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FACULTY OF SOCIAL SCIENCES
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Does Foreign Aid Decrease Inequality? Evidence from the Most Recent Data

Bachelor thesis

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Declaration of Authorship

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Prague, May 5, 2019

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Abstract

Income inequality is an alarming issue affecting especially developing countries, yet very scarce attention is paid to how it is influenced by development aid. This study investigates the relationship, focusing on modern approaches to foreign assistance which have changed considerably since 1999. With a sample of 123 developing countries, the effect is estimated using both static and dynamic panel data techniques while controlling for the Kuznets curve. The results show that robust to method and functional form, development aid neither improves nor worsens inequality. Nonetheless, estimating the model for specific groups of countries in the sample yields different, statistically significant results, while also depending on political environment.

JEL Classification	D31, F35, C23
Keywords	Inequality, Foreign Aid, Panel Data

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Abstrakt

Příjmová nerovnost je alarmujícím problémem, který postihuje zejména rozvojové země, avšak jen velmi málo pozornosti je věnováno tomu, jaký vliv na něj má rozvojová pomoc. Tato práce zkoumá tento vztah se zaměřením na moderní pojetí zahraniční pomoci, které se od roku 1999 značně proměnilo. Efekt je určen na vzorku 123 rozvojových zemí pomocí statických i dynamických metod pro panelová data, a to s ohledem na přítomnost Kuznetsovy křivky. Výsledky ukazují, že rozvojová pomoc, robustně vůči metodě a použitým proměnným, nezlepšuje ani nezhoršuje nerovnost. Nicméně analýza pro specifické skupiny zemí přináší rozdílné, statisticky významné výsledky, a to často v závislosti na politickém prostředí.

Klasifikace JEL	D31, F35, C23
Klíčová slova	Nerovnost, Rozvojová Pomoc, Panelová Data
Název práce	Snižuje rozvojová pomoc nerovnost? Analýza nejnovějších dat

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Acronyms

DAC Development Assistance Committee

EU European Union

FE Fixed effects estimation

GDP Gross Domestic Product

GMM Generalized method of moments

GNI Gross National Income

n.a. not applicable

ODA Official Development Assistance

OECD Organisation for Economic Co-operation and Development

OLS Method of Ordinary Least Squares estimation

RE Random effects estimation

UK United Kingdom of Great Britain and Northern Ireland

UN United Nations

US United States of America

USD United States Dollar

Bachelor Thesis Proposal

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Proposed topic	Does Foreign Aid Decrease Inequality? Evidence from the Most Recent Data

Research question and motivation The purpose of development aid is to foster economic prosperity and help with societal problems such as HIV/AIDS or the consequences of wars and natural disasters. End of poverty is often cited as one of its primary objectives, which has even been included by the United Nations among the Sustainable Development Goals. In the past, studies focused on its effect on growth rates (Minoiu & Reddy 2009) whilst others researched the relationship between growth and inequality (Deininger & Squire 1998; Suresh Babu *et al.* 2016; Fosu 2017). Yet the link of development aid and inequality has escaped the attention despite its strict relevance to the assessment of development aid as a whole. The question thus is what effect aid has on inequality.

Contribution There is wide array of literature available regarding the impact of development aid on economic growth; nonetheless, little evidence has be found as to how development aid affects distribution of income in emerging economies. At the same time, existing studies such as those of Herzer & Nunnenkamp (2012) and Chong *et al.* (2009) arrive at different conclusions depending on the sample of countries used. As a result, distributional effects of development aid deserve further attention.

Methodology Data on development aid, inequality (proxied by the Gini coefficient), and related variables are available and were used by the existing studies from the databases of the OECD, World Development Indicators of the World Bank, the United Nations or the Inequality Project of the University of Texas. Advanced econometrics methods will need to be employed to study the time-series data and draw conclusions thereof.

Outline

1. Introduction
2. Literature review
3. Data
4. Methodology
5. Results
6. Conclusion
7. List of academic literature

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Supervisor

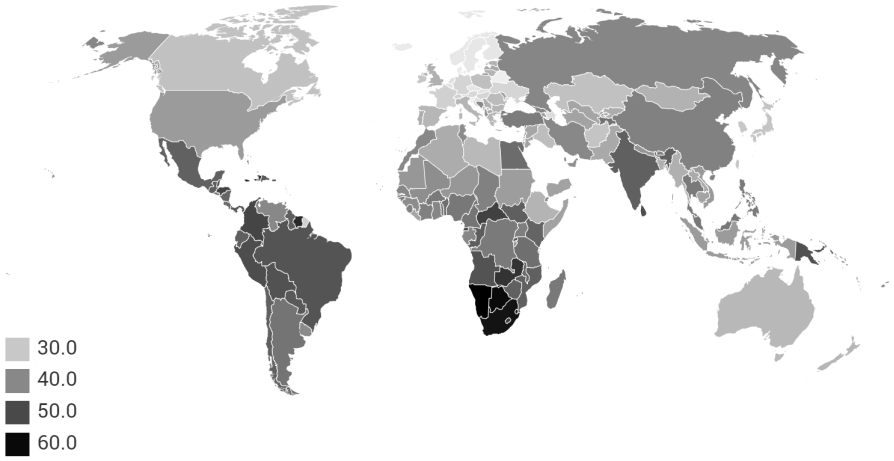
Chapter 1

Introduction

In 2015, one in ten people lived below the poverty line of USD 1.90 per day (World Bank 2019a). While the total number of people living in poverty continues to decrease, at the same time income held by the wealthiest 1% is rising (Roser 2016). Despite the relatively recent improvements on the centuries of rising global income inequality, the situation is still alarming, especially in developing countries (Roser 2016). In particular, there are large differences among regions, as illustrated by Figure 1.1. The majority of impoverished people lives in Sub-Saharan Africa (World Bank 2019a), which together with Latin America and the Caribbean are the world's most unequal regions. The problem of poverty and inequality transcends moral concerns as these phenomena pose a threat to political stability and peace within these countries, with the potential to spark civil unrest and violence (Sharma & Abekah 2017).

With that in mind, the international community addresses poverty through the issuance of development aid. It became a distinct tool of foreign policy in the second half of the 20^{th} century (Moschella & Weaver 2014), despite its particular motives frequently changing. During the 1960s, it was believed that economic growth, facilitated by foreign assistance, would spread across different cohorts of the society and thus help redistribute income (Lindner & Strand 2006). However, lack of commitment to poverty reduction, political motives as well as an unfavourable economic environment led to substantial increases in both global income inequality and the amount of debt held by developing countries (Lindner & Strand 2006; Moschella & Weaver 2014). It was not until the turn of the millennium that the movement to end world poverty rose to prominence with the introduction of the Comprehensive Development Framework by the World Bank. In particular, end of poverty has been featured

Figure 1.1: Income inequality across countries



Income inequality as measured by the Gini coefficient, average of available data for years 1999-2016. Countries for which no data was available are left out of the map. Source of data: Solt (2016).

as the top priority of both the Millennium Development Goals in 2000 and their successors, the Sustainable Development Goals in 2015 (United Nations 2015).

Nonetheless, the allocation of development aid has received a plethora of criticisms, in particular to its supposed effect on economic growth (Burnside & Dollar 2000; Easterly 2003; Nowak-Lehmann *et al.* 2012, among others). Despite the clear objective to improve the situation of the poorest and in doing so the income distribution, literature on the topic is scarce. At the same time, existing studies arrive at different conclusions depending on the sample of countries, political environment, region or specific aid allocation mechanisms.

Specifically, Chong *et al.* (2009) finds a negative relationship between aid and inequality conditioned on the quality of institutions using the Generalized Method of Moments. On a similar sample though, Bjørnskov (2010) identifies a positive effect for democracies in particular, relying primarily on random effects estimation. Different results are estimated for different regions with Arvin & Barillas (2002) concluding a negative impact on inequality for East Asia and the Pacific, and Sharma & Abekah (2017) finding a positive sign for Africa and South America. A positive effect robust to different inequality datasets is also detected by Herzer & Nunnenkamp (2012). In spite of that, a recent study by Kasuga & Morita (2018) uncovers a negative sign when focusing specifically on pro-poor components of development aid.

Therefore, the aim of this study is to reassess the workings of development

aid and the direction of its impact on inequality. Unlike previous literature which generally disregarded the differing motives underlying foreign assistance throughout the past decades in choosing their studied time period, I focus on modern approaches to development aid alone. That is, the analysis relates specifically to years after 1999 which marked the beginning of substantial changes to the motives and particularly to the commitment to end world poverty (Bulíř & Hamann 2006). In doing so I examine the effect on a total of 123 developing countries as well as on particular subsets thereof, such as different regions, or countries with similar per capita income or historical development. Furthermore, special attention is paid to countries which are regarded as potential tax havens or offshore financial centres, which is novel to existing literature on the topic. In the process, both static and dynamic panel data techniques are employed.

The results suggest that aid does not in general influence the level of country's income inequality, robust to the method and functional form used. This implies that development aid affects all segments of the society equally, contrary to the pleas to focus specifically on poverty reduction. However, when applied to specific groups of countries, different and statistically significant results are obtained. In line with the objective to reduce inequality are the findings for the region of Middle East and North Africa as well as for countries whose population is between 10 and 50 million people. The impact is further found to be decreasing with improving political environment for the least developed countries and former British colonies, aligned with the aim to incentivize political reforms and the advancement of democracy in developing countries (Moschella & Weaver 2014). Contrary to these efforts, the effect is identified to be positive in former French territories, though to some extent this aligns with the conclusions of previous literature, particularly of Sharma & Abekah (2017).

The remainder of this study is organised as follows. Chapter 2 reviews relevant literature on the topic together with its interconnectedness with the effect of both foreign aid and inequality on economic growth. Chapter 3 describes the data collection process. Chapter 4 specifies the model I estimate together with the employed methods. Results thereof are commented on in Chapter 5 and supplemented with a sensitivity analysis of both the size of population and aid flows. Finally, Chapter 6 provides conclusions and policy recommendations.

Chapter 2

Literature Review

In this chapter, the existing literature on the topic of development aid and inequality is examined. Section 2.1 briefly summarizes the changing approaches to development aid throughout history. Next, Section 2.2 reviews previous studies related to the main research question of foreign aid and its impact on income distribution. Sections 2.3 and 2.4 take a different perspective by analyzing the connection of the two variables to economic growth.

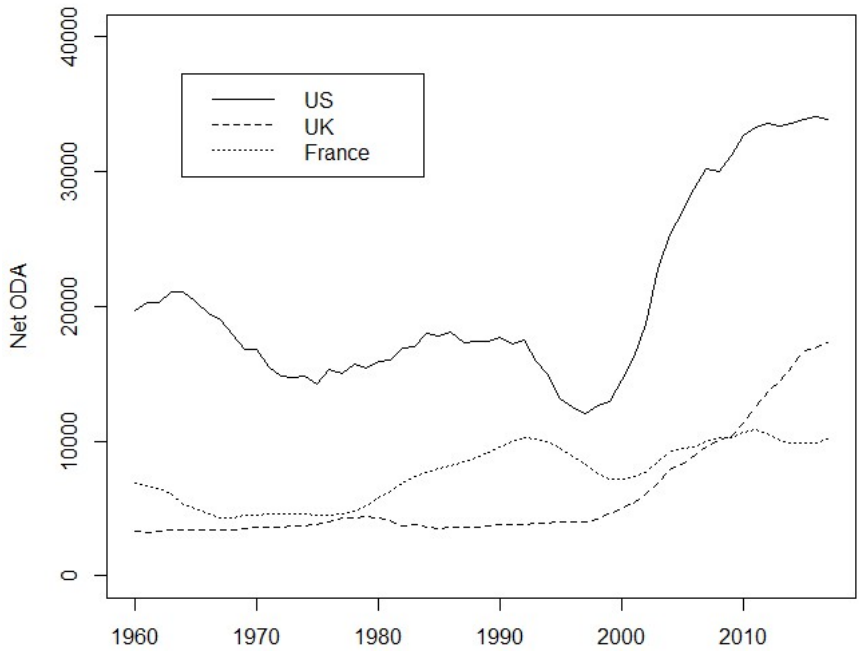
2.1 History of development aid

To understand the impact of development aid, it is important to consider its particular motives which have been changing throughout history. Support for the concept of aid can be traced back already to the era of Enlightenment and Adam Smith (Moschella & Weaver 2014). Early examples of foreign assistance can be found both prior to (e.g. development projects in British colonies as well as loans to Latin American countries under president Roosevelt) and after the WWII (e.g. the Marshall Plan) (Moschella & Weaver 2014).

Importantly, events of the 1950s and 1960s laid foundations for institutionalization of aid, with a direct focus on economic growth (Lindner & Strand 2006). Nonetheless, strategic and political interests played a distinct role in aid allocation, specifically in the United States (Minoiu & Reddy 2009; Moschella & Weaver 2014; Kaufmann *et al.* 2019). At the same time, poverty reduction was not prioritized as it was believed that industrialization would bring benefits to all layers of the society (Lindner & Strand 2006).

In contrast, the motives started to shift in the 1970s with a particular role of the President of the World Bank, Robert McNamara (Moschella & Weaver

Figure 2.1: American, British, and French ODA



Moving 5-year averages of net ODA, in millions of USD in constant prices. Source of data: OECD (2018).

2014). As the number of people living below the poverty line continued to rise despite attempts to stimulate economic growth, poverty reduction was emphasised as the primary objective of development efforts (Lindner & Strand 2006). Nonetheless, the narrative was not met with the same level of determination in practice and further offset by global economic stagnation in the aftermath of the oil shocks of the 1970s (Moschella & Weaver 2014). In response, the idea of Washington consensus emerged during the 1980s, spelling out the importance of internal reforms to address the crisis and skyrocketing amounts of debt (Lindner & Strand 2006).

It was not until the 1990s that international institutions and bilateral donors alike credibly committed to ending world poverty (Bodenstein & Kemmerling 2015). Apart from approaching the impossible-to-repay debt through the heavily indebted poor countries programme in 1996 (Bulíř & Hamann 2006), closer attention was also paid to the importance of political reforms and good governance in fostering development (Lindner & Strand 2006). Eventually, the World Bank introduced a new strategy, the Comprehensive Development Framework in 1999, followed by the Poverty Reduction Strategy Paper process (Lindner & Strand 2006). Distinct from its previous efforts, the focus became centered on

direct participation and empowerment of governments of developing countries (Moschella & Weaver 2014). At the same time, the United Nations placed poverty reduction at the heart of the Millennium Development Goals (Lindner & Strand 2006).

During the past two decades, improving the effectiveness of foreign assistance has become the central theme of discussion (Moschella & Weaver 2014). The international community has continued to substantially increase its aid expenditure, with specific commitments made and reiterated during the 2002 Monterrey Summit, the 2005 G8 Gleneagles Summit, or the 2009 L'Aquila Summit (Herzer & Nunnenkamp 2012). In particular, the Bush administration supervised an unprecedented expansion of the development agenda, in part motivated by the aftermaths of 9/11 (Easterly 2003; Moschella & Weaver 2014). Similarly, the amount of money spent by the government of the United Kingdom has started to grow significantly since the end of the 1990s, whereas France has overturned its declining trend during this period, as can be seen in Figure 2.1.

All in all, while the idea of foreign assistance reaches back to the 18$^{\text{th}}$ century, its primary objectives were changing throughout the 20$^{\text{th}}$ century. In particular, the focus on the end of poverty as a credible commitment of the international community has only been established at the turn of the millennium, together with rapid increases of development aid in absolute terms.

2.2 Effect of development aid on inequality

The effect of development aid on income distribution has received a scarce attention as opposed to its influence on economic growth and development. Importantly, previous studies do not take into account the shifting objectives of development aid and thus fail to distinguish the impact of modern approaches to aid, as described in the previous section. Besides, existing literature finds mixed evidence thereon while conditioning the effect on political environment, regional differences as well as the particular design of aid allocation.

To begin with, Chong *et al.* (2009) identifies that foreign aid reduces income inequality, though the conclusion is not robust to using different measures of inequality and is conditioned on taking the quality of a country's institutions into consideration. Contrary to that and on a similar sample, Bjørnskov (2010) detects a positive relationship in democracies whereas results on autocratic

regimes were inconsequential. In particular, the share of a democratic country's income possessed by the wealthiest 20% increases with additional foreign aid.

As for regional differences, Bornschier *et al.* (1978) posits that geographical area does not influence the estimated positive effect. While Arvin & Barillas (2002) observe no causality on a sample of 118 countries, when focusing on particular subsets, they detect a positive relationship between aid and inequality in low income countries and a negative one in the region of East Asia and Pacific. Their explanation of this particular estimate centres on the assumption that decreasing inequality signals notable effort in those countries who then in turn attract more aid. On the contrary, a positive impact is found in Africa and South America, being more detrimental to equality in the latter of the two regions (Sharma & Abekah 2017).

Several studies also examine the design of aid allocation and its impact on inequality and poverty reduction. Herzer & Nunnenkamp (2012) conclude a positive effect on inequality, though their sample consists of only 21 countries. They further assess that rent-seeking in recipient countries is not the sole problem, and suspect an incentive problem by the donors themselves. De Matteis (2013) elaborates thereon, asserting that focus on poverty reduction in donor countries is necessary for development assistance to be effective alongside proper aid utilization by its recipients. On a different note, an influential study by Collier & Dollar (2002) presents the calculation of a poverty-efficient aid allocation among countries. They discover that reality is substantially different, and in fact, they claim that optimally allocated foreign aid could alleviate poverty of twice as many people as it does in reality. In particular, increasing levels of foreign aid provided need not be necessary to reduce inequality if aid is better allocated (Kasuga & Morita 2018). To additionally emphasize the design and structure of foreign aid and the role of donors, volatility of development aid has been increasing since 1975 (Bulíř & Hamann 2006), thus further offsetting the efforts to reduce global income inequality which benefit from stability in aid flows (Berrittella 2017).

To conclude this section, the relationship of foreign assistance and inequality is unclear with studies in support of its positive as well as negative sign. Moreover, it can depend on the political environment of a particular country as well as the geographical area. However, there appears to be a consensus on the allocation of development aid in that its current design is sub-optimal.

2.3 Effect of development aid on growth

Apart from the direct effect of foreign aid on inequality, the impact may materialize indirectly by influencing economic development and growth, which in turn shape the income distribution. The following two sections disentangle these effects.

While foreign aid can aim at various targets, including the end of poverty, reduction of child mortality or improvement of literacy rate (Roesdahl & Varughese 2017), it is still in essence based on the notion of promoting economic growth (Arvin & Barillas 2002; Herzer & Grimm 2012; OECD 2018). Contrary to that, existing literature provides conflicting results thereof, with Doucouliagos & Paldam (2013) claiming that previous studies failed to conclude that foreign aid is beneficial to development.

In the underlying theory, key to the link between growth and development aid is the assertion that foreign aid raises the savings rate in under-developed countries (Kunofiwa 2018). In the Harrod-Domar model, increased savings translate to more investment and hence to the expansion of capital stock within the economy. Assuming a constant capital-output ratio, economic growth improves accordingly. In comparison, the Solow model focuses on the steady state of the economy, thus predicting convergence to zero growth rates in the long term. In the short term however, when savings rate increases, the economy accumulates more capital for the next period and can thus converge to a higher steady state. Therefore, both predict a positive impact of foreign aid on economic development.

Accordingly, there is an array of empirical results supporting the theoretical conclusions. Already in 1978, Bornschier *et al.* (1978) estimated a positive effect of foreign aid on short-term relative rates of economic growth, irrespective of region. In contrast, more recent research identifies that in the short term, the impact though positive is small in magnitude, but it materializes fully in the long term (Arndt *et al.* 2015). Moreover, foreign aid is found to benefit general societal welfare by reducing poverty or child mortality as well as stimulating the sources of growth, including physical and human capital accumulation (Arndt *et al.* 2015). These conclusions are supported in a study by Minoiu & Reddy (2009), who focus specifically on the developmental component of aid, i.e. its part that is expected to directly benefit development in the form of physical infrastructure building, contributing to human capital accumulation, or improving health care services. As noted by Minoiu & Reddy (2009), it is indeed

reasonable to expect benefits of investing into these specific areas to emerge over the long term rather than contemporaneously. Additionally, expansion of the financial sector further encourages positive impact of foreign aid on growth rates (Kunofiwa 2018).

Burnside & Dollar (2000) presented an influential paper conditioning the positive effect of aid on the political environment of countries. In particular, well-governed countries with competent fiscal, monetary, and trade policies benefit to a greater extent than those without. The paper has since been extended and replicated by a number of studies, including Easterly (2003), Dalgaard *et al.* (2004), and Radelet & Bazzi (2012). While identifying a positive impact, Radelet & Bazzi (2012) note its small magnitude as well as great variation across countries. Furthermore, aid is concluded to have diminishing returns with respect to promoting growth.

Dalgaard *et al.* (2004) also consider regional differences and the role of climate, deriving that foreign aid, though beneficial to growth, is less effective in tropical regions. Focusing specifically on Latin America, Tezanos *et al.* (2013) add to the evidence of positive effects of aid after adjusting the levels of GDP per capita to inequality. Moreover, the impact is stronger in less corrupt countries, in line with Burnside & Dollar (2000).

Returning to the theoretical framework, once the assumption of the positive relationship between foreign aid and savings is relaxed, both the Harrod-Domar and the Solow model predict a negative effect on growth rates. Empirically, development aid is found to crowd out private investment (Herzer & Grimm 2012) and domestic savings (Nowak-Lehmann *et al.* 2012) which in turn reduce net savings, capital accumulation and the pace of economic development. In addition, foreign aid can be argued to reinforce the levels of corruption, keep the political establishment in power, and distort incentives in the market environment (Moyo 2010).

An insignificant or negative relationship also finds empirical support. Robust to different regions as well as levels of development, a negative though modest estimate is concluded particularly for highly aid-dependent countries (Nowak-Lehmann *et al.* 2012). Although Stojanov *et al.* (2019) detect a positive effect between years 1990 and 1999, all other periods exhibit an insignificant relationship between aid and growth. Furthermore, uncertainty of future aid inflows, which has increased according to Bulíř & Hamann (2006), further negatively influences growth (Stojanov *et al.* 2019).

Overall, there is mixed evidence of the relationship between aid and growth

with both theoretical and empirical support for either direction of the effect. Moreover, even when positive estimates are found, they are often small in magnitude (Radelet & Bazzi 2012; Arndt *et al.* 2015), thus further undermining the intended outcomes of foreign aid with respect to growth.

2.4 Effect of growth on inequality

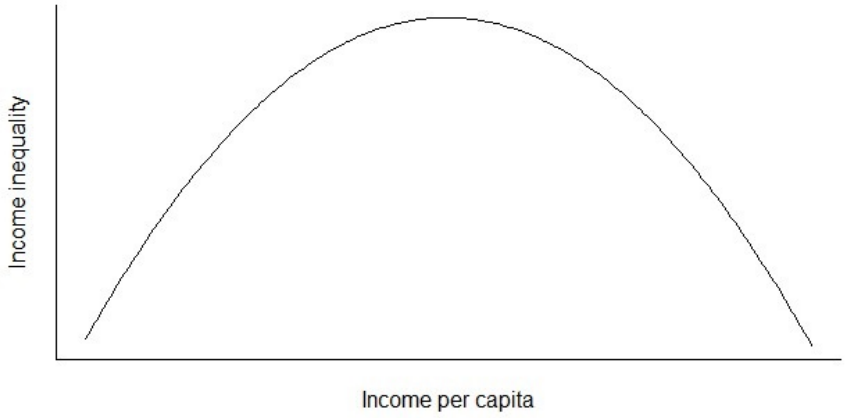
According to Fosu (2017), changes in the levels of poverty, both upward and downward, are primarily driven by the growth of average income. As a result, studying the interconnectedness of inequality and growth is key to understanding and evaluating the workings of development aid.

There are multiple theoretical frameworks underpinning the relationship. On one hand, a positive effect is to be expected since the savings rate of the rich is higher than that of the poor. Therefore, redistribution of income decreases savings of the economy as a whole and thus hinders further capital accumulation and economic development (Shin 2012). Nonetheless, a negative sign can also be justified as the poor face credit constraints and hence less investing opportunities. As a result, the economy can spiral in a poverty trap. Moreover, high levels of income inequality can arouse political unrest, thus further undermining economic growth (Shin 2012).

A widely discussed concept is that of the Kuznets curve (Kuznets 1955). In theory, as industrialization takes places and population shifts to towns, inequality between rural and urban regions increases. This further attracts agriculture workers to move, which in turn maintains low levels of wages for labour. Furthermore, those with greater initial endowments are better able to invest, accumulating ever-more wealth and stimulating increasing inequality. However, as income per capita increases, inequality eventually starts to decrease. Some of the reasons stated by Kuznets (1955) include greater political power of the low-income population, protective legislation as well as increasing efficiency of the urban population in time. The resulting relationship follows an inverted-U-shaped curve, illustrated in Figure 2.2. Therefore, for low levels of per capita income, inequality increases with economic development until a turning point is reached, after which it decreases with further advancements.

Empirical literature is very inconclusive on the matter. Taking into account public consumption, Li & Zou (1998) observe that higher levels of income inequality are related to faster economic growth. Contrary to that, Suresh Babu *et al.* (2016) show that inequality considerably hinders economic growth

Figure 2.2: Kuznets curve



in the long term. Similar results though in different subsets are reached by other scholars as well. A negative relationship is found in democracies only (Persson & Tabellini 1994), for poor only (Deininger & Squire 1998), and in less developed countries (Neves *et al.* 2016). Interestingly, while Deininger & Squire (1998) condemn redistribution of income in favour of wealth accumulation for reasons mentioned at the beginning of this section, Suresh Babu *et al.* (2016) find no evidence of negative effects of redistribution on economic growth.

Apart from linear relationships, some literature also supports more complicated functional forms. Apart from Chen (2003), also Bjørnskov (2010) reports evidence of the Kuznets curve, with a turning point between USD 4 000 and 5 000. Moreover, Shin (2012) contends that the effect of inequality is conditional on the stage of development of the given country. In particular, in early stages of development, higher levels of income inequality obstruct growth, whereas they stimulate it closer to the steady state.

Overall, a consensus is found neither on the relationship between aid and growth, nor for inequality and growth. While it may be assumed that foreign assistance promotes economic growth and development as is its primary goal, the same line of argument cannot be drawn for inequality and growth.

Chapter 3

Data

This chapter aims to explain how data that is used for model estimation is obtained and processed. Section 3.1 characterizes the dependent and independent variables. Section 3.2 provides descriptive statistics thereof, and finally Section 3.3 details the treatment of missing data and spells out its consequences for the empirical analysis.

3.1 Variables

Within this section, I describe the process of assembling the dataset that is used in the empirical analysis.

Firstly, the sample of countries used comes directly from the list of development aid recipients as compiled by the Development Assistance Committee (OECD 2017). DAC oversees the distribution of aid with respect to the implementation of its long-term objectives including those of poverty reduction, and regularly reviews the list of eligible countries (OECD 2017). Due to limited data availability, not all listed countries are studied within the analysis, implications of which are commented on in Section 3.3. The final sample of countries is reported in Table A.1.

In order to specifically consider modern approaches to providing development aid and to assess its effect on income distribution, I focus on a period from 1999 to 2016. The year 1999 had a substantial impact on future aid allocation with the launch of the Comprehensive Development Framework, which foreshadowed the process of Poverty Reduction Strategy Papers (Bulíř & Hamann 2006; Lindner & Strand 2006). Furthermore, it is the year that marked the beginning of sizable increases of aid donations, as can be seen from Figure

2.1 and as is commented on in Section 2.1. Importantly, to avoid short-term fluctuations in the statistical data caused by the business or political cycles or any other temporary shocks, I construct three-year averages for all collected observations.

Secondly, for the dependent variable, data on income inequality is needed, for which the Gini coefficient is chosen. On a 0-to-100 scale, Gini coefficient measures how a country's income distribution deviates from perfect equality represented by 0. Due to the way it is calculated, it cannot provide full information on specific income distributions of the poorest or wealthiest segments of population. Also, different survey designs can obscure the results it provides, while estimation procedures of combining different databases together may cause it to be biased. On the other hand, unlike alternative measures such as poverty headcount index or the percentage of income held by a particular percentile of population, all segments of population are accounted for within the Gini coefficient. Importantly, it is the most commonly used measure of inequality, allowing the results of this analysis to be comparable with related literature.

As for the choice of a database for the Gini coeffient, there is a multitude of options including the Estimated Household Income Inequality assembled by a research group at the University of Texas (2016), the Standardized World Income Inequality Database by Solt (2016), the World Income Inequality Database by the United Nations (2018), or data by the World Bank (2018). However, none provides a perfectly balanced panel. Based on its broadest data availability in the selected time period, I work with the Standardized World Income Inequality Database by Solt (2016) which is also used in the studies by Herzer & Nunnenkamp (2012) and Suresh Babu *et al.* (2016). Based on this database, countries with no or just one observation of the Gini coefficient are excluded from the sample of ODA recipients. The resulting sample consists of 123 countries, wherein the minimum number of observations of the Gini coefficient is 5.

Though the Gini coefficient is the most often used measure, different indices are also considered in order to check for the robustness of the results. While Chong *et al.* (2009) utilizes poverty headcount index, poverty gap index, as well as their squares, I also gathered data on income held by the poorest as well as the wealthiest 20% alongside the aforementioned indices at different levels of income per day from the World Development Indicators (World Bank 2019b). However, availability of neither of these alternatives is sufficient to be used as

a dependent variable. Consequently, the Gini coefficient is used exclusively.

Thirdly, the independent variable of key interest is the amount of received development aid, for which data on the Official Development Assistance (ODA) is used (OECD 2018). ODA consists of transactions that are provided solely by official agencies with economic development and welfare of developing countries as their primary purpose. These flows must be of concessional character with loans counted only under specific criteria. ODA strictly excludes military expenditure, yet it treats relief of past loans as current aid unlike Net Aid Transfers, which are used by Herzer & Nunnenkamp (2012) or Nowak-Lehmann *et al.* (2012). While debt relief overestimates the size of actual aid flows, omitting it would result in underestimation of the overall cost imposed on donor countries. Specific donor motivation is key to understanding the differing approaches to development aid over the course of history and specially in recent years with the focus on poverty reduction (Bjørnskov 2010). As a result, the use of ODA is preferred and indeed in line with the examples of Collier & Dollar (2002), Chong *et al.* (2009), Bjørnskov (2010), Herzer & Grimm (2012), De Matteis (2013), Arndt *et al.* (2015), Berrittella (2017), or Kasuga & Morita (2018).

As is a usual practice, I work with development aid as a share of gross domestic product. While both the OECD (2018) as a source of data on ODA and the United Nations (2017) as a source of data on GDP provide data in both nominal and real terms, they choose different base years. Instead of scaling either of the variables to achieve alignment, nominal values are used to obtain the desired the ratio.

Fourthly, a set of control variables is employed in the analysis. To account for the Kuznets curve, a logarithm of real GDP per capita as well as its square are included as proposed by Herzer & Nunnenkamp (2012). Moreover, Burnside & Dollar (2000), Dalgaard *et al.* (2004) as well as Suresh Babu *et al.* (2016) suggest to include the logarithm of country's population since it is likely to affect the size of aid flows (Collier & Dollar 2002; Doucouliagos & Paldam 2013). In both cases, logarithms are used to account for the skewness of data. Data on GDP as well as population is obtained from the United Nations (2017).

Furthermore, an independent variable capturing the political environment of a given country is included. The reason for its inclusion is based on the expectation that country's politics influence how development aid, outcomes of the projects it finances, and benefits thereof are distributed among the population. Similarly to Arvin & Barillas (2002), I work with the democracy index

assessed by Freedom House (2018). This indicator comprises of two sets of ratings - one for political freedoms, and another for civil liberties, with the former employed in the analysis as it better reflects common definitions of democracy (Arvin & Barillas 2002). While the democracy index may not fully capture all aspects of the political environment as opposed to the Polity IV Index (used by Bjørnskov 2010) or the World Bank's Country Policy and Institutional Assessment (used by Collier & Dollar 2002), its main advantage is that it is very easily comparable across years and countries with a simple 1-to-7 scale. Furthermore, it is widely and freely available for all countries and years of the sample. Additionally, for the empirical analysis itself, the variable is scaled by being divided by seven.

Supplementary independent variables include trade as a percentage of GDP (as proposed by Bjørnskov 2010; Sharma & Abekah 2017), and a measure of urbanization (suggested by Berrittella 2017). Both can be expected to affect the income distribution of a given country, and a similar line of argument justifies the inclusion of a variable that would capture the level of education. For this purpose, different indicators were compared, including literacy rate that is included by Chong *et al.* (2009), with completion rate of primary school selected thanks to being most widely available whilst still strictly relevant. For all three, data from the World Development Indicators are utilized (World Bank 2019b).

Table 3.1: Grouping of countries

Income groups		Historical groups	
Least Developed	43	UK colonies	40
Other Low Income	1	French colonies	26
Lower Middle Income	35	Communist countries	28
Upper Middle Income	44		
Regional groups		**Restrictions**	
East Asia and the Pacific	19	Aid $\geq$1% and $\leq$30%	
Europe and Central Asia	18	on average	90
Latin America and	25	in all years	54
the Caribbean		Population on average	
Middle East and North Africa	11	less than one billion	121
South Asia	8	less than 50 million	106
Sub-Saharan Africa	42	less than 10 million	66

Finally, I control for regional differences and different stages of development using several dummy variables. As proposed by Bjørnskov (2010) as well as Arndt *et al.* (2015), I also distinguish between countries with a colonial past that is either related to the United Kingdom or France. Likewise, a dummy for countries that were or still are under a communist rule is constructed since their income distribution is generally different to other countries (Chong *et al.* 2009). Table 3.1 specifies the different groups of countries which are described using the proposed dummies.

Last but not least, I focus on countries that are at a risk of being a tax haven or being involved in money laundering or terrorist financing. First group of 31 countries includes those that appear on the EU's list of non-cooperative states or on its watchlist, based on their commitments on meeting criteria essential to not being considered as a tax haven, such as transparency and fair tax competition (European Parliament 2018). Second group of 36 countries pertains to high-risk states, i.e. those exposed to the threat of money laundering or terrorist financing, or otherwise regarded as potential international offshore financial centres (European Commission 2018).

Complete list of variables employed in the model together with their precise description and sources is available in Tables A.2 and A.3.

3.2 Descriptive statistics

In this section I focus on descriptive statistics of the variables employed within the analysis and describe how they differ among various subsets of the sample. Statistics of variables of interest are reported in Table 3.2.

A great variation of the Gini coefficient can be observed across countries, regions, and stages of development. Some of these trends can already be deduced from Figure 1.1. Lowest levels of inequality can be found in Europe and Central Asia with Belarus recording the lowest observation of all countries in the sample at the value of 23.60 in 2015. On the other hand, the greatest income inequality is present in Latin America and the Caribbean as well as in Sub-Saharan Africa with Namibia recording 62.60 in 1999. Interestingly, the variance of inequality among countries appears to be increasing with improving stages of development.

Similarly, there is a great diversity in the levels of received development aid. Most aid in terms of GDP flows on average to East Asia and the Pacific with Tuvalu receiving 139.89% of its GDP in ODA in 2015. Several countries

Table 3.2: Descriptive statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
Gini coeffient	1 708	41.87	7.01	23.6	62.6
ODA (mil. of USD)	2 200	604	1 029	-947	22 057
Aid as % of GDP	2 200	6.99%	11.01%	-2.45%	139.89%
Real GDP (mil. of USD)	2 214	135 141	569 069	26	9 507 063
Real GDP per capita	2 214	3 070	2 734	168	14 675
Population (thousands)	2 214	43 719	162 119	9	1 403 500
Policy	2 197	3.97	1.90	1	7
Trade as % of GDP	2 061	79.34%	35.67%	0.17%	311.35%
Urbanization	2 196	45.51%	19.23%	8.04%	91.63%
Completion rate	1 471	83.29%	21.84%	16.36%	186.05%

also functioned as net donors within the studied period, thus the lowest level of received foreign aid is -2.45% for Saint Lucia in 2004. It can be noted that countries with population below 10 million people collected on average more aid in terms of their GDP than those above this line, corresponding to the assertion that population size impacts the scale of aid (Collier & Dollar 2002; Doucouliagos & Paldam 2013). Furthermore, countries on the EU list for potential tax havens or offshore financial centres are on average given only half the development assistance of other countries.

3.3 Treatment of missing data

In this section I comment on the reasons why observations of certain variables are missing and what consequences it may have on the results.

Firstly, the issues of collecting data on the Gini coefficient are mainly connected to different survey designs and the prevailing general difficulty of gathering inequality data. There are also political reasons affecting the quality and availability of data as in the case of Democratic People's Republic of Korea, Somalia, or West Bank and Gaza. The central limitation in this regard is the need to exclude a total of 20 countries from the complete DAC List of ODA Recipients (OECD 2017). While politics help explain a significant proportion of these, the remaining countries are often small island nations, to which our empirical results may not be well applicable.

Besides, several observations of the ODA, urbanization, and policy are miss-

ing, specifically on Montenegro and Kosovo. This is however easily explained since these two countries gained independence within the studied period.

Finally, in case of completion rate of primary school, different indicators of a country's level of education were compared with this variable being most widely available whilst still strictly relevant. As the variable is often missing for single years only, taking the three-year averages for each country to some extent corrects for this issue. Assuming a steady trend as is reasonable for completion rate of primary school, instead of having only 66.44% of data available, I can work with 81.71%. Similarly for missing data on trade, the affected countries are spread among different stages of development as well as different regions, and thus they should not fundamentally bias the empirical results.

Chapter 4

Methodology

The model I am estimating has the following form:

$$gini_{it} = \beta_0 + \beta_1 aid_{it} + \mathbf{X}_{it}\beta_2 + \mathbf{Y}_i\beta_3 + u_{it},$$
$$i \in \{1, \ldots, 123\},\ t \in \{1, \ldots, 6\}$$

where *aid* represents the aforementioned ODA-to-GDP ratio.

$\mathbf{X}_{it}$ is used as a matrix of control variables that composes of logarithm of real GDP per capita, its square, logarithm of population, trade as a percentage of GDP, policy variable as well as its interaction with aid (suggested by Collier & Dollar 2002; Bjørnskov 2010), urbanization, and the completion rate of primary school.

Additionally, $\mathbf{Y}_i$ stands for a set of dummy variables representing stage of development, region, colonial or communist past. To prevent the dummy variable trap in the unrestricted model, *stage4* and *region2* are excluded, as suggested by Bjørnskov (2010) who also chooses the region of Europe to be hidden in the intercept. Last but not least, time dummies are added to account for a time trend within the data. Since I am working with three-year averages, there is a total of 6 time periods starting with 1999-2001 through to 2014-2016.

The model is assessed on all countries with various functional forms. Furthermore, having selected the most appropriate set of methods and functional forms, different subsets of countries are used for estimating the model.

The methods applied include both static and dynamic panel data estimators. Specifically for static models there is a choice between pooled ordinary least squares, first differencing, fixed effects estimation, and random effects estimation, limitations of which are described in Section 4.1. In order to be able to work with lagged variables to account for endogeneity, dynamic panel data

estimators are also employed, namely the Generalized Method of Moments, on which I comment in Section 4.2.

4.1 Static panel data estimators

In this section, different static methods are examined for their potential constraints in estimating the model.

Firstly, I focus on whether it is possible to use pooled OLS. In the equation above, the error term can be decomposed into two parts: an unobserved error term a_i and an idiosyncratic error v_{it}.

$$u_{it} = a_i + v_{it}$$

Pooled OLS therefore suffers from a built-in heteroskedasticity, unless there are no time-fixed effects a_i, i.e. no time-fixed differences between the individual countries that are not already captured in the dummy variables. This hypothesis can be tested against an alternative that a_i are present and thus so is heteroskedasticity using the Breusch-Pagan-Langrange Multiplier test for panel data. Having run the test for different functional specifications, the obtained p-values fall in a range between 8.66% and 8.74%; as a result, there is enough evidence to reject the null hypothesis at 95% level of confidence. Consequently, pooled OLS is not relied upon in the analysis.

A limitation of using this test is that it needs to be assumed that time-fixed effects, if present, are not correlated with the independent variables. In economic theory, such time-invariant variables can be found that are not fully captured by the explanatory variables yet they may be correlated with them. For example, distance from seashore and being a landlocked country in general is known to affect a country's income while certainly being time-fixed. Although this notion may render the Breusch-Pagan-Langrange Multiplier test ineffective, it alone answers the original question on the presence of time-fixed effects, and thus confirms the inappropriateness of using pooled OLS.

Similarly, random effects estimation assumes that the time-fixed effects are uncorrelated with independent variables. While the distance from seashore has already been mentioned, other examples may be found like being located in the tropics, or burdened by diseases such as malaria, though that can have changed in the selected time period. Again, both can be correlated with aid flows as well

as GDP per capita. While the results obtained using random effects estimation are reported, they must be approached with care.

Results of the Hausman test comparing random and fixed effects in their appropriateness are also stated; nevertheless, since the used data does not follow its asymptotic assumptions, appropriate caution is necessary. Still, it is to be noted that when estimating the model on all countries, its p-values range from 0.777 to 0.981, giving the preference for fixed effects estimation. This is contrary to the conclusion reached by Bjørnskov (2010) who preferred random effects in the majority of models. However, the study worked with a different model specification and indeed a different sample, focusing on a period between 1960 and 2000 when approaches to foreign aid were in a stark contrast to those today, as outlined in Section 2.1, which may help explain the heterogeneity.

Next, there may be problems related to using first differencing. Firstly, this method is best suited for residuals that follow a random walk. Nonetheless, the proposed model includes factors that can change over time and that may be serially correlated, though not as strongly as random walk. For example, the incidence of malaria, which has already been mentioned in relation to the structure of the unobserved effects, and its related death rate have been generally declining in the studied period (Roser & Ritchie 2017). Hence, it is not following a random walk, rendering first differencing less useful.

Secondly, the estimates may be biased due to the breach of strict exogeneity. Whereas the bias of fixed effects tends to 0 as T increases, the bias of first differencing is unaffected by T, and therefore substantially different estimates may be obtained with this method. To conclude, when comparing the outcomes of different models the magnitude of the estimates of first differencing must be interpreted carefully.

All in all, the use of pooled OLS is rejected for the analysis. Though results using first differencing and random effects are reported, fixed effects estimation shall be preferred in interpreting the results.

Last but not least, a problem left to assess is the presence of serial correlation in residuals. Because of a potential breach to strict exogeneity in data, the Durbin-Watson test is used. For each model, a p-value of less than 10^{-15} is obtained. Therefore, the null hypothesis that there is no serial correlation in residuals is rejected. To correct for this defect, similarly to Burnside & Dollar (2000), I construct standard errors robust to both this phenomenon as well as heteroskedasticity as proposed by Arellano.

4.2 Dynamic panel data estimators

It is not unreasonable to expect endogeneity in the data as inequality may be affecting the level of foreign aid that a country receives. Indeed, countries where high inequality is correlated with higher levels of foreign aid may be receiving more aid because they are more unequal or impoverished in the first place. In order to address the issue of endogeneity within the model, I turn to dynamic panel data estimators, namely the Generalized Method of Moments, which controls for the problem by adding lags of the dependent variable (Ullah *et al.* 2018).

When adding a lagged variable to the model, problems of serial correlation in errors arise. The Nickell bias causes estimates to be inconsistent, and specifically, this bias cannot be avoided by adding additional observations. Moreover, it is particularly disturbing for samples with short time periods, which is indeed the case. While also being present for independent identically distributed processes, it is ever-more severe when auto-correlation is present which the previous section has shown.

As a result, the dynamic model cannot be estimated using methods of fixed or random effects, and more advanced econometric methods must be employed. The proposed solution to this issue as recommended by Ullah *et al.* (2018) is the Generalized Method of Moments. It is designed for the context of short time periods with a large number of individuals which corresponds to the sample used. Furthermore, a linear relationship with lags of the dependent variable is required. The proposed model specification also meets criteria for the presence of time-invariant unobserved errors.

Following the work of Chong *et al.* (2009), GMM-system matrix is used as opposed to an ordinary one, and as further suggested, a two-step procedure is adopted which is asymptotically more efficient than its one-step counterpart. In doing so, consistent estimates of the model's parameters shall be obtained.

Attained estimates are subjected to the Sargan-Hansen test for over-identifying restrictions wherein under the alternative hypothesis, the model contains too many instruments. Moreover, auto-correlation is tested. While auto-correlation of order one is present by construction of the method, higher orders should not be observed, and if they are, the corresponding lags are not be appropriate instruments.

While adhering to these tests, instruments used in the estimation are all available lags of the Gini coefficient starting from its third lag together with

dummy variables for former British and French colonies and (formerly) communist countries, similarly to Chong *et al.* (2009). For reasons discussed in the previous section, robust errors are employed.

Chapter 5

Empirical Results

In this chapter, I turn to estimating the proposed model and interpreting results thereof. In Section 5.1, different methods and functional forms are applied to the entire sample. Next, in Section 5.2, it is tested if results differ when certain countries are excluded from the sample based on their population size or levels of aid received. Finally, in Section 5.3, I estimate the model on different subsets of the sample based on regional, income, and historical groups as well as for countries at risk of being a tax haven or an offshore financial centre.

5.1 Estimates for all developing countries

Within this section, different functional forms of the model and different methods that are outlined in Chapter 4 are compared when applied to the entire sample of 123 countries. Table 5.1 presents regression results for first differencing and for fixed effects, Table 5.2 for random effects and the Generalized Method of Moments.

Firstly, magnitude and significance of results can be compared across the different methods applied. While fixed and random effects estimation provide generally similar estimates of the parameters, first differencing stands in contrast to those. Reasons for this heterogeneity, related to the structure of errors as well as potentially being subjected to a bias, have already been outlined in Section 4.1. In comparison, for the Generalized Method of Moments, no explanatory variables with the exception of the first lag of the Gini coefficient are identified as statistically significant, similarly to Chong *et al.* (2009).

Table 5.1: Regression results

	First differencing			
	(1)	(2)	(3)	(4)
Aid	-0.387	-0.108	-0.233	0.135
	(0.530)	(0.460)	(1.167)	(1.958)
Log of real GDP		9.898***	10.750***	9.589**
		(2.912)	(3.465)	(3.704)
Log of real GDP squared		-0.655***	-0.704***	-0.647***
		(0.188)	(0.222)	(0.235)
Log of population		-1.087	-1.403	-1.193
		(1.331)	(1.336)	(1.642)
Trade			-0.002	-0.004
			(0.004)	(0.005)
Policy			-0.555*	-0.374
			(0.304)	(0.404)
Policy ∗ Aid			0.035	-1.689
			(2.395)	(3.969)
Urbanization				0.054
				(0.054)
Completion				0.010
				(0.007)
Constant	-0.282***	-0.222**	-0.232**	-0.637**
	(0.057)	(0.095)	(0.099)	(0.275)
	Fixed effects			
	(1)	(2)	(3)	(4)
Aid	-1.519	0.756	2.433	0.474
	(1.539)	(1.450)	(3.660)	(4.239)
Log of real GDP		13.372***	15.813***	16.860***
		(3.700)	(4.569)	(5.085)
Log of real GDP squared		-0.837***	-0.980***	-1.039***
		(0.243)	(0.294)	(0.336)
Log of population		-1.196	-1.784	-1.703
		(1.748)	(1.812)	(2.414)
Trade			-0.007	-0.007
			(0.006)	(0.007)
Policy			-1.441	-1.195
			(0.877)	(1.080)
Policy ∗ Aid			-2.261	-1.694
			(6.652)	(8.936)
Urbanization				0.054
				(0.077)
Completion rate				0.005
				(0.009)
Hausman test (p-value)	0.942	0.953	0.981	0.777

Note: *p<0.1; **p<0.05; ***p<0.01
Time dummies were used in each model.

Table 5.2: Regression results *(continued)*

	Random effects			
	(1)	(2)	(3)	(4)
Aid	-1.893	0.511	1.468	-1.752
	(1.512)	(1.454)	(3.627)	(4.116)
Log of real GDP		12.521***	14.565***	15.067***
		(3.449)	(4.226)	(4.408)
Log of real GDP squared		-0.772***	-0.886***	-0.909***
		(0.226)	(0.272)	(0.286)
Log of population		-0.101	-0.298	-0.294
		(0.287)	(0.284)	(0.314)
Trade			-0.007	-0.007
			(0.006)	(0.007)
Policy			-1.522*	-1.461
			(0.841)	(1.040)
Policy ∗ Aid			-0.798	1.301
			(6.203)	(8.652)
Urbanization				-0.001
				(0.050)
Completion rate				0.005
				(0.010)
Constant	37.027***	-12.221	-16.730	-19.683
	(0.678)	(14.585)	(17.711)	(17.951)
Hausman test (p-value)	0.942	0.953	0.981	0.777
	Generalized Method of Moments			
	(1)	(2)	(3)	(4)
First lag of Gini	1.214***	1.155***	1.148***	1.183***
	(0.084)	(0.087)	(0.104)	(0.124)
Aid	0.453	0.823	-10.942	4.231
	(0.782)	(2.015)	(12.370)	(17.149)
Log of real GDP		1.097	0.204	8.811
		(3.747)	(5.214)	(7.961)
Log of real GDP squared		-0.101	-0.065	-0.582
		(0.245)	(0.336)	(0.505)
Log of population		-0.004	-0.012	0.198
		(0.115)	(0.140)	(0.185)
Trade			-0.001	-0.002
			(0.003)	(0.003)
Policy			-1.281	0.077
			(1.515)	(2.343)
Policy ∗ Aid			20.022	1.420
			(21.907)	(34.520)
Urbanization				-0.003
				(0.024)
Completion rate				-0.004
				(0.006)
Sargan-Hansen test (p-value)	1.000	1.000	1.000	1.000
Autocorrelation test (1) (p-value)	0.005	0.020	0.044	0.038
Autocorrelation test (2) (p-value)	0.019	0.009	0.008	0.028

Note: *p<0.1; **p<0.05; ***p<0.01
Time dummies were used in each model together with dummies for different regions, stages of development, and colonial or communist past.

Next, the estimates for the individual parameters can be interpreted. For the key variable of interest - aid as a percentage of GDP, neither of the functional forms identifies sufficient evidence of the impact of development aid on income inequality, similarly to Arvin & Barillas (2002) and Chong *et al.* (2009). In other words, while foreign assistance does not in general worsen income distribution, neither does it improve it. Subsequently, the effect development aid has on the society must be spread across different segments thereof which results in the overall effect on inequality being insignificant. Therefore, these findings show that foreign aid is not appropriately targeted despite the pledges to focus on alleviating poverty.

For all static methods applied on the entire sample, there is a statistically significant relationship between the logarithm of GDP per capita and income inequality in the shape of the Kuznets curve. The approximate ceteris paribus turning point after which inequality falls with economic development can be calculated as follows:

$$\frac{\partial gini_{it}}{\partial \log(\text{real GDP per capita}_{it})} = \beta_A + 2\beta_B \log(\text{real GDP per capita}_{it}) = 0$$

$$\log(\text{real GDP per capita}_{it}) = -\frac{\beta_A}{2\beta_B}$$

$$\text{real GDP per capita}_{it} = e^{-\frac{\beta_A}{2\beta_B}}$$

where β_A is the parameter for $\log(\text{real GDP per capita}_{it})$ and β_B for the squared term.

Calculated estimates of turning points of the Kuznets curve for static methods are compiled in Table 5.3. Robust to method and functional form, I find estimates of the peak real GDP per capita between 1 600 and 4 000 USD, respectively between 2 900 and 4 000 USD when only taking into account fixed and random effects estimation for reasons described above. As compared to Bjørnskov (2010), who estimates a turning point between 4000 and 5000 USD, the results are generally lower; nonetheless, as discussed in Chapter 2, literature does not find robust evidence of the presence of the Kuznets curve overall. Furthermore, Bjørnskov (2010) worked with a different time period, namely years 1960-2000.

When applying the fixed effects estimate of model (3) to the sample of countries, on average 78 countries (63.4%) appear on the upward-sloping part of the curve, wherein these countries would be subject to increasing inequality when per capita income improves. Assuming a positive relationship between

Table 5.3: Turning points of the Kuznets curve

	(2)	(3)	(4)
First differencing	1 904	2 078	1 648
Fixed effects	2 953	3 203	3 340
Random effects	3 334	3 729	3 976

aid and real GDP per capita (Bornschier *et al.* 1978; Burnside & Dollar 2000; Dalgaard *et al.* 2004; Minoiu & Reddy 2009; Radelet & Bazzi 2012; Tezanos *et al.* 2013; Arndt *et al.* 2015; Kunofiwa 2018), these countries would then be harmed by development aid in terms of their inequality. On the other hand, 45 countries (36.6%) find themselves on the downward-sloping part and may thus benefit from foreign aid in terms of income distribution. Different positions of countries on the Kuznets curve could explain why a significant impact of aid on inequality is not identified overall, which shall become clearer when I turn to estimating the model on different subsets of the sample of countries.

5.2 Sensitivity to outliers

While countries within the sample have very different characteristics some of which are commented on in Section 3.2, results of the analysis for all countries may be obscured by assigning too much weight to the outliers, be it in terms of their population size or the amount of aid they receive. In this section, I examine the sensitivity of the results to these observations by excluding countries from the sample based on different criteria.

Chapter 4 has discussed why it may be preferred to use the method of fixed effects estimation in the analysis, which Section 5.1 has empirically confirmed. Within this section, I rely on this method while commenting how the coefficients and their significance vary when random effects estimation is used for low p-values of the Hausman test. At the same time, I continue to estimate the model using the Generalized Method of Moments, reporting its significant estimates other than those of the lagged variable.

Of the different functional forms specified in the previous section, further on I work with (3) which at once avoids over-specification of (4), identifies additional significant variables in several instances as opposed to (2), and finds support in literature.

Table 5.4: Sensitivity to population size

	Dependent variable:			
	Gini coefficient			
	all countries (1)	less than one billion (2)	between 10 and 50 million (3)	less than 10 million (4)
Aid	2.433	2.171	-20.382**	1.485
	(3.660)	(3.750)	(9.962)	(5.092)
Log GDP	15.813***	15.087***	19.242***	5.971
	(4.569)	(4.508)	(7.276)	(8.307)
Log GDP squared	-0.980***	-0.966***	-1.243**	-0.426
	(0.294)	(0.292)	(0.489)	(0.523)
Log population	-1.784	-1.880	0.149	-2.844
	(1.812)	(1.799)	(2.875)	(2.116)
Trade	-0.007	-0.009	-0.018	-0.012
	(0.006)	(0.007)	(0.014)	(0.008)
Policy	-1.441	-1.465*	-1.815	-2.893**
	(0.877)	(0.882)	(1.531)	(1.262)
Policy ∗ Aid	-2.261	-3.009	14.635	-0.816
Number of countries	123	121	40	66
Hausman test (p-value)	0.981	0.985	0.939	0.398
Kuznets curve	3 203	2 470	2 299	n.a.

Note: *p<0.1; **p<0.05; ***p<0.01
Time dummies were used in each model.

5.2.1 Sensitivity to population size

First, I turn to how outlying population size can affect the regression results. Within the sample, there are countries both extremely small (e.g. Tuvalu with an average of 10 248 inhabitants) and extremely large (namely China and India with population exceeding one billion). While existing literature does not take this issue into account, the samples chosen by scholars often exclude China despite including India (Chong *et al.* 2009; Bjørnskov 2010; Herzer & Nunnenkamp 2012). In the following analysis, several constraints to population size are constructed with boundaries set to one billion, 50 million, and 10 million citizens, results of which are reported in Table 5.4.

As for the estimates, when compared to the initial inclusion of all developing countries for which data is available, it can be noted that there is enough evidence for the presence of the Kuznets curve with the exception of the smallest countries. Furthermore, the turning points thereof are found to be highly sensitive to the sample used and are decreasing with the more restrictions there are placed on population size. In particular, by excluding China and

India only, the estimated peak of the Kuznets curve shrinks by over USD 700. As a result, more countries may find themselves on the downward-sloping part of the Kuznets curve and their inequality should be diminishing with additional aid.

This relationship is found in case of countries whose population lies between 10 and 50 million people where there is a significant negative effect of aid on inequality which corresponds to the general goals of providing foreign assistance. Looking at the composition of this group, around half of these countries are in Sub-Saharan Africa and about the same proportion belongs to the least developed countries in the world. In contrast, both these groups constitute approximately one third of the entire sample of countries and are thus give less weight in the original analysis. However, only 16 of these 40 countries have average real GDP per capita of more than USD 2 299, and only these are therefore on the downward-sloping Kuznets curve.

Moreover, the sensitivity analysis uncovers a significant negative effect of policy on inequality, though it is not robust to setting different constraints to countries' population. Interestingly, countries with lower degrees of freedom and political rights are expected to be more equal in income distribution. This stands contrary to the findings of Bjørnskov (2010) who used a different policy index nonetheless.

Overall, it can be concluded that the regressions are highly sensitive to the choice of sample and its restrictions. This already materializes when excluding the two largest countries, China and India, and must therefore be accounted for in further analysis.

5.2.2 Sensitivity to the size of aid flows

Following the example Bjørnskov (2010), countries with extremely small or extremely large aid inflows are excluded from the sample to test for its sensitivity. The boundaries to aid set by Bjørnskov (2010) are at least 1% and at most 30% of a country's GDP. Using these limits, I investigate countries whose inflows meet these criteria on average as well as countries who conform to them in each year, results for which are reported in Table 5.5.

In the previous subsection, it is noted that regression results are highly sensitive to the inclusion of China and India within the sample. Neither of these two countries meets the set criteria on aid inflows; therefore, additional sensitivity checks need not to be made in this regard.

Table 5.5: Sensitivity to the size of aid flows

	Dependent variable:		
	Gini coefficient		
		Aid of $\geq 1\%$ and $\leq 30\%$	
	all countries	on average	in all years
	(1)	(2)	(3)
Aid	2.433	4.534	11.651
	(3.660)	(6.461)	(11.931)
Log GDP	15.813***	7.189	3.187
	(4.569)	(5.315)	(6.711)
Log GDP squared	-0.980***	-0.426	-0.127
	(0.294)	(0.356)	(0.478)
Log population	-1.784	-1.116	-0.744
	(1.812)	(2.058)	(2.283)
Trade	-0.007	-0.012*	-0.016*
	(0.006)	(0.007)	(0.008)
Policy	-1.441	-1.658*	-2.142
	(0.877)	(0.911)	(1.497)
Policy $*$ Aid	-2.261	-4.371	-21.933
	(6.652)	(8.928)	(16.577)
Number of countries	123	90	54
Hausman test (p-value)	0.981	0.996	0.449
Kuznets curve	3 203	n.a.	n.a.

Note: *p<0.1; **p<0.05; ***p<0.01
Time dummies were used in each model.

Altogether, analysis of the impact of development aid on inequality is robust to restricting the size of aid flows as neither sample specification identifies a significant effect. Nonetheless, it is particularly sensitive in detecting evidence of the influence of other independent variables. In contrast, the analysis of Bjørnskov (2010) is robust to constraining the sample. However, it should be noted that this paper examines a different time period of years 1960-2000, and as is remarked in Chapter 2, approaches to foreign aid at the time were unlike those of the new millennium. While the difference may not fully capture the heterogeneous conclusions, it may help to partially explain them.

Specifically in this analysis, evidence for the Kuznets curve is no longer found to be statistically significant. Countries that are excluded from the sample belong mainly to the group of upper middle income countries. More importantly, the vast majority of countries that do comply with the criteria set to development aid are in fact countries with less than 10 million people. Consequently, in line with the findings of Subsection 5.2.1 it cannot be deduced whether the disappearance of the Kuznets curve is due to the size of aid flows

or due to the countries' population size below the threshold of 10 million.

Furthermore, additional variables are found to be significantly different from zero. Namely, a negative coefficient for trade implies that with increasing proportion of trade in terms of GDP, inequality declines. And thus in this particular sample specification, trade openness proves to be beneficial for fairer income distribution, as is also identified by Bjørnskov (2010) and Sharma & Abekah (2017). Moreover, in one instance a negative impact of policy is uncovered similarly to before.

To conclude, the presence of the Kuznets curve together with the effect of other variables may be conditioned on a country's level of aid inflows. However, this sensitivity may be explained through the dependence on population size of countries within the sample, in particular to the threshold of 10 million people.

5.3 Estimates on different subsets

Within this section, different subsets of the sample are investigated based on the countries' income, region, historical origins or inclusion on the EU's lists for non-cooperative or high-risk countries. Bearing in mind the implications of the sensitivity analysis, similar methodological approach is applied. Consequently, fixed effects estimation is used unless advised otherwise through the Hausman test, and the Generalized Method of Moments is reported upon yielding significant estimates other than those of the lagged variable.

5.3.1 Income groups

Referring to the DAC List of ODA Recipients (OECD 2017), there are four distinct income groups within the sample, depending on their gross national income as of 2016. Namely, these are least developed, other low income, lower middle income and upper middle income countries. Nonetheless, the group of other low income countries only consists of two countries - Zimbabwe and the Democratic People's Republic of Korea. Since the latter is excluded from the sample due to insufficient data availability, there is only one country left within this income group, and hence it is studied together with least developed countries.

Table 5.6 lists the regression results for estimating the model on different income groups using fixed effects estimation. The analysis includes the outlying observations of India (among lower middle income countries) and China

Table 5.6: Fixed effects on income groups

	Dependent variable:			
	Gini coefficient			
	all countries	least developed	lower middle income	upper middle income
	(1)	(2)	(3)	(4)
Aid	2.433	0.024	22.521	11.037
	(3.660)	(3.464)	(16.928)	(20.211)
Log GDP	15.813***	7.483	8.755	17.172
	(4.569)	(7.681)	(12.197)	(16.178)
Log GDP squared	-0.980***	-0.481	-0.245	-1.081
	(0.294)	(0.536)	(0.803)	(0.928)
Log population	-1.784	-5.125	6.442**	-10.302***
	(1.812)	(3.373)	(3.175)	(3.422)
Trade	-0.007	-0.0002	-0.011	-0.006
	(0.006)	(0.006)	(0.010)	(0.011)
Policy	-1.441	-0.791	-3.135**	0.680
	(0.877)	(1.363)	(1.568)	(1.718)
Policy $*$ Aid	-2.261	0.244	-16.404	-23.589
	(6.652)	(6.127)	(23.435)	(24.434)
Number of countries	123	44	35	44
Hausman test (p-value)	0.981	0.810	0.367	0.995
Kuznets curve	3 203	n.a.	n.a.	n.a.

Note: *p<0.1; **p<0.05; ***p<0.01
Time dummies were used in each model.

(among the higher middle income countries) for excluding these observations changes neither the magnitude, nor the statistical significance of the variables involved. Furthermore, compositions of each of the income groups and of the entire sample are alike in terms of the occurrence of countries with less than 10 million inhabitants.

Again, it can be observed that there is no evidence for neither the influence of development assistance, nor the presence of the Kuznets curve. Countries within the same income group can be expected to have similar positions on the curve with respect to the estimated turning point; as a result, the Kuznets curve is not found for them individually. Overall, there is no significant impact of real GDP per capita on inequality within income groups. Similarly, existing literature has not reached a consensus on the topic with a range of papers supporting positive, negative as well as more complicated relationships between economic growth and inequality (Shin 2012).

Unlike in the unrestricted sample, there is evidence of the effect of logarithm of a country's population for lower and upper middle income countries. While

inequality increases with population growth in lower middle income countries, it falls in case of upper middle income countries. A negative relationship is also supported by Deaton & Paxson (1997), who based on life cycle theory estimate that inequality rises with decreasing population growth for data from the US, UK, Taiwan, and Thailand. While per capita income of the first three exceeds the thresholds set by the OECD (2017), Thailand features in the sample as an upper middle income country, wherefore findings of this paper may be relevant to upper middle income countries in particular and not countries with lower levels of per capita gross national income.

Again in one sample specification, a negative effect of policy on inequality is uncovered. While not robust to different income groups, the finding is in line with those of Subsections 5.2.1 and 5.2.2.

Estimating the model on different income groups using the Generalized Method of Moments yields statistically significant results for several independent variables, and it is therefore reported in Table 5.7.

Firstly, for least developed countries there is a statistically significant impact of both foreign aid and policy on inequality in these countries. From these the partial effect of aid alone can be calculated:

$$\frac{\partial gini_{it}}{\partial aid_{it}} = \beta_{aid} + \beta_{policy*aid} * policy_{it} = -8.754 + 19.135 * policy_{it}$$

Based on this calculation the turning point of policy after which the effect becomes positive is estimated to be 0.457, which translates to 3.202 of policy rating after rescaling to the original 1-to-7 scale. Within the sample of least developed countries, political rights of seven countries are on average rated better than that and they therefore experience a negative effect of aid on inequality. In the remaining 37 countries, increasing foreign aid flows is associated with deepening inequality. This corresponds to the conclusion of Arvin & Barillas (2002) on the impact on poverty reduction in low income countries. However, it can be noted that the inequality-reducing effect of development aid is associated with improvements of the political environment. This corresponds to the supplementary aims of foreign assistance to facilitate democratic reforms (Moschella & Weaver 2014).

Following the same procedure, the partial effect of policy is estimated at $-1.662 + 19.135 * aid_{it}$, yielding a turning point of 1.79% of aid inflows with respect to GDP. Of the 44 countries, only Angola and Myanmar receive on average less aid; thus the majority of least developed countries is subject to

Table 5.7: GMM on income groups

	Dependent variable:			
	Gini coefficient			
	all countries	least developed	lower middle income	upper middle income
	(1)	(2)	(3)	(4)
First lag of Gini	1.148***	1.081***	1.083***	0.975***
	(0.104)	(0.053)	(0.061)	(0.033)
Aid	-10.942	-8.754*	1.611	40.798
	(12.370)	(5.012)	(9.785)	(26.209)
Log GDP	0.204	4.923	-10.596	26.178
	(5.214)	(4.187)	(23.192)	(21.350)
Log GDP squared	-0.065	-0.342	0.707	-1.518
	(0.336)	(0.293)	(1.547)	(1.221)
Log population	-0.012	0.180	0.282*	0.077
	(0.140)	(0.169)	(0.171)	(0.129)
Trade	-0.001	0.001	-0.002	0.001
	(0.003)	(0.004)	(0.004)	(0.004)
Policy	-1.281	-1.662*	0.656	0.157
	(1.515)	(0.873)	(1.816)	(0.650)
Policy $*$ Aid	20.022	19.135**	0.304	-39.136
	(21.907)	(8.925)	(20.256)	(53.133)
Number of countries	123	44	35	44
Sargan-Hansen test (p-value)	1.000	1.000	1.000	0.995
Autocorrelation test (1) (p-value)	0.044	0.012	0.309	0.698
Autocorrelation test (2) (p-value)	0.008	0.363	0.150	0.067

Note: *p<0.1; **p<0.05; ***p<0.01
Time dummies were used in each model.

a positive effect of policy on inequality. In other words, worse policy rating creates a more unequal society. Contrary to the results hitherto, this finding corresponds to that of Bjørnskov (2010).

Similarly to results of the fixed effects estimation, increasing a country's population is expected to raise inequality in lower middle income countries. However, after excluding India from the sample, the coefficient is no longer significantly different from zero. As for sensitivity for including China in the sample of upper middle income countries, estimates change in magnitude though not in significance.

All in all, it can be concluded that the effects of both aid and other variables depend on the income group and can differ in significance, magnitude as well as sign. As for the main variable of interest, there is a generally positive effect of aid on inequality in the majority of least developed countries, though it is not robust to using a different method.

Table 5.8: Fixed effects on regional groups

	Dependent variable:					
	Gini coefficient					
	(1)	(2)	(3)	(4)	(5)	(6)
Aid	1.751	3.318	34.168	262.594**	-33.158	1.884
	(3.330)	(38.890)	(32.226)	(111.134)	(23.057)	(4.384)
Log GDP	6.042	-0.333	-10.045	105.991***	-8.407	1.801
	(13.733)	(10.648)	(30.524)	(31.673)	(21.025)	(9.024)
Log GDP squared	-0.354	-0.092	0.322	-5.882***	0.922	-0.035
	(0.857)	(0.647)	(1.729)	(1.915)	(1.334)	(0.641)
Log population	-3.562	-2.256	2.792	11.267*	-8.341	-5.165
	(6.503)	(4.490)	(6.280)	(5.535)	(17.414)	(3.966)
Trade	0.008	-0.005	-0.027	-0.035	0.031	-0.004
	(0.010)	(0.015)	(0.017)	(0.030)	(0.050)	(0.009)
Policy	-4.332**	1.145	1.302	3.397	-2.452	-0.836
	(1.753)	(3.416)	(3.513)	(3.177)	(3.492)	(1.316)
Policy ∗ Aid	7.871	-24.537	-63.899	-296.552**	47.414	-5.156
	(4.908)	(54.824)	(57.086)	(124.631)	(39.598)	(9.030)
Number of countries	19	18	25	11	8	42
Hausman test (p-value)	1.000	n.a.	0.000	n.a.	n.a.	0.958
Kuznets curve	n.a.	n.a.	n.a.	8 182	n.a.	n.a.

Note: *p<0.1; **p<0.05; ***p<0.01
Time dummies were used in each model.

5.3.2 Regional groups

Based on a categorization by the United Nations (2018), I distinguish between six different regions: (1) East Asia and the Pacific, (2) Europe and Central Asia, (3) Latin America and the Caribbean, (4) Middle East and North Africa, (5) South Asia, and (6) Sub-Saharan Africa. This division results in different sample sizes for individual regions that range from 8 countries in South Asia to 42 in Sub-Saharan Africa. Subsequently, only fixed effects estimation can be used on certain samples without the loss of time dummies or certain explanatory variables.

Table 5.8 summarizes the regression results for individual regions. With several exceptions, generally there are only a few variables which have a significant impact on inequality on regional level, yet none is found robustly across all subsamples.

As for the key variable of interest, a significant relationship is identified on the sample of Middle East and North Africa. In particular, following the procedure outlined in Subsection 5.3.1 the partial effect of aid is estimated as $262.594 - 296.552 * policy_{it}$, turning point of which is a policy rating of 0.885,

rescaled as 6.198. Countries rated better than that (in 2016 all except Syria and Yemen) would thus experience a negative impact of aid on inequality. Their income distribution would therefore become fairer with additional aid inflows. On the contrary, Sharma & Abekah (2017) estimated a positive effect for Africa. Nonetheless, North Africa and Middle East is one of the generally most equal regions of the world whereas Sub-Saharan Africa demonstrates second most unequal income distribution. Looking alone at the distribution of Gini coefficients among countries, the region can be considered as more closely related to that of East Asia and the Pacific, for which Arvin & Barillas (2002) coincidentally also estimate a negative effect of aid on inequality.

Continuing with the case of Middle East and North Africa, the region demonstrates presence of the Kuznets curve. Its turning point of USD 8 182 is both well above the previously estimated turning points for different subsets and above the average per capita GDP of all countries in this region, thus positioning them on the curve's upward-sloping part. Consequently, increases in income of Middle Eastern and North African countries bring about greater degree of income inequality.

Furthermore, there is positive impact of population growth as well as a statistically significant effect of policy on inequality. Since all countries within this region receive non-negative amounts of foreign aid, all experience rising levels of inequality with improvements in policy rating.

As for other regions, in East Asia and the Pacific a negative effect of policy on inequality is estimated. Therefore, improving a country's policy rating is associated with rising income inequality. This finding, though lower in magnitude, is robust to excluding China from the sample. Similarly the results are robust to excluding India from the sample of South Asian countries, wherein all estimates remain statistically insignificant.

Last but not least, a preference for random effects estimation is found in case of Latin America with a very low p-value of the Hausman test. Nonetheless, no additional explanatory variables are identified as significantly different from zero when using this method instead.

To conclude, there are no robust findings across all regions, though a generally negative impact of aid on inequality is determined in Middle East and North Africa. This region also manifests the presence of the Kuznets curve despite all its countries being on its upward-sloping part.

Table 5.9: Fixed and random effects on historical groups

	Dependent variable:		
	Gini coefficient		
	British colonies	French colonies	Communist countries
	RE	RE	FE
	(1)	(2)	(3)
Aid	-0.417	21.662*	-3.370
	(7.619)	(12.137)	(7.625)
Log GDP	-4.073	-5.974	-0.374
	(8.215)	(11.349)	(10.211)
Log GDP squared	0.427	0.436	-0.037
	(0.570)	(0.799)	(0.623)
Log population	-0.239	-2.163*	3.502
	(0.542)	(1.261)	(3.068)
Trade	0.006	-0.016	0.006
	(0.010)	(0.016)	(0.010)
Policy	-0.586	1.538	-1.140
	(1.183)	(1.147)	(2.146)
Policy ∗ Aid	-2.747	-27.250	1.858
	(9.762)	(23.149)	(10.479)
Constant	53.577*	95.859**	
	(28.911)	(46.815)	
Number of countries	40	26	28
Hausman test (p-value)	0.006	0.000	0.985

Note: *p<0.1; **p<0.05; ***p<0.01
Time dummies were used in each model.

5.3.3 Historical groups

Having examined the impact of dividing the sample among different income and regional groups, another factor that can influence how country's aid flows interact with inequality is its historical endowments, wherein ties to British or French law and colonial rule or being a (post-)communist country are often cited (Chong *et al.* 2009; Bjørnskov 2010; Arndt *et al.* 2015). It should be noted that unlike in the previous grouping where a particular country can only belong to one region or income group, there is a certain extent of duplication within this category. For example, the Republic of Vanuatu was managed through an Anglo-French condominium before claiming independence on both countries in 1980.

Regression results presented in Table 5.9 show a significant positive effect of foreign aid on inequality in former French colonies. 15 of these countries (58%) are located in the region of Sub-Saharan Africa. Although a significant

impact is not estimated in this region in Subsection 5.3.2, there is support for its positive sign in the existing literature (Sharma & Abekah 2017).

Furthermore, former French colonies demonstrate a significant negative relation to logarithm of population. In other words, population growth is associated with fairer income distribution within a country. As was mentioned previously, this is in line with the findings of Deaton & Paxson (1997), though while the paper only studied four countries, neither of them had French law origins.

The stated findings and the significance of results is robust to the inclusion of countries with extremely large population, i.e. India among the sample of former British colonies, respectively China among communist countries. Additionally, each of the historical groups has a representation of countries with population below 10 million similar to that of the entire sample.

Next, estimates of the Generalized Method of Moments are reported in Table 5.10 as additional explanatory variables are identified as significantly different from zero.

Unlike for fixed and random effects estimation, significant impact of aid is not found in countries with French law origins, but in British instead. In particular, the partial effect of aid is estimated at $-7.443 + 12.941 * policy_{it}$ with a turning point of 0.575, rescaled to a policy rating of 4.026. Since political rights are rated on a 1-to-7 scale, this value represents the approximate point separating free and not free countries.[1] Of the 40 former British colonies within the sample, 17 find themselves above this value and are therefore subject to a positive effect of aid on inequality. On the other hand, the remaining 23 supposedly free countries experience improvements in their income distribution with additional aid inflows. This is contrary to the results of Bjørnskov (2010) who estimated a positive effect in democracies whereas autocracies demonstrated a negligible impact. However, this finding is aligned with the aim to incentivize democratic reforms in emerging economies (Moschella & Weaver 2014).

Upon excluding India from the sample, the partial effect of aid changes to $13.810 * policy_{it}$. Since policy ratings only attain positive values, all countries thus manifest a positive impact, i.e. worsening inequality with additional aid inflows. Though this corresponds to the sign estimated by Bjørnskov (2010), the effect is stronger for higher policy ratings, that is in autocracies as opposed

[1] It is only an approximation as Freedom House (2018) distinguishes between three categories of countries based on a combined rating of political rights and civil liberties: free (up to 2.5), partly free (between 3.0 and 5.0), and not free countries (over 5.5).

Table 5.10: GMM on historical groups

	Dependent variable:			
	Gini coefficient			
	British colonies		French	Communist
	all	without India	colonies	countries
	(1)	(2)	(3)	(4)
First lag of Gini	1.022***	1.024***	1.060***	1.118***
	(0.026)	(0.021)	(0.057)	(0.039)
Aid	-7.443*	-8.033	-11.970	10.621
	(4.335)	(5.058)	(13.766)	(21.175)
Log GDP	5.373***	5.430***	13.048**	-9.271
	(1.789)	(1.595)	(6.610)	(7.893)
Log GDP squared	-0.345***	-0.349***	-0.860*	0.633
	(0.114)	(0.101)	(0.454)	(0.522)
Log population	0.097**	0.079	0.374*	-0.192
	(0.039)	(0.049)	(0.221)	(0.151)
Trade	-0.003	-0.003	-0.00003	0.002
	(0.002)	(0.002)	(0.005)	(0.004)
Policy	-0.934***	-0.919**	-1.993	1.243
	(0.310)	(0.370)	(1.353)	(1.787)
Policy $*$ Aid	12.941**	13.810*	20.931	-12.647
	(6.528)	(7.050)	(21.987)	(25.733)
Observations	40	39	26	28
Sargan-Hansen test (p-value)	0.997	0.995	1.000	1.000
Autocorrelation test (1) (p-value)	0.504	0.626	0.183	0.232
Autocorrelation test (2) (p-value)	0.434	0.299	0.245	0.563
Kuznets curve	2 431	2 387	1 977	n.a.

Note: *p<0.1; **p<0.05; ***p<0.01
Time dummies were used in each model.

to democracies. However, it must be noted that this paper works with a different policy variable and indeed a rating of the state of political rights of a country cannot fully capture its degree of democracy.

In both these instances, policy significantly influences income distribution with a partial effect of $-0.934 + 12.941 * aid_{it}$ when India is included in the sample. This yields a turning point of 7.21% in aid flows with respect to GDP. Consequently, for 13 countries who receive more in foreign assistance, worsening state of political rights implies greater income inequality, while the opposite is true for the remaining 27.

Next, both former British and French colonies demonstrate the presence of the Kuznets curve. Despite their peaks being below those estimated on the entire sample in Section 5.1, all are within a permissible logical range. Robust to the inclusion of India, exactly half of formerly British colonies is on the

downward-sloping part of the curve who thus benefit from economic growth in terms of fairer income distribution. In comparison, only 7 of 26 countries with French law origins are so positioned, despite a considerably lower turning point of the Kuznets curve. Indeed, former French colonies have on average only slightly above half the real per capita GDP of British colonies within the used sample, and a majority of them is considered least developed according to the OECD (2017).

As for the effect of population growth, it is estimated as positive for countries of either colonial origin. Nonetheless, it is not robust to excluding India from the sample. A positive impact is contrary both to the previous findings using fixed and random effects estimation and to the aforementioned work of Deaton & Paxson (1997). The disappearing effect in former British colonies is particularly interesting in the context of this paper, which focused on the UK and the US alongside Taiwan (a former Japanese colony) and Thailand (a country that has never been colonized).

Finally, on a sample of (formerly) communist countries, no explanatory variable is concluded to have a significant impact on inequality in either of the methods used. Furthermore, this result persists after omitting China from the sample.

To summarize, both former French and British colonies demonstrate a significant and generally positive impact of aid on inequality. However, neither is robust to using different methods, and moreover, results for British colonies depend on the quality of political rights as well as on whether India is included in the studied sample. Similarly other independent variables are highly sensitive to the method used.

5.3.4 Potential tax havens and offshore centres

Unlike authors of the existing literature on the topic, I also investigate how a country's lacking regulation in financial transparency and tax optimisation might affect the relation between aid and inequality. To this end, various lists compiled by the European Union are used to identify two distinct subsets of the sample. First relates to countries with a potential to be a tax haven who have not taken sufficient steps to refute the assessment or are continuously monitored. Second separates high-risk countries who could be home to money laundering, terrorist financing or other offshore financial activities.[2]

[2]Full description with corresponding sources is available in Table A.3.

Table 5.11: Fixed and random effects on potential tax havens and offshore centres

	Dependent variable:		
	Gini coefficient		
	Non-cooperative countries	High-risk countries	
		all	without China
	RE	FE	FE
	(1)	(2)	(3)
Aid	1.498	7.968	4.735
	(11.633)	(13.903)	(13.723)
Log GDP	22.751***	18.623***	17.900***
	(7.860)	(6.592)	(5.686)
Log GDP squared	-1.621***	-1.115***	-1.138***
	(0.471)	(0.394)	(0.354)
Log population	-1.058*	-3.231	-3.308***
	(0.551)	(3.218)	(0.535)
Trade	-0.002	-0.004	-0.006
	(0.009)	(0.011)	(0.011)
Policy	-0.888	-0.779	-0.585
	(1.175)	(1.044)	(0.983)
Policy ∗ Aid	-23.880	-13.319	-11.058
	(21.062)	(15.744)	(15.448)
Constant	-17.320		
	(35.058)		
Number of countries	31	36	35
Hausman test (p-value)	0.000	0.601	0.345
Kuznets curve	1 116	4 223	2 595

Note: *p<0.1; **p<0.05; ***p<0.01
Time dummies were used in each model.

From the regression results presented in Table 5.11, a conclusion can be drawn that there is no significant impact of aid on inequality within these subsets. These results correspond to the analysis of the unrestricted sample of all countries from Section 5.1. Similarly to that, presence of the Kuznets curve is identified in each of the sample specification, though with very different estimates of the peaks. In particular, the turning point for non-cooperative countries is considerably lower than that of high-risk countries despite the fact that the former earn on average more per capita income than the latter. Subsequently, all countries listed as non-cooperative find themselves on the downward-sloping part of the curve, and thus benefit from economic growth in terms of fairer income distribution. On the other hand, 23 (64%) high-risk countries experience the opposite, even though there is a substantial overlap of the two groups.

Interestingly, the peak of the Kuznets curve as well as evidence for the effect of population size are greatly sensitive to the presence of China in the sample. With an estimated negative sign corresponding to Deaton & Paxson (1997), population growth is associated with fairer income distribution in both non-cooperative and high-risk countries, conditioned on omitting China.

Overall, there is no evidence for the impact of development assistance alone though the Kuznets curve is identified in both potential tax havens and offshore financial centres. Unlike in the analysis of the entire sample though, a negative effect of population growth is found when excluding China from the set.

Chapter 6

Conclusion

Inequality presents an alarming issue facing the world today, with consequences both moral and practical as it can spark civil unrest and hinder economic development. In particular, the highest levels of disparity are found in developing countries, which the international community addresses by providing development aid. However, it was not until the turn of the millennium that its allocation began to pay attention to the specific income distribution in developing countries by pledging to end poverty. Despite these vows, the effect of aid on inequality receives very scarce attention in literature. Moreover, related studies detect mixed evidence thereon (Collier & Dollar 2002; Chong *et al.* 2009; Bjørnskov 2010; Herzer & Nunnenkamp 2012, among others).

Therefore in this study, I have built a model to estimate the relationship between foreign aid and income inequality in developing countries. The specific contribution of this study consists of focusing on modern approaches to development assistance which have changed considerably since 1999 (Bulíř & Hamann 2006). Employing data for 123 developing countries over the period 1999-2016, I have controlled for the potential effects of the Kuznets curve, population size, political environment as well as other variables that may influence income distribution. In doing so, I have utilized both static and dynamic panel data techniques, namely first differencing, fixed effects estimation, random effects estimation, and the Generalized Method of Moments. Sensitivity of the results has also been tested for varying size of population as well as aid inflows.

The main results are the following: (i) Foreign assistance neither significantly improves nor worsens the level of income inequality. The finding is robust to using different methods and functional forms of the model as well as to applying various sensitivity checks, and it is consistent with the work of

Arvin & Barillas (2002) and Chong *et al.* (2009). Nonetheless, estimating the model on specific subsets of countries in the sample yields different, statistically significant results. (ii) Development aid improves income distribution in the region of Middle East and North Africa as well as for countries with a population between 10 and 50 million people, corresponding to the goal to lessen the degree of income inequality in the world. (iii) The impact is further found to be decreasing with improving political environment for the least developed countries as well as former British colonies, aligned with the aim to incentivize political reforms and the advancement of democracy in emerging economies (Moschella & Weaver 2014). (iv) Contrary to the efforts to reduce inequality, a positive effect is detected in former French colonies, though to some extent this is consistent with the findings of Sharma & Abekah (2017).

Additionally, several other variables have been found to significantly impact inequality in emerging economies. While sensitive to the specific method applied and subset of countries used, weak evidence has been identified in support of the presence of the Kuznets curve, similarly to Chen (2003) and Bjørnskov (2010). Interestingly, when real per capita GDP has been detected to affect income distribution, it has always been in the shape of the Kuznets curve. Furthermore and perhaps contrary to expectations, it has been shown that improvements in the area of political rights are generally associated with worsening income inequality, occasionally depending on the level of development aid received. Last but not least, mixed evidence is found for the effect of population size while the overall results exhibit a high degree of sensitivity to the inclusion of extremely large countries.

These findings have important implications for aid allocation. While development aid is not in general concluded to curb income distribution, neither is it found to improve it. Subsequently, it must be influencing all layers of the society equally for the overall effect on inequality to remain insignificant. Therefore, these findings show that foreign aid is not appropriately targeted, despite the pledges to focus on alleviating poverty and yet in line with the conclusions of Collier & Dollar (2002) and Kasuga & Morita (2018). As a result, a reassessment of the specific allocation mechanisms may be needed to uncover the source of the problem. Deeper insights may be gained by distinguishing different forms of aid and separating the effect of project-specific and general donations, which presents a potential area for future research.

Furthermore, certain policy recommendations can be drawn from the influence of political environment on the effect of development aid in several in-

stances in that improvements in the area facilitate declines in income inequality. Specifically, support for democratic reforms and advancement of political rights shall be more emphasised in the least developed countries and former British colonies.

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Appendix A

Appendix

Table A.1: List of countries

Afghanistan	Dominica	Liberia	Senegal
Albania	Dominican	Macedonia	Serbia
Algeria	Republic	Madagascar	Sierra Leone
Angola	Ecuador	Malawi	Solomon Islands
Argentina	Egypt	Malaysia	South Africa
Armenia	El Salvador	Maldives	Sri Lanka
Azerbaijan	Ethiopia	Mali	St. Lucia
Bangladesh	Fiji	Mauritania	St. Vincent and
Belarus	Gambia	Mauritius	the Grenadines
Belize	Georgia	Mexico	Sudan
Benin	Ghana	Micronesia	Suriname
Bhutan	Grenada	Moldova	Swaziland
Bolivia	Guatemala	Mongolia	Syria
Bosnia and	Guinea	Montenegro	Tajikistan
Herzegovina	Guinea-Bissau	Morocco	Tanzania
Botswana	Guyana	Mozambique	Thailand
Brazil	Haiti	Myanmar	Timor-Leste
Burkina Faso	Honduras	Namibia	Togo
Burundi	Chad	Nepal	Tonga
Cambodia	China	Nicaragua	Tunisia
Cameroon	India	Niger	Turkey
Cape Verde	Indonesia	Nigeria	Turkmenistan
Central African	Iran	Pakistan	Tuvalu
Republic	Iraq	Panama	Uganda
Colombia	Jamaica	Papua	Ukraine
Comoros	Jordan	New Guinea	Uzbekistan
Congo	Kazakhstan	Paraguay	Vanuatu
Costa Rica	Kenya	Peru	Venezuela
Cote d'Ivoire	Kosovo	Philippines	Vietnam
Democratic	Kyrgyzstan	Rwanda	Yemen
Republic of	Laos	Samoa	Zambia
the Congo	Lebanon	Sao Tome	Zimbabwe
Djibouti	Lesotho	and Principe	

Table A.2: List of variables and their sources

Gini coefficient	Estimate of Gini index of inequality in equivalized (square root scale) household disposable (post-tax, post-transfer) income. Source: Solt (2016).
ODA	Official Development Assistance in USD at current prices. ODA covers flows to countries on the DAC list of ODA recipients (OECD 2017). Transactions that are counted in the Official Development Assistance must by provided by official agencies with economic development and welfare of developing countries as their primary purpose. These flows must be of concessional character with loans counted only under specific criteria. ODA treats relief of past loans as current aid but strictly excludes military expenditure. Source: OECD (2018).
GDP	Gross domestic product in USD at current prices. Source: United Nations (2017).
Real GDP	Gross domestic product in USD at constant prices with 2010 as base year. Source: Ibidem.
Population	Population of a given region as of July 1 of a given year. Source: Ibidem.
Trade	Trade as a percentage of GDP. Source: World Bank (2019b).
Urbanization	Urban population as a percentage of total. Source: Ibidem.
Completion rate	Completion rate of primary school as a percentage of total population of the relevant age group. Source: Ibidem.
Policy	Political rights, measured on a one-to-seven scale, with one representing the highest degree of freedom and seven the lowest. Source: Freedom House (2018).
stage1	Dummy equals one for Least Developed Countries according to the DAC List of ODA Recipients effective for reporting on 2018, 2019 and 2020 flows, zero otherwise. Source: OECD (2017).
stage2	Dummy equals one for Other Low Income Countries (per capita GNI $\leq$ USD 1 005 in 2016) according to the DAC List of ODA Recipients effective for reporting on 2018, 2019 and 2020 flows, zero otherwise. Source: Ibidem.
stage3	Dummy equals one for Lower Middle Income Countries and Territories (per capita GNI USD 1 006 - 3 955 in 2016) according to the DAC List of ODA Recipients effective for reporting on 2018, 2019 and 2020 flows, zero otherwise. Source: Ibidem.

Table A.3: List of variables and their sources *(continued)*

stage4	Dummy equals one for Upper Middle Income Countries and Territories (per capita GNI USD 3 955 - 12 235 in 2016) according to the DAC List of ODA Recipients effective for reporting on 2018, 2019 and 2020 flows, zero otherwise. Source: Ibidem.
region1	Dummy equals one for the region of East Asia and the Pacific, zero otherwise. Source: United Nations (2018).
region2	Dummy equals one for the region of Europe and Central Asia, zero otherwise. Source: Ibidem.
region3	Dummy equals one for the region of Latin America and the Caribbean, zero otherwise. Source: Ibidem.
region4	Dummy equals one for the region of Middle East and North Africa, zero otherwise. Source: Ibidem.
region5	Dummy equals one for the region of South Asia, zero otherwise. Source: Ibidem.
region6	Dummy equals one for the region of Sub-Saharan Africa, zero otherwise. Source: Ibidem.
British colonies	Dummy equals one for former colonies of the United Kingdom, zero otherwise.
French colonies	Dummy equals one for former colonies of France, zero otherwise.
Communist countries	Dummy equals one for (formerly) communist countries, zero otherwise.
Non-cooperative countries	Dummy equals one for countries that appear either on the list of non-cooperative countries or on the watch list, zero otherwise. Non-cooperative countries are those who made insufficient or no commitments on meeting criteria essential to not being considered as a tax haven, such as transparency and fair tax competition. Watchlist includes countries whose commitments though sufficient are closely monitored by the EU. Source: European Parliament (2018).
High-risk countries	Dummy equals one for countries that are listed as high-risk third countries, zero otherwise. High-risk third countries are countries exposed to the threat of money laundering or terrorist financing, or otherwise regarded as potential international offshore financial centres. Source: European Commission (2018).