that there are time-invariant unobservable factors influencing the LHS and RHS of the regression. In this kind of model, the individual specific effect is expected to be correlated with the independent variable (Wooldridge, 2012).

36

Given the heterogeneity of the sample, it is plausible to have country specific, unobserved effects that influence the socioeconomic Welfare, and it indicators. These effects account for the country's predisposition towards welfare development, due to a number of factors not examined in this research. Moreover, an individual's quality of life can be affected by a multitude of factors, therefore it would be impossible to design a model that included every variable influencing Welfare and its components. Having selected the variables relevant to the analysis, and upon inspection of previously employed models, the following equation is developed for the dependent variable Welfare:

Welfare$_{i,t}$ =   [3.2]

$$\beta_1 \times CFA_{i,t-2} + \beta_2 \times TRADE_{i,t} + \beta_3 \times ODA_{i,t-2} + \beta_4 \times INV_{i,t} + \beta_5 \times IQ_{i,t} + \beta_6 \times INF_{i,t} + a_i + u_{i,t}$$

β_x is the estimated coefficient;

a is the unobserved time invariant individual effect;

u is the error term;

i is the country index $i = 1, 2, …,49$;

t is the time index, in years $t = 2002, 2003, …, 2016$;

CFA denotes the main independent variable Chinese ODA-like foreign aid;

TRA denotes trade openness;

ODA denotes official development aid inflows;

INV denotes total investment;

IQ denoted institutional quality;

INF denotes consumer price inflation

The Hausman Test has also been run for the other three dependent variables, namely Income, Health and School. In every case, the null hypothesis has been rejected. The Hausman test for the dependent variable Income reports a value (=.0452) near, but still inferior, to 0.05. The results of the additional Hausman Tests are also reported in Appendix B. In line with the selection of fixed effects models, the following equations have been developed:

$$\text{Income}_{i,t} = \qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad [3.3]$$

$$\beta_1 \times CFA_{i,t-2} + \beta_2 \times TRADE_{i,t} + \beta_3 \times ODA_{i,t-2} + \beta_4 \times INV_{i,t} + \beta_5 \times IQ_{i,t} + \beta_6 \times INF_{i,t} + a_i + u_{i,t}$$

$$\text{Health}_{i,t} = \qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad [3.4]$$

$$\beta_1 \times CFA_{i,t-2} + \beta_2 \times TRADE_{i,t} + \beta_3 \times ODA_{i,t-2} + \beta_4 \times INV_{i,t} + \beta_5 \times IQ_{i,t} + \beta_6 \times INF_{i,t} + a_i + u_{i,t}$$

$$\text{School}_{i,t} = \qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad [3.5]$$

$$\beta_1 \times CFA_{i,t-2} + \beta_2 \times TRADE_{i,t} + \beta_3 \times ODA_{i,t-2} + \beta_4 \times INV_{i,t} + \beta_5 \times IQ_{i,t} + \beta_6 \times INF_{i,t} + a_i + u_{i,t}$$

3.2   OPERATIONALIZATION

The operationalization is the "process of linking abstract concepts to concrete (potential) observations" (Blatter & Haverland, 2012). As described in Chapter 1, this research intends to analyze the effect of Chinese Foreign Aid on Welfare in African recipient countries. While for the objective of this research Chinese Foreign Aid is intended as ODA-like commitments, and it's measured as per capita aid, Welfare, Trade, and the other control variables require less direct methods of operationalization: those are presented in the following paragraphs. The measurements selected for the socioeconomic welfare dependent variables follow the HDI methodology, while the others are drawn from theories and existing literature.

3.2.1   Dependent Variables

Main dependent variable: Socioeconomic Welfare

This research attempts to investigate whether there is an impact of Chinese ODA on socioeconomic welfare, and what its magnitude is. Being a very broad concept, welfare cannot be represented by an individual indicator describing one aspect of life quality. It has been defined in different ways by authors, all circling around the concept of "the satisfaction of human needs" (Drewnowski, 1972: p. 79), predetermined by the conditions in which an individual lives in. After the paradigmatic shift that prioritized poverty reduction over economic growth as the main objective of aid programs, numerous indicators of socioeconomic welfare gained prominence, in order to better evaluate aid effectiveness in

this new context and therefore improve development planning. In this context, as explained in Chapter 1, the Human Development Index has been developed to capture the Quality of Life enjoyed by people in a country. The HDI has been created in 1990, in order "to emphasize that people and their capabilities should be the ultimate criteria for assessing the development of a country, not economic growth alone" (United Nations, 2019). It is therefore a departure from the utilization of GDP per capita and income level as indicators of individual welfare, as it also encompasses the health and education dimensions. It follows the capability perspective stemmed from the collective work of Amartya Sen and Martha Nussbaum. While Sen' *capability* approach and Nussbaums's *capabilities* approach differ in many aspects, they both delineate "the desirable characteristics that are essential (…) to human dignity and human forms of sociability" (Comim, 2016: p.5). The HDI has been criticized numerous times since its introduction (Klugman et al, 2011; Hirai, 2017). On these accounts, it has undergone a number of revisions and reformulations, which has greatly strengthened its efficacy in portraying socioeconomic welfare, ultimately replacing GDP per capita with GNI per capita in 2010. The HDI is an aggregate index of three dimensions, deemed representative of individual capabilities, namely health, income, and education. The Health dimensions is represented by the life expectancy at birth indicator, Income is portrayed by GNI per capita, while the Education dimension is a composite of both expected years of schooling and mean years of schooling. The value portrayed by HDI is the geometric mean of normalized indices for each dimension, ranging from 0 (worst possible value) to 1 (best possible value). As 2018, it covers 189 countries (UNDP, 2018). It has been used in a large number of quantitative researches, producing important insights for aid evaluation and institutional quality in recipient countries (See 2.3). Hence, HDI is selected as the dependent variable for representing the socioeconomic welfare dimension in the research. Data for HDI has been retrieved from the United Nations Development Program (UNDP).

Expected years of schooling

The component dimensions of HDI, namely health, education, and income are also treated as individual dependent variables. To represent the education dimension, expected years of schooling is chosen over mean year of schooling for two main reasons. Firstly, expected years of schooling is a more comprehensible indicator of education. The variable depicts the years of education that a child can expect when she starts her education path. Secondly, it is much harder to register the effect of ODA on indicator mean years of schooling, as the latter is heavily conditioned by the past education conditions in the target country, even prior to the dataset employed. The indicator expected years of schooling is calculated by looking at the enrollment tables which portray age-specific enrollment rates, thanks to data provided by censuses and education Ministries. Data for expected years of schooling is retrieved from the UNDP database, in collaboration with the United Nation Education, Science, and Culture Organization (UNESCO).

Life expectancy at birth

The indicator portrays the average years of life that an infant at birth is expected to live, given the country-specific death rate. It is calculated by looking at life tables, which report age-specific death rates thanks to data provided by censuses and vital statistics. The methodology employed to measure life expectancy at birth slightly differs from country to country (OECD, 2017), with an estimated maximum error of 1 year. Data for this indicator is retrieved from the United Nation Development Program (UNDP) database, in collaboration the United Nation Department of Social and Economic Affairs (UN/DESA) Institute for Statistics.

GNI per capita

Finally, the variable GNI per capita represents "the aggregate income of an economy generated by its production and its ownership of factors of production, less the incomes paid for the use of factors of production owned by the rest of the world (…), divided by midyear population" (UNDP, 2018).
In the HDI, GNI per capita measured at Purchasing Parity Power (PPP) is employed, making it possible to compare different incomes around the world. The shift from GDP per capita to GNI per capita when the HDI was reviewed in 2010, in order to account for remittances which are particularly relevant in low- and middle-income countries. Data for GNI (GNI, US$ capita, PPP) per capita is retrieved from the UNDP database, which gathered statistics produced by the World Bank, the IMF, and the Human Development Report Office (HDRO).

3.2.2 Main Independent Variable

The main independent variable is Chinese Foreign Aid. Accordingly to the explanation provided in Chapter 1 about the nature of aid, only Official Development Assistance is taken into account, in order to exclude any aid directly targeted towards economic ventures. As previously explained, China does not report its aid figures to the Creditor Reporting System, therefore data about Chinese aid flows were retrieved thanks to the mixed system methodology developed by Strange et al (2017), namely the Tracking Underreported Financial Flows (TUFF), under the aegis of the William & Mary College research lab AidData. The three-staged process of TUFF consists of:

(I) *Project identification*. Information are gathered from accredited news sources; official declaration of embassies, the central government, and commercial offices; information from ministries' plans in counterpart countries; and data collected thanks to field research conducted by scholars and NGOs "in order to minimize the impact of incomplete or inaccurate information" (Dreher et al, 2017: p.4).

(II) *Sources triangulation*. Information retrieved in the first step is then confirmed or dismissed by proving the projects' existence, thanks to research conducted via Google and local source engines, which aims to uncover further data on the projects' volume and implementation. If additional projects are identified at this stage, they are returned back to the first step (I).

(III) *Quality control.* The final step consists of a rigorous process to prepare the data for presentation by assuring its comparability among cases, review their validity, eliminate double counting, and check for logical inconsistencies when projects cannot be clearly defined as ODA. Finally, the data is pre-released to external researchers, which are requested to provide feedback on the database.

> **Commented [ZA(1)]:** Did you employ the methodology yourself or did you use a data-set that employs this methodology?
>
> **Commented [g2R1]:** The latter: let me know if I should keep it in.

The methodology has been previously employed by Dreher et al (2017) to report the Chinese aid figures, in the authors' effort to determine the effect of Chinese aid on economic growth in recipient countries. In total, the dataset includes information about 4304 aid-financed projects in 138 countries around the world (Dreher et al, 2017). For the purpose of this research, only aid directed towards African countries is taken into account. Furthermore, only the data that has been labeled as "appropriate for research" is selected: this excludes from the analysis projects which were announced but Chinese authorities but which finances never reached the official commitment stage. The dataset represents the most complete and transparent source of Chinese finance aid in the 21st century, and it has been widely employed by econometric and development studies about aid's impact on a number of socioeconomic indicators in developing countries (Blair & Roessler, 2016), alongside analyses of its ecological impact (BenYishay, 2016) and corruption (Isaksson & Kotsadam, 2018; Brazys et al, 2017).

Following the methodology employed by Dreher et *al* (2017), within the dataset only the aid which reached the stage of commitment is considered. Therefore pledged aid is not taken into account. Moreover, a lagged effect of 2 years is employed (t-2): aid is expected to have any effect on local indicators only after a considerable period, which in this research is 2 years, following the methodology applied in Dreher's research. In fact, the average length of completed projects is 664 days from the date of commitment. This operation is possible because the time specifications in the dataset do in fact refer to the year of commitment. The aid values are then divided by the year-specific population of the selected country. Unlike Dreher's study, which analyzed the effect of aid on the macro-dimensional economic growth, the focus of this research is more micro driven, therefore per capita aid is believed to be a more effective indicator. Data for population is retrieved from the World Bank Database. As previously explained, there are various instances in which countries have not received aid on a specific year. Over the 705 observations, 288 report zero values, i.e. 40.8% of observations. In order not to discard the observations when standardizing the distribution of the independent variable Chinese ODA per capita, the log(x+1) is computed instead of the normal logarithmic function. This also ensures the absence of negative values in the final distribution, since a number of aid per capita observations are between 0 and 1 US$, especially in the larger countries.

3.2.3 Control Variables

After the presentation of the dependent variables and the main independent variable, the operationalization of control variables is hereby reported.

Trade Openness

In this analysis, trade openness is proxied by combining the GDP share of exports and imports. The data is retrieved from the World Bank database (Export of goods and services, share of GDP; Import of goods and service, share of GDP). The control variable has been previously employed in other econometric studies, examined in Chapter 2 (Kosack, 2003: Asongu, 2012). In this research, Trade is expected to have positive effect on HDI, for the reasons previously listed.

Inflation

For the purpose of this research, consumer price inflation is considered, which captures the price change of a basket of goods typically enjoyed by the average household. Data about consumers' price inflation are retrieved from the World Bank Database and the International Monetary Fund. Two different sources have consulted, since data for countries like Zimbabwe and Angola was only available in the IMF database. Consumer Price Inflation is expected to have a negative effect on the dependent variables. Consumer price inflation is expected to have a negative effect on HDI and its component dimensions.

Official Development Aid

The large majority of aid provision is captured by the data reported in the World Bank Database, and it is considered sufficient to the purpose of this research. The data about ODA (Net Official Developmental Assistance received; current US$) are retrieved from the World Bank Database, in the period 2000-2014 Following the literature explored in Chapter 2, ODA disbursements are expected to have a positive effect on HDI.

Investment

To measure gross domestic investment, data (Gross capital formation, %GDP) are retrieved from the World Bank database[11] for the period 2002-2016. Total investment is expected to have a positive effect on HDI and its component dimensions, following the literature explored (Asongu, 2014).

Institutional Quality

Over the years, different indicators have been employed to assess the quality of the "institutional framework" (Scully, 1998). The Worldwide Governance Indicators (WGIs), developed thanks to a World Bank research program, capture six key dimensions of governance, namely Voice &

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[11] Data originally reported by the IMF in the Balance of Payment Database.

Accountability, Political Stability and Lack of Violence, Government Effectiveness, Regulatory Quality, Rule of Law, and Control of Corruption, in over 200 countries. WGIs have proved to be effective in capturing the intended dimensions, and they often served as a baseline for policy development.

Two of these dimensions have been selected for the analysis, thanks to their ability in capturing institutional quality: Rule of Law and Governance Effectiveness.

- Rule of law: it depicts the subjective confidence that people have in the societal rules and norm, taking into account the role of justice, police, courts, and the likelihood of crime and violence (World Bank, 2010a). It considers several indicators, including but not limited to cost of organized crime, reliability of the police, confidence in the judicial system, and respect of property rights.

- Government Effectiveness: it "captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies" (World Bank, 2010b ; p. 1). It takes into account a number of indicators, including but not limited to satisfaction with the transport system, energy coverage, policy instability, and quality of the bureaucracy.

Control of Corruption has also been taken into consideration, but many of its indicators overlap with Government Effectiveness, which is overall more encompassing. In Figure 3.1, a graphical representation of the equations is offered, taking into account the expected effect of the independent variables on the four dependent indicators.
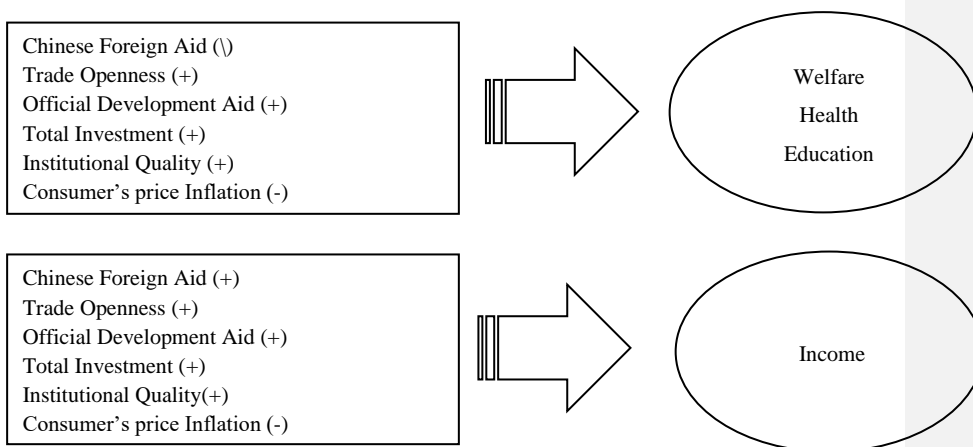
Figure 3-1. *Graphical representation of equations 3.2, 3.3, 3.4, and 3.5*
(+): a positive significant effect on the dependent variable is expected.
(-): a negative significant effect on the dependent variable is expected.
(\): a non-significant effect on the dependent variable is expected.

Finally, Table 3.1 summarizes the operationalization conducted in the chapter, highlighting the dimensions considered, the measurement units, the name assigned to each indicator, and the source of the data.

	Dimension	Indicator	Variable	Source
Dependent	Socioeconomic Welfare	Index	Welfare	UNDP
	Education	Expected years of schooling (Years)	School	UNDP
	Health	Life expectancy (Years)	Life	UNDP
	Income	GNI per capita (Current US$, PPP)	Income	World Bank
Independent	China ODA (\\)	China Oda per capita (Current US$)	CFA	AidData
	Government Effectiveness (+)	Index	GOV	World Bank
	Rule of Law (+)	Index	RULE	World Bank
	Trade Openness (+)	Export of goods and services (%GDP) + Imports of goods and services (%GDP)	TRA	World Bank
	ODA (+)	Net ODA received per capita (Current US$)	ODA	World Bank
	Investment (+)	Gross Capital Formation (%GDP)	INV	World Bank
	Inflation (-)	Consumer price inflation (% growth)	INF	World Bank, IMF

Table 3-1. *Operationalization*

3.2.4   Validity and Reliability

In econometric research, internal validity often represents a problem. It is inherently more difficult to guarantee internal validity in non-experimental studies, as independent variables cannot be manipulated to infer their effects, and the sample is not located in a controlled environment kin to a laboratory. In a multiple regression, five major threats to internal validity are identified: omitted variable bias, wrong functional form, errors-in-variables bias, sample selection bias, and simultaneous causality bias (Harvard, 2012). The first one predicts that the omission of control variables both related to the independent variable and correlated with one of the regressors may compromise the results. The models employed have attempted to take into consideration the most relevant dimensions affecting socioeconomic welfare in order to avoid this problem. Moreover, the employment of a FE panel data model, where the individuals' characteristics are considered, does diminish the incidence of this bias. However, since it is not an experimental design, it is not feasible to identify every control dimension. Similarly, an omission of interaction variables that could result in a wrong function form, is difficult to identify. The theory explored does not however points towards an interaction between the variables considered. Errors-in-variables bias is verified when data are assumed to be always exact, i.e. no errors happened in data collection. In order to avoid the verification of the errors-in-variables bias, only highly reputable sources of data have been considered, and the absence of extreme outliers have been ensured. The selection sample bias, which happens when the sample influences the statistical quality of data due to the sample's nature, is not present. In fact, enough variance of all variables has been ensured (See 4.1). Lastly, the simultaneous causality bias, which implies reverse causality, is dismissed thanks to the theories, the empirical evidence, and the characteristics of Chinese aid explored.

Regarding external validity, the results of this research are easily generalizable, since the scope of the research is limited to the African continent, which sample of countries is considered in its quasi-entirety. Therefore, the sample and the population under study differ only by a small margin, reinforcing the generalizability of results. Moreover, the countries selected for the study appropriately represents all African regional groups (Appendix A). Clearly, the findings of this thesis should not be applied to other developing countries, as they fall outside the scope of the research.

Reliability refers to the consistency and the repeatability of measurements (Trochim, 2006), hence its presence ensures that the research can be repeated with consistent results using the same methodology and values in the future. In order to guarantee reliability, it has been assured that the data is gathered from highly reputable institutions. In fact, the majority of data comes from either the World Bank, the International Monetary Fund, or the United Nations Development Programme. The main independent variable Chinese Foreign Aid is retrieved from the AidData research lab, which operates under the aegis of the William & Mary College. Its method of data collection are transparent (See 3.22).

4   CHAPTER 4 ANALYSIS

After the background laid out by the first three chapters about aid effectiveness, the characteristics of Chinese aid, the relevant literature, and the selection of variables and data sources, Chapter 4 main objective is to answer the central hypothesis of the research. The chapter consists of (4.1) a descriptive analysis, in order to offer a preliminary data presentation; the review of statistical assumptions (4.2), and the selection of the most appropriate models, conducted by including control variables one by one in the models for each dependent variable (4.3). Finally, the results are interpreted and briefly discussed (4.4).

4.1   DESCRIPTIVE ANALYSIS

In order to conduct a thoroughly explanatory analysis, it is of foremost importance to offer a preliminary presentation of the data at hand, so that the parameters dealt within the research are readily understandable. Hence, a summary of the data is presented in Table 4.1, including the number of cases, maximum values, minimum values, averages, and standard deviations, to indicate how much the average correctly represents the variable it portrays. Standard deviations, minimum values, and maximum values, are reported both for the totality of data, between countries, and within countries, given that the analysis is longitudinal. As observed in the Table, the number of observations total to 705. In order to fill in missing values, two main methods of imputation have been employed: linear interpolation and country-mean imputation. Linear interpolation has been employed to fill in the missing values for HDI, and Income, as the overall trend for the variables shows either a linear negative or a linear positive growth. On the other hand, mean imputation has been applied to substitute the missing values of Inflation and Investment. To increase the value of the imputation accuracy, the means have been calculated on a country basis (Eekhout & de Boer, 2012). Country-mean imputation has also been used to estimate the values for the year 2001 of the two Institutional Quality dimensions, namely Government Effectiveness and Rule of Law, since the WGIs have started to be measured on a yearly basis only after 2002. Overall, imputation has provided for approximately 7.5% of total observations. As the ratio of imputed values is rather small when compared to the total sample, the substitution of missing values is not considered as

Variable	Years	Measurement	Mean	Std. Dev.	Min	Max	n	N
Welfare Human Development Index	2002-2016	Index	0.506	0.119	0.263	0.793	47	705
Health Life expectancy at birth	2002-2016	Years	59.268	7.839	40.7	76.1	47	705
School Expected Years of schooling	2002-2016	Years	9.901	2.496	3	16	47	705
Income GNI per capita	2002-2016	Current US$, PPP	4871.816	5716.432	430	29010	47	705
CFA China ODA per capita	2000-2014	Current US$	6.742	33.988	0	664.868	47	705
INF Consumer Price Inflation	2002-2016	Percentage change by year	0.069	0.085	-0.098	1.089	47	705
TRA Trade Openness	2002-2016	Export + Import as %GDP	0.771	0.375	0.191	3.114	47	705
ODA ODA per capita	2000-2014	Current US$	62.842	76.253	0.460	691.925	47	705
INV Gross Capital Formation	2002-2016	%GDP	0.242	0.097	0.015	0.615	47	705
GOV Government Effectiveness	2002-2016	Index	-0.699	0.613	-1.884	1.044	47	705
RULE Rule of Law	2002-2016	Index	-0.669	0.635	-2.009	1.077	47	705

Table 4-1. Descriptive statistics

Table 4.1 offers several interesting insights. First of all, a great degree of heterogeneity in values can be observed across many variables. The biggest variance is registered among the dependent variable Income and the independent variables CFA, ODA, and INF, as in every of these instances the reported standard deviation is bigger than the mean. Due to the many zero values of CFA, the standard deviation is more than 5 times the mean, representing a very high degree of variance in the sample. On the other hand, the remaining dependent variables, Welfare, Health, and School, and the independent variables INV, GOV, RULE, and TRA do not show similar levels of variation. Many variables also present a large difference between the minimum and maximum values, showing the presence of several outliers in the sample. The outliers are included in the final analysis, as they do not represent erroneous data, and there is no theoretical justification to support their exclusion. In fact, they mostly regard the per capita values of small states, and only in certain years when China increased its aid commitments: the variation is therefore accounted for by the fixed effects model.

4.2   STATISTICAL ASSUMPTIONS

In order to conduct the panel data analysis, a number of statistical assumptions must be taken into consideration, namely the normality of distribution, multicollinearity, homoscedasticity, and serial correlation.

Normality of Distribution

The first criteria to be met is that of normal distribution, meaning that each variable and their residual errors follow a symmetrical, bell-shape curve (Johnson et al, 2016). However, due to the size of the sample (n=705), alongside the heterogeneity brought about by a large number of subjects (n=47), ensuring a normal distribution of variables has been the biggest limitation of this analysis. In fact, even while undergoing different kinds of transformation, e.g. employing logarithms and roots, it has been impossible to ensure a normal distribution of all variables without having unintelligible outcomes. The transformation of the indicators can likely hinder the interpretation of results. Hence, the choice to include quasi-normal distribution in the analysis was made. To support this choice, the relevant literature shows that in many cases the normality of distribution is not assured. For example, empirical studies considered in Chapter 2 do not account for normal distribution of variables (Dreher et al, 2017). Moreover, "several important properties of OLS coefficient estimators do not depend on the assumption that the error term is normally distributed" (Berry, 1993, p. 81-82), meaning that efficient and unbiased results can still be produced, given that the model respects all the additional assumptions.

The distribution of the main independent variable CFA represents a problem on its own. In fact, the dataset contains 288 zero observations under Chinese Foreign Aid, i.e. the 40.8% of all observations. This is due to the fact that China has not devolved ODA-like aid to every African country on a yearly basis. This results in a very zero-inflated distribution of the variable (Figure 4.1). Not only many observations coincide with zero, but since the indicator describes aid per capita, a large majority of the values are shown to be near-zero. In fact, the number 621 reported above the first column in the histogram (Fig 4.1) does also refer to these near-zero values, as the graph bar groups together similar values. A number of outliers, i.e. sitting >2.5 standard deviations from the mean, are identified. These observations either coincide with aid devolved to small countries characterized by a <1Mln population size, such as Cabo Verde, Equatorial Guinea, and Seychelles, or to very large-scale projects, such as the infrastructural venture launched in the Republic of Congo, with the aim support the Chinese mining venture (Johns Hopkins, 2013). In that instance, more than 600Mln US$ in aid were committed in 2012 alone.
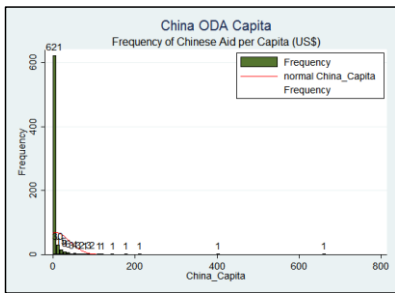

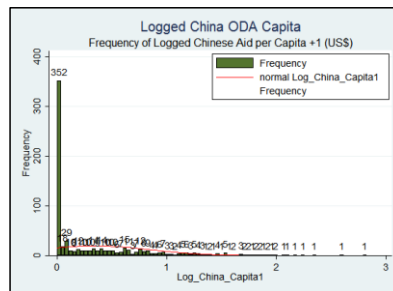*Fig 4.1. Distribution of Chinese Oda per capita*

Fig 4.2. Distribution of loggedChinese Oda per capita

To solve the problem of non-normal distribution, several transformations of CFA have been attempted. The logarithmic transformation, following Dreher et *al* (2017) produces a better distribution, as it is depicted in Table 4.2. In order not to drop the zero values in the logarithmic transformation, a constant = 1 has been added to every observation in the sample. The constant 1 is the smallest value possible to make the logarithmic transformation feasible. The resulting graph is far from being normally distributed, but it shows a less marked zero-inflation. Therefore the independent variable logged CFA is employed in the analysis.

The distribution of the dependent variable HDI was not affected by a similar problem. In fact, its histogram shows a semi-normal, single-peaked distribution (Fig. 4.3). Similarly, the dependent variable School is normally distributed, as shown in Fig. 4.4, as well as Health (Fig. 4.5), which shows a quasi-normal distribution. On the other hand, the histogram depicting the dependent variable Income (Fig. 4.6) shows non-normal distribution. In order to ensure normal distribution, the values have been transformed with a logarithmic operation (Fig. 4.7).

Some of the control variables have also shown non-normal distributions. The histograms for these values can be found in Appendix C. The variable ODA has undergone logarithmic transform in order to ensure a more normal distribution. On the other hand, INV, GOV, and RULE did not require any transformation. The variable TRA underwent transformation by the power of $\frac{1}{4}$. On the other hand, the variable INF presented many negative observations. In order to transform the distribution, the constant 0.098, which represents the minimum value among the observations in order for them to become all positive, was summed to each observation.
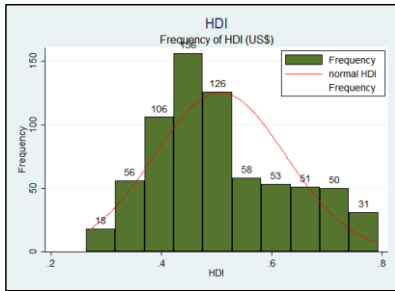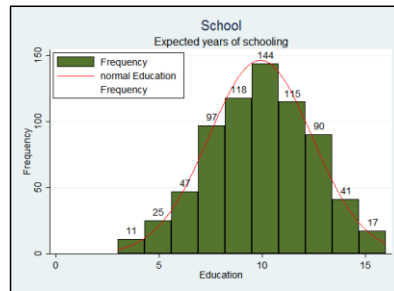
Fig 4.3. *Distribution of HDI*

Fig 4.4. *Distribution of variable School*
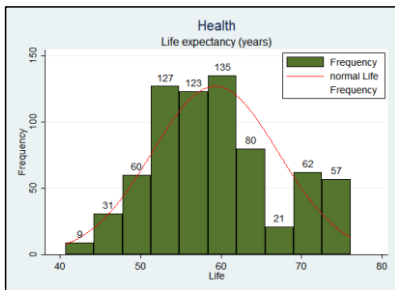
Fig 4.6. *Distribution of variable Health*
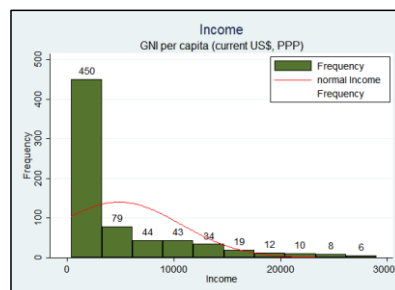
Fig 4.7. *Distribution of variable Income*
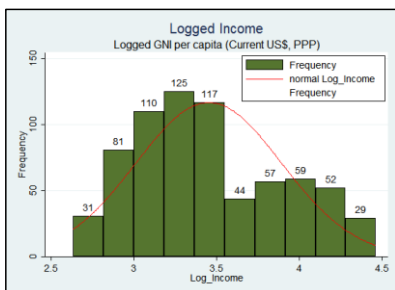
Fig 4.5. *Distribution of logged Income*

Multicollinearity

The issue of multicollinearity arises when in a multiple regression, two or more independent variables are highly correlated (Wooldridge, 2012). This constitute a problem because it makes it more difficult to identify which explanatory variable does have an effect on the individual predictor. In order to identify whether there is a problem of multicollinearity, the most common method is to run a correlation matrix among the independent variables, and discard those who have a high degree of correlation (Berry, 1993). It is commonly agreed that variables with a Pearson correlation higher than .5 would be an issue to the analysis, highlighting the problem of multicollinearity. In Fig 4.9 the Correlation Matrix is presented. The Figure shows a high degree of correlation between the variables GOV and RULE, representing respectively the institutional quality dimensions of government effectiveness and rule of law. As they have been chosen to represent the institutional quality of recipient countries, the variable GOV is chosen over RULE. The choice is justified by the more encompassing nature of GOV, which takes into account not only the law and law enforcement aspects of RULE, but also indicators of process transparency, bureaucratic efficiency, and the quality of policy formulation and implementation.
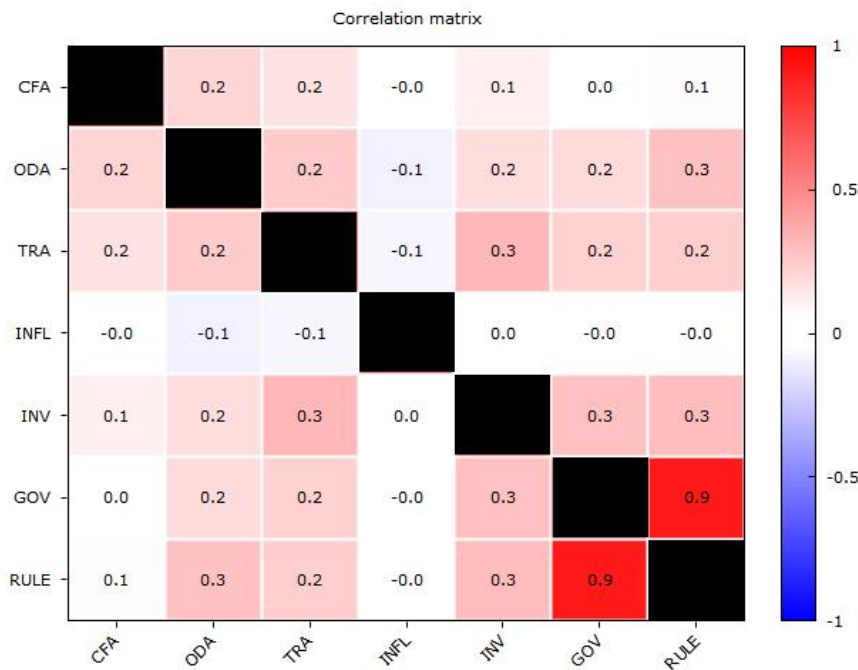
Fig 4.9 Correlation Matrix among independent variables

Homoscedasticity

The assumption of homoscedasticity holds when the variance of the unobserved error, u, is constant (Wooldridge, 2012). The Pesaran test is run to check for homoscedasticity. It tests the degree of dependency of the errors' variance on the values of the independent variables. The Pesaran test has been chosen instead of the Breusch-Pagan test since it performs better with N>T datasets, meaning that they have more cross-sectional units than time-series units, such as in this case. However, T is expected to be sufficiently large: T=15 fits the purpose (De Hoyos & Sarafidis, 2006). The hypothesis H0= constant distribution of errors' variance is therefore tested on the Welfare equation (Table 4.1).


`Pesaran's test of cross sectional independence =78.560, Pr = 0.0000`

Table 4-2. *Pesaran Test for Equation 3.2*

The Pesaran Test reports a very high (78.6) and significant (p<0.001) degree of dependence; therefore, the data does not fit the assumption of homoscedasticity. Heteroscedasticity was expected, due to high standard deviations. In order to account for heteroscedasticity in the analysis, clustering will be applied. It allows to relax the assumptions of autocorrelation and homoscedasticity by grouping standard errors in uncorrelated clusters. This results in standard error estimates that are robust to autocorrelation and heteroscedastic disturbances (Hoecle, 2007). The Pesaran test is similarly run for the other three equations, 3.3, 3.4, and 3.5. Every equation shows the issue of heteroscedasticity, therefore the clustering option will be included in the final analyses. The results of these additional Pesaran Tests are found in Appendix D.

Serial correlation

In order to detect whether there is a problem of serial correlation in the panel data regressions, the Wooldridge test is run for each equation. Serial correlation arises when the error terms in a regression are correlated, with the result that they follow a pattern. It constitutes a problem in time series and panel data regression since in the models the error u is assumed to be random. The results returned by the Wooldridge tests shows a problem of serial correlation for all four models (Appendix E). The serial correlation is taken into account by clustering standard errors. In fact, clustering is shown to solve both the issues brought about by serial correlation and by heteroscedasticity, by ensuring the presence of robust standard errors despite the two distrubances (Hoecle, 2007).

4.3   ANALYSIS

After having taken into account the assumptions, the panel data FE model is employed, in order to answer the second research sub-question. Five different panel data FE regressions are run for each dependent variable, in the respective order: Welfare, Health, School, and Income. In every model the main dependent variable is present, and the control variables are added one by one, in order to identify the best-fit model for the data at hand. The order of their inclusion in the model is dictated by their degree of correlation, i.e. the Pearson index, with the model-specific dependent variable. The correlation matrices for each dependent variable are reported in Appendix F.

The goodness of fit indicator R^2, in its adjusted version, is employed to select the best model. R^2 is an estimate of how much variance in the dependent variables is explained by the independent variables (Wooldridge, 2012). A small R^2 implies that the error variance is large compared to the dependent variable, therefore it may indicate the omission of relevant variables in the model. The adjusted R^2 is more helpful with the methodology at hand, namely adding control variables one by one. It solves an inherent issue of R^2: when more independent variables are included, its value can only increase. This is observed also when independent variables which are not related in any way to the dependent variable are included. Therefore in this research the adjusted R^2 is the primary source of goodness of fit.

The F-statistic is also applied as a criterion in determining which model is more significant. The F-statistic represents the ratio between the sum of squared residual means in the specified model and the sum of squared residual means in a similar model, when no predictors are included (Wooldridge, 2012). Its value helps define whether the independent variables are jointly statistically significant: the larger the F value, the better the predictive power of the model.

4.3.1 Effect of CFA on Welfare

	Model 1	Model 2	Model 3	Model 4	Model 5
constant	.4962437***	.4083965***	.3428941***	.3809287***	.3855419***
	(40.13)	(6.35)	(6.02)	(6.15)	(5.15)
CFA	.0158014***	.015515***	.0134031***	.0131844***	.0106983***
	(4.71)	(4.64)	(4.07)	(4.05)	(4.14)
GOV	-.0063644	-.0064726	-.0059765	-.0065526	-.0058297
	(-0.35)	(-0.36)	(-0.34)	(-0.38)	(-0.39)
TRA		.0956128	.0212473	.0300711	.0299859
		(1.35)	(0.34)	(0.47)	(0.51)
INV			.195352***	.1947247***	.1453365***
			(3.92)	(3.89)	(3.20)
ODA				.0517432***	.0512803***
				(5.24)	(5.07)
INFL					-.0647791
					(-1.37)
N	705	705	705	705	705
Adjusted R^2	0.0505	0.0643	0.1152	0.2572	0.2668
F	11.99	8.52	10.51	13.38	13.00
Significance	0.0001	0.0001	0.0000	0.0000	0.0000

***=coefficient significant at 0.01 level
**=coefficient significant at 0.05 level
*=coefficient significant at 0.1 level

***Table 4-3**. Regression against dependent variable Welfare, different models' composition*

Regarding the model for the dependent variable Welfare, which follows the equation 3.3, the highest R-squared and F-statistics are registered in model 5, where all the control variables are included, with values respectively equal to 0.27 and 13.00 (Table 4.3). Therefore, the independent variables CFA, GOV, TRA, INV, INFL, and ODA, are shown to explain approximately 26.68% of the variance in the dependent variable Welfare. The results reported by model 5 are thereafter chosen for the final analysis.

4.3.2 Effect of CFA on School

	Model 1	Model 2	Model 3	Model 4	Model 5
constant	9.730653***	7.495682***	8.495974***	6.832069***	5.681974***
	(29.60)	(4.23)	(4.06)	(3.40)	(2.74))
CFA	0.3699524***	0.3626655***	.3567017***	.3035368***	.249971***
	(3.89)	(3.87)	(3.85)	(3.25)	(2.70)
GOV	-0.0659713	-0.0687237	-.0839176	-.0712186	-.0556424
	(-0.14)	(-0.15)	(-0.18)	(-0.15)	(-0.13)
TRA		2.432542	2.659577	.7819962	.7801613
		(1.28)	(1.42)	(0.47)	(0.49)
INFL			-1.936424	-1.91199	-1.730072
			(-1.45)	(-1.39)	(-1.28)
INV				4.924726***	3.860604***
				(3.59)	(2.96)
ODA					1.104889***
					(3.80)
N	705	705	705	705	705
Adj R^2	0.0330	0.0440	0.0545	0.0941	0.1732
F	7.58	5.49	5.51	7.27	8.76
Significance	0.0014	0.0026	0.0010	0.0000	0.0000

***=coefficient significant at 0.01 level
**=coefficient significant at 0.05 level
*=coefficient significant at 0.1 level

Table 4-4*. Regression against dependent variable School, different models' composition*

Concerning the dependent variable School, employed to predict the effect of CFA on education, Table 4.5 presents the 5 different panel regressions, when the independent variables are added one by one. Model 5 shows the highest R-squared (0.1862), alongside the highest F-statistic (9.99) as well. The independent variables CFA, GOV, TRA, INFL, INV, and ODA are expected to explain the 17.3% of variance in the dependent variable School. The predictive value is lower than previous models, meaning that there are likely omitted factors affecting School which have been left out from the analysis.

4.3.3 Effect of CFA on Health

	Model 1	Model 2	Model 3	Model 4	Model 5
constant	58.11342***	44.32997***	42.04818***	37.47553***	2.527004***
	(49.90)	(12.77)	(8.31)	(7.59)	(34.47)
CFA	1.453639***	1.213181***	1.218087***	.9836963***	.9714929***
	(4.28)	(3.73)	(3.75)	(3.85)	(3.79)
GOV	-.9510366	-.9086041	-.9151651	-.8538926	-.8907244
	(-0.56)	(-0.57)	(-0.57)	(-0.60)	(-0.64)
INV		20.12005***	18.84965***	14.23333***	14.22557***
		(4.01)	(3.18)	(2.78)	(2.73)
TRA			3.430738	3.517752	4.074772
			(0.51)	(0.58)	(0.67)
ODA				4.78616***	4.753102***
				(5.17)	(5.06)
INFL					-4.627342
					(-1.12)
N	705	705	705	705	705
Adj R^2	0.0524	0.1264	0.1282	0.2713	0.2771
F	11.13	9.58	7.66	8.52	8.37
Significance	0.0001	0.0000	0.0002	0.0000	0.0000

***=coefficient significant at 0.01 level
**=coefficient significant at 0.05 level
*=coefficient significant at 0.1 level

Table 4-5*. Regression against dependent variable Health, different models' composition*

Among the models which analyze the effect of CFA on the dependent variable Health, both Model 4 and 5 are good candidate, according to their predictive power and significance (Table 4.4). In fact, while Model 4 presents a higher F statistic than Model 5, the latter shows a slightly larger R-squared value. Since both F-statistic are more than satisfactory, given their level of significance (Sig.) equal to 0, model 5 is selected for the interpretation. The independent variables CFA, GOV, INV, TRA, ODA and INFL are shown to account for approximately 27.7% of the dependent variable Health variance.

4.3.4   Effect of CFA on Income

	Model 1	Model 2	Model 3	Model 4	Model 5
constant	7.404736***	6.694343***	6.08847***	6.53144***	5.957379***
	(48.87)	(9.18)	(8.84)	(8.82)	(8.24)
CFA	.187133***	.1848168***	.1652825***	.1627351***	.1359981***
	(4.81)	(4.78)	(4.22)	(4.19)	(3.87)
GOV	-.1016475	-.1025223	-.0979333	-.1046431	-.0968684
	(-0.48)	(-0.48)	(-0.46)	(-0.49)	(-0.51)
TRA		.7731913	.0853386	.188104	.1871882
		(0.98)	(0.13)	(0.27)	(0.30)
INV			1.806933***	1.269756***	1.268479*
			(2.93)	(2.94)	(2.00)
INFL				-.8527843	-.7619813
				(-1.42)	(-1.23)
ODA					.5514972***
					(4.14)
N	705	705	705	705	705
Adj R^2	0.0408	0.0459	0.0705	0.0800	0.1710
F	11.55	7.98	9.35	8.86	14.51
Significance	0.0001	0.0002	0.0000	0.0000	0.0000

***=coefficient significant at 0.01 level
**=coefficient significant at 0.05 level
*=coefficient significant at 0.1 level

Table 4-6. *Regression against dependent variable Income, different models' composition*

In Table 4.6, the five different models run against the dependent variable Income are presented. Among the models, Model 5 shows the largest R-squared, while Model 4 shows the largest F-statistic. Since both models present a degree of significance= 0, Model 5 is selected for the final analysis. The independent variables are shown to affect approximately the 17.1% of the dependent variable's variance. Again, the R-squared reported is rather small, meaning that despite the control variables, other factors influencing Income are not included in the model.

4.4 INTERPRETATION OF THE RESULTS

In the last paragraph, the selection of the most appropriate models for the analysis has been conducted. After the selection, the results are hereby interpreted. The independent variables are treated individually, and their effects on the 4 dependent variables Welfare, Health, Education, and Income, are discussed (Table 4.7).

	Welfare HDI index	**Health** Life expectancy (years)	**School** Expected years of schooling	*Income* Logged GNI per capita, US$ PPP
Constant	.3855419*** (5.15)	2.527004*** (34.47)	5.681974*** (2.74))	5.957379*** (8.24)
CFA Logged Chinese ODA per capita, US$	.0106983*** (4.14)	.9714929*** (3.79)	.249971*** (2.70)	.1359981*** (3.87)
GOV Government Effectiveness, Index	-.0058297 (-0.39)	-.8907244 (-0.64)	-.0556424 (-0.13)	-.0968684 (-0.51)
TRA 4th root of Export + Import, %GDP	.0299859 (0.51)	4.074772 (0.67)	.7801613 (0.49)	.1871882 (0.30)
INV Gross Capital Formation, %GDP	.1453365*** (3.20)	14.22557*** (2.73)	3.860604*** (2.96)	1.268479* (2.00)
INFL 4th root of Consumer Price Inflation, %growth by year	-.0647791 (-1.37)	-4.627342 (-1.12)	-1.730072 (-1.28)	-.7619813 (-1.23)
ODA Logged ODA per capita, US$	.0512803*** (5.07)	4.753102*** (5.06)	1.104889*** (3.80)	.5514972*** (4.14)
N	705	705	705	705
R²	0.2668	0.2771	0.1732	0.1710
F	13.00	8.37	8.76	14.51
significance	0.0000	0.0000	0.0000	0.0000

***=coefficient significant at 0.01 level
**=coefficient significant at 0.05 level
*=coefficient significant at 0.1 level
Names of transformed indexes have been italicized.

Table 4-7. *Selected models for each dependent variable.*

Chinese Foreign Aid

The main focus of this research, namely Chinese foreign aid, is shown to have a positive, significant relation with all dependent variables. These findings subvert all the hypotheses previously formulated, with the exception of H4. CFA is in fact shown to have a positive significant effect on Income, as a 1% growth in CFA corresponds to a 0.13% increase in GNI per capita. These findings confirm those resulted from the Dreher's study on the effect of Chinese ODA on economic growth, where CFA is shown to have a positive and significant effect on the economic dimension (Dreher et al, 2017). On the other hand, contrary to hypothesis, CFA is shown to have a positive effect on Welfare as well, with high significance (p<0.01). A one percent increase in Chinese aid per capita corresponds to an $\frac{\beta_1}{100} = 0.000136$ increase in HDI (Benoit, 2011; Treiman, 2009). Similarly, coefficients are shown to be positive and significant for the Health variable (p<0.05), where a 1% growth of CFA corresponds to a 0.009 growth in years of life expectancy, and for the School/Education dimension (p<0.01), where a 1% increase in CFA results in a .000119 increase in expected years of education. Therefore, the positive externalities generated by Chinese ODA-like foreign aid are not offset by the development of aid dependence and the economic dominance obtained by Chinese enterprises, like it was predicted in Chapter 2 (Bräutigam, 2000). While it has been shown in this research that Chinese Aid is often entangled with commercial investment (Wang, 2016), and it is usually accompanied by R4I practices (Zongwe, 2010), its spillover effects still benefit the well-being of recipient populations. Therefore, the results fall more in line with the aid theories explored, while they discount the expectations on Chinese aid. Still, the registered effect of CFA on socioeconomic welfare is fairly limited. However, as the R^2 indexes suggest, the conclusions of this research are not conclusive, since there is a number of factors influencing the chosen socioeconomic welfare dimension which could not be captured by the models employed. The implications of this findings are discussed at greater length in Chapter 5.

Government Effectiveness

The coefficient describing the relation between GOV and the dependent variables are all negative. However, none of this relation is shown to be significant. Therefore, it is concluded that the Worldwide Governance Indicator of Government effectiveness does not influence the variance of Welfare, Health, Education and Income in the selected African countries. The findings dismiss the expectations previously formulated in the research. It may seem counterintuitive to have a positive Pearson correlation index with the dependent variables, but a negative regression coefficient. However, according to Kennedy (2002) this can indeed happen in multivariate analyses.

Trade Openness

Across every model, Trade openness is shown to have a positive effect on the dependent variable. However, in every case, no significance is observed. These results conclude that, contrary to

expectations, there is no relationship between the countries' openness to trade, and their Welfare, Health, Education and Income dimensions, according to the measurements offered by the selected indicators. The results do not support the claims about trade openness positive effect elaborated in previous chapters.

Investment

The coefficients describing the relation between the independent variable Investment and the Welfare, Health, Education, and Income dimensions are all shown to be positive. Moreover, high degrees of significance ($p<0.01$) are registered in every model. Therefore, it is concluded that total investment has a positive effect on the dimensions Welfare, Health, Education and Income in the selected African countries. Since coefficient refer to a unit increase of investment, i.e. 100%, the value must be divided by 100. A one percent increase in Investment corresponds to a 0.001453 increase in HDI and a 0.03861 increase in Education. Moreover, a one percent increase in Investment is associated with a 0.14 unit increase of Life expectancy and a 1.2% growth in GNI per capita, the latter with $p<0.1$ significance. In conclusion, investment is shown to have a much greater effect than CFA and ODA. The conclusions fall in line with the theoretical expectations and the empirical findings discussed in Chapter 2.

Consumers' Price Inflation

The independent variable INFL is shown to have a negative effect on every dimension considered. However, the coefficients reported are never statistically significant. Therefore, it is concluded that inflation does not have an effect on the dependent variables Welfare, Education, Income, and Health. This is not in line with the expectations developed in previous chapters, which predicted a negative effect of Inflation on all the considered dimensions. However, the effect of inflation on socioeconomic welfare indicators have often been source of debate, as discussed in Chapter 2, therefore the results should not be considered surprising.

Official Development Aid

Official Development Aid is shown to have a positive, significant ($p<0.01$) relation with the indicators of socioeconomic Welfare, Health, Education, and Income. A 1% increase in ODA per capita corresponds to a .000513 increase in the HDI index. Regarding the Health dimension, a 1% growth of ODA per capita results in a 0.047 unit increase in Life expectancy years, while it is corresponded by a 0.01045 additional school expectancy years. Finally, a 1% growth in ODA per capita is corresponded by a 0.5% increase in GNI per capita. Hence, it is concluded that Official Development Aid from non-Chinese sources has a positive effect on the dependent variables considered. This partially falls in line with the expectations firstly formulated in Chapter 2. Interestingly, ODA is shown to have a fourfold effect on HDI, when compared to Chinese Foreign Aid. A similar ratio of approximately ¼ between the two coefficients holds for the other dependent variables as well.

5   CONCLUSIONS

The conclusive chapter provides answers to the central research question and the sub-questions (5.1), thanks to the results produced in Chapter 4. Afterwards, the limitations of this research are addressed (5.2), alongside insights that could provide basis for additional research (5.3). Lastly, policy implications from these findings are formulated (5.4).

5.1   CENTRAL RESEARCH QUESTION

What is the effect of Chinese Official Developmental Assistance on recipient African countries' socioeconomic welfare?

In order to answer the Central Research question, two sub questions have been developed. The first one is:

According to the existent body of literature, does Chinese Official Developmental Aid affect Socioeconomic Welfare in recipient countries?

The answer to the first sub-question has been provided in Chapter 2. Firstly, the theoretical framework on aid effectiveness has been explored. Due to the complex nature of socioeconomic welfare, poverty has been chosen as a proxy dimension, inasmuch as poverty is often correlated with the reduction of capabilities, and poverty reduction is considered a core characteristic of welfare development. From there, the theories predicting the effect of aid on poverty reduction have been summarized. Three main streams have been distinguished: Theories claiming that Foreign Aid has a positive effect on socioeconomic welfare development, (2) Theories dismissing the effects of Foreign Aid on socioeconomic welfare development, and (3) Theories claiming that Foreign Aid has a conditionally positive impact on socioeconomic welfare development.

However, the analysis of the theories has ultimately not provided a definitive answer to the sub-question, due the contrasting frameworks they present. The analysis of Chinese aid history and characteristics, alongside the review of the empirical studies on aid effectiveness, have proven to be more helpful. From the study of its characteristics, it has emerged that Chinese aid has in fact conditional ties that may offset the development of welfare, namely the propensity for African countries to develop aid dependence, and the rather scarce involvement of locals in the implementation of aid programs. Apart from Dreher et al (2017), it was impossible to gather information on the effects of Chinese ODA. However, even in Dreher's the conclusions only concern the economic dimension of GDP growth. Therefore, the exploration of empirical studies focused on the effects of ODA on socioeconomic Welfare indicators (mainly HDI) in recipient LDCs and developing countries. While the empirical studies helped the selection of variables, their findings are rather mixed. In the majority of studies about Africa, ODA is

believed to have a positive effect on HDI (Staicu & Barbulescu, 2017; Asongu & Nwachukwu, 2017). However, as previously stated, the examination of Chinese aid characteristics points towards many differences between ODA and Chinese ODA-like aid, mainly in the nature of conditional ties and their degree of entanglement with commercial projects and private investment. Therefore, Chinese aid is expected to have no impact on socioeconomic Welfare in recipient countries, expect for the increase of GNI per capita. In order to verify whether this is indeed the case, the second sub-question has been developed.

What is the empirical evidence about the effects of Chinese developmental aid on socioeconomic Welfare in recipient African countries?

Firstly, in chapter 3, all the relevant dimensions underwent operationalization. Afterwards, the appropriate quantitative model was chosen, namely a Panel Data fixed-effects. Lastly, for each variable different models were compared against each other, in order to find the best-fitted ones for the analysis. The results retrieved after the selection of models point towards dismissing H1, H2, and H3 while they confirm the expectations brought about by H4. Hence it was possible to provide an answer to the main research question: Chinese ODA is shown to have a positive effect on socioeconomic Welfare in recipient countries, albeit it is very limited. In fact, it is smaller than the effect of ODA and much smaller than the effect of Total Investment. Therefore, it is concluded that Investment remains the largest driver of socioeconomic development, in line with the theories developed by the neoclassical development scholars. Still, the models developed show the effect of Chinese aid on HDI to be indubitably positive (see 5.2). Chinese aid effectiveness partly discredits development theories that advocate for policy reforms as the foundation stone for socioeconomic development. In fact, it does seem that the positive externalities brought about by Chinese "non-conditional" aid (See 2.1.1) do in fact make a positive impact in recipient African countries. . However, according to the results, ODA's impact is much more beneficial in socioeconomic terms. The same conclusions applies to the 3 additional dimensions, namely health, education, and income. The positive effects on income was already registered by Dreher et al's study (2017) on a macroeconomic level in their research about the effectiveness of Chinese aid among recipient countries: the same conclusions apply to the African continent when considered individually. The reasons behind the positive effects on the Health and School dimensions are less clear, but they can be tracked back to the positive externalities generated by Chinese Aid. Again, ODA and to a greater extent investment proved to be more effective in fostering the development of the three selected dimensions, confirming the central role assigned to capital by neoclassical scholars in development. On the other hand, whether the policy conditionality path taken by international organizations is th best course of action is still unclear, because while the effects of ODA on HDI are greater than Chinese Aid, the per capita ODA widely surpasses the Chinese aid per capita in African Countries.

5.2   LIMITATIONS

Three large limitations were identified in this research. Firstly, the inclusion of a non-normally distributed variable in the panel data analysis, due to zero-inflated distributions, partly hinders the quality of the results. The problem was represented by the main independent variable CFA, which could not be transformed to ensure a normal distribution. The second limitation regarded the transformation of other variables. In order to guarantee a normal, or quasi-normal, distribution of their observations, several variables underwent different types of transformation, namely logarithmic and 4th root transformations. The resulting values render the interpretation of results more complex and less intuitive for the reader, and the approximation of the coefficients when a log-transformed variable is under scrutiny less precise (Treiman, 2009). The third and final point of limitation derives from the analysis itself. Since the R^2 reported is in all cases fairly low (<0.3), the easiest solution would be the inclusion of additional control variables, in order to add more factors that could explain the dependent variables' variance. However, due to data unavailability, the following dimensions could not be included: government social spending, unemployment, and military spending. To this day, African countries still severely lag behind in the collection and report of data. The effort of non-governmental organizations and scholars partly compensates for this issue (Hsiao, 2007). However, as in the case of the aforementioned dimensions, the key aspect of governmental collaboration is not always a guarantee (Amerson & Strang, 2015).

5.3   SUGGESTIONS FOR FURTHER RESEARCH

As previously asserted, this research has uncovered a difference in the magnitude of socioeconomic effects between Chinese ODA-like aid and traditional ODA. Further research should be conducted on why these differences are registered, in order to provide the recipient countries with a complete body of knowledge on the effects of different conditional ties on their socioeconomic welfare. Moreover, this research has suffered from data unavailability in certain dimensions, as reported in 5.2. May in the future this data become available, it is strongly suggested for it to be included as control variables in the models developed. Finally, while HDI has been chosen as the principal indicator of socioeconomic welfare, it fails to capture several dimensions that are connected to the quality of life and capabilities paradigms. For example, indicators able to capture the individual degree of access to basic goods and services, alongside their quality of said goods and services, may be more appropriate in encapsulating the characteristics of the capabilities approach.

5.4 POLICY IMPLICATIONS

According to the results, Chinese ODA does ultimately improve socioeconomic welfare conditions in recipient African Countries. Therefore, the findings point towards an increased openness from African governing bodies towards China as an aid donor. However, traditional ODA is also shown to have a positive effect, with far better results. While this thesis does not attempt to investigate the reasons behind this difference in magnitude, it concludes that the recipiency traditional ODA should be prioritized by African countries, if the objective is to develop socioeconomic welfare of their populations. Still, Chinese aid should not by any means be discounted, as it could serve as an additional source for welfare development.

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APPENDIX A: SAMPLE

Northern Africa

Algeria	Egypt	Libya
Morocco	Sudan	Tunisia

Eastern Africa

Burundi	Comoros	Djibouti
Ethiopia	Kenya	Madagascar
Malawi	Mauritius	Mozambique
Rwanda	Seychelles	Tanzania
Uganda		

Central Africa

Angola	Cameroon	Central African Republic
Chad	DR Congo	Republic of the Congo
Equatorial Guinea	Gabon	

Western Africa

Benin	Burkina Faso	Cabo Verde
Cote d'Ivoire	Ghana	Guinea
Guinea-Bissau	Liberia	Mali
Mauritania	Niger	Nigeria
Senegal	Sierra Leone	

Southern Africa

Botswana	Lesotho	Namibia
South Africa	Zambia	Zimbabwe

APPENDIX B: HAUSMAN RESULTS

Welfare

```
Test: Ho:   difference in    coefficients not systematic
chi2(6)    = (b-B)'[(V_b-V_B)^(-1)](b-B) =       44.37
           Prob>chi2  =       0.0000
```

Income

```
Test: Ho:   difference in coefficients not systematic
chi2(6) = (b-B)'[(V_b-V_B)^(-1)](b-B)=       40.22
           Prob>chi2 =       0.0000
```
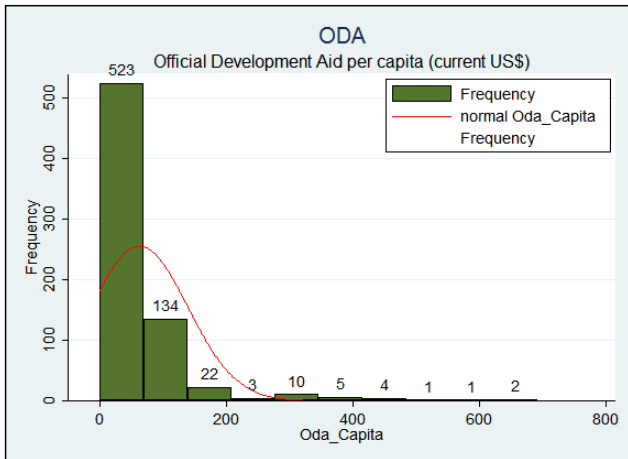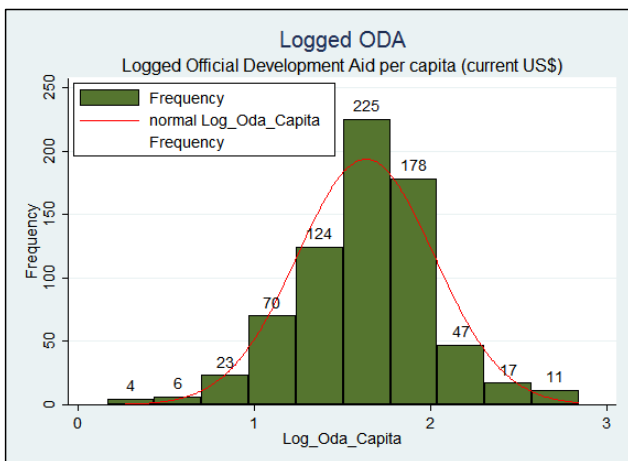
School

```
Test:  Ho:  difference in coefficients not systematic
chi2(6) = (b-B)'[(V_b-V_B)^(-1)](b-B)=       34.00
            Prob>chi2 =       0.0000
```

Health

```
Test: Ho:   difference in    coefficients not systematic
chi2(6)    = (b-B)'[(V_b-V_B)^(-1)](b-B)=       24.68
           Prob>chi2  =       0.0004
```
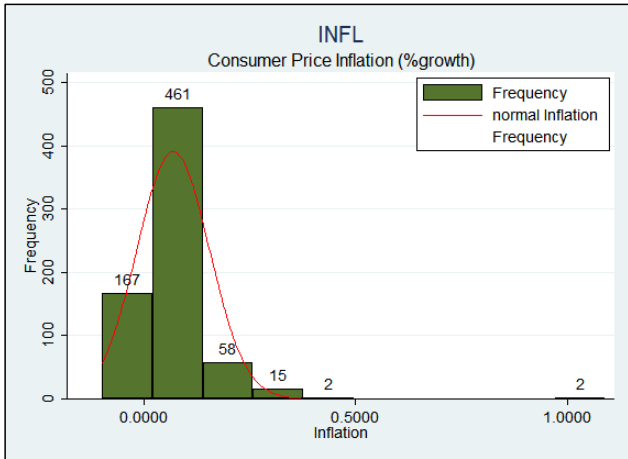
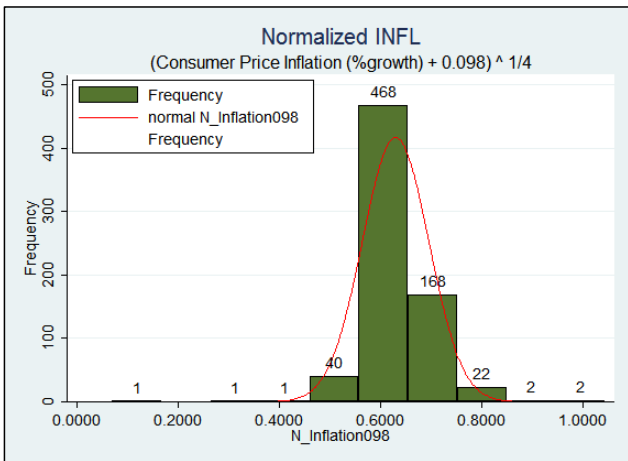**APPENDIX C: DISTRIBUTION OF CONTROL VARIABLES**
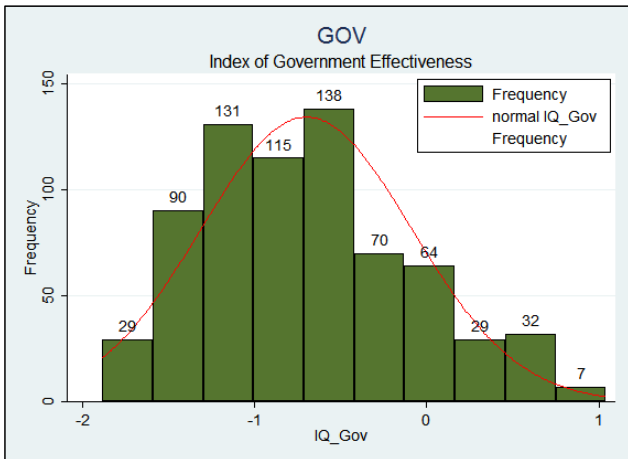

Official Development Aid

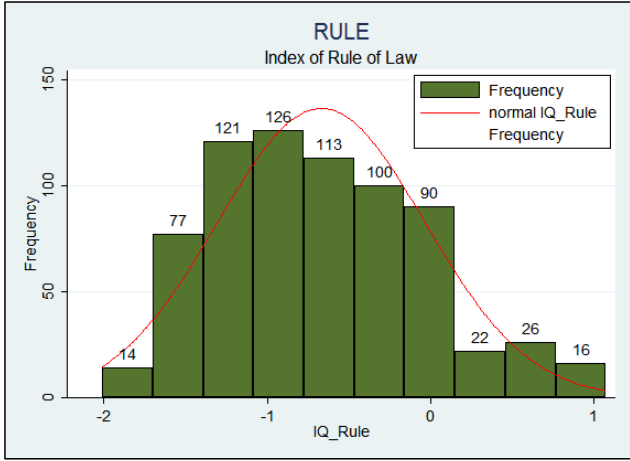Log of Official Development Aid

Consumer Price Inflation

4th root of Consumer Price Inflation + constant 0.098

Government Effectiveness

RULE
Index of Rule of Law

Rule of Law

TRA
Exports (%GDP) + Imports (%GDP)

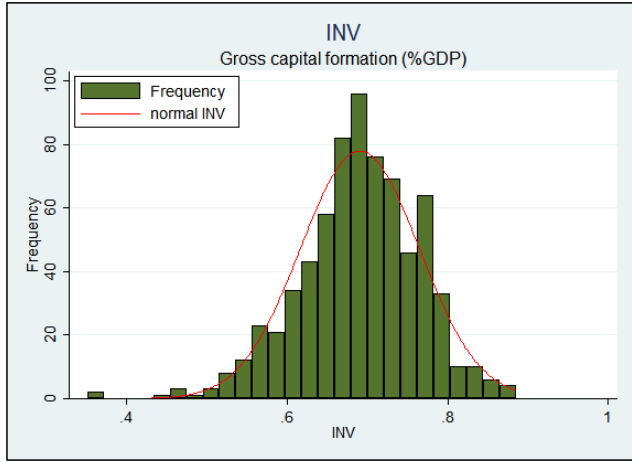Trade Openness

Normalized TRA
(Exports (%GDP) + Imports (%GDP)) ^ 1/4
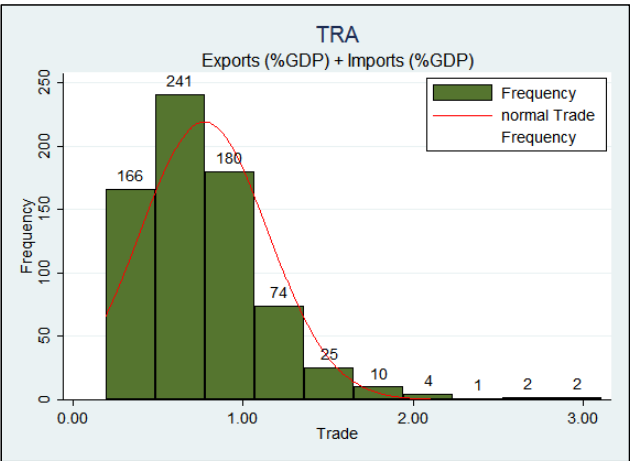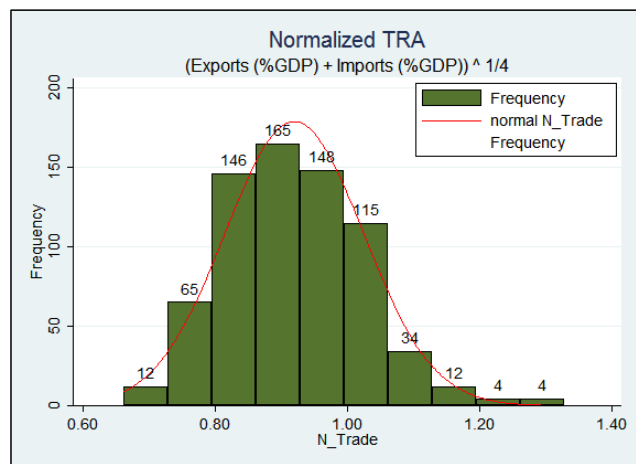
4th root of trade openness

Total Investment

APPENDIX D: PESARAN's TESTS FOR HETEROSKEDASTICITY

Welfare

```
Pesaran's test of cross sectional independence =    78.560,
Pr = 0.0000
```

Income

```
Pesaran's test of cross sectional independence =    67.776,
Pr = 0.0000
```

Health

```
Pesaran's test of cross sectional independence =    60.064,
Pr = 0.0000
```

School

```
Pesaran's test of cross sectional independence =    42.669,
Pr = 0.0000
```

APPENDIX E: WOOLDRIDGE TESTS FOR SERIAL CORRELATION

Welfare

```
Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
    F(  1,      46) =     80.734
          Prob > F =      0.0000
```

Income

```
Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
    F(  1,      46) =      3.569
          Prob > F =      0.0452
```

School

```
Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
    F(  1,      46) =     27.262
          Prob > F =      0.0000
```

Health

```
Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
    F(  1,      46) =  38505.964
          Prob > F =      0.0000
```

APPENDIX F: CORRELATION MATRICES

Welfare

Order		Welfare
0	Welfare	1
1	GOV	0.4951
3	INV	0.2349
5	INFL	-0.0909
2	TRA	0.327
4	ODA	-0.0731
0	CFA	0.0452

Income

Order		Income
0	Income	1
1	GOV	0.3866
3	INV	0.2812
4	INFL	-0.1097
2	TRA	0.3823
5	ODA	-0.1264
0	CFA	0.0407

Health

Order		Health
0	Health	1
1	GOV	0.4395
2	INV	0.3639
5	INFL	-0.1284
3	TRA	0.2443
4	ODA	0.1405
0	CFA	0.0178

School

Order		School
0	School	1
1	GOV	0.4718
4	INV	0.09
3	INFL	-0.0966
2	TRA	0.316
5	ODA	0.028
0	CFA	0.0662