

The effect of different forms of aid on human development in Sub-Saharan Africa

Radboud University



Abstract

This thesis empirically studies the effect of World Bank aid and Chinese aid on human development in Sub-Saharan Africa. It distinguishes itself from the current literature on aid and growth in several ways. Firstly, this thesis is conducted at the regional level. Secondly, growth effects of human development are of interest here, rather than only economic growth. Thirdly, the hypothesis that different forms of aid might affect each other is tested here. It is obtained that the effects of aid depend on how the model is specified. Additionally, this thesis finds that although World Bank aid and Chinese aid could be complementary, competition between donors has negative consequences for aid effectiveness. Furthermore, ODA-like Chinese aid is less effective than total Chinese aid.

Kevin Zwartscholten (S4351851)

Supervisor: J.Smits

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1. Introduction

After the so-called lost decades, Sub-Saharan Africa has finally experienced a period of economic growth since 2000 (African Development Report (ADR), 2015). Nevertheless, the institutional structure is still amongst the weakest in the world, and poverty levels remain persistently high (IMF, 2017). Since the literature on economic growth has argued that institutions are the determinant factor for long-term development (Keefer and Knack, 1997; Acemoglu, Johnson, Robinson and Thaicharoen, 2003b; Rodrick, Subramanian and Trebbi, 2004), these factors are still a point of concern. Although recent growth has been accompanied by some improvements in institutional quality and reductions in poverty, these improvements are disproportional to economic growth and could potentially threaten the sustainability of the recent growth path (ADR, 2015; IMF, 2017). If these factors are left unaddressed, economic development may eventually run out of steam and recent improvements could be undone (Acemoglu and Robinson, 2014). However, addressing these factors is not an easy task, since the problems of weak institutional structures and poverty are self-enforcing (Acemoglu and Robinson, 2014; Haushofer and Fehr, 2014; Murdugh, 1995). As such, it is unlikely that the African region overcomes these problems by itself, so that external assistance might be needed to break through the structural constraints that hamper development.

Development aid has more recently regained its popularity as an external source to overcome these structural problems in recipient countries (Moss, Peterson and Walle, 2006). However, the debate about the effectiveness of aid is still ongoing. Although the effectiveness of aid on development is often addressed in the literature, the results produced are mixed. Where Rajan and Subramanian (2008) cannot find a relation between aid and growth, Burnside and Dollar (2000) argue that aid is only effective in good policy environments. In contrast, Hansen and Tarp (2001) find that aid promotes growth through investment, and their results are not conditional on good institutions. Additionally, the debate has become even more complicated with the growing importance of China as a provider of development assistance in Africa, whose funding has substantially increased since 2000 (Foster, Butterfield, Chen and Pushak, 2009). Chinese aid differs substantially from traditional aid, where traditional refers to developed countries (mostly Western) and Western dominated institutions¹. While traditional aid is conditioned on policy improvements (Montinola, 2010), China uses aid as barter for trade and investment deals, and it does not interfere with the recipient's internal affairs (Grimm, 2014). Consequently, the impact of aid on development could be different depending on which form of aid is received. Chinese presence could potentially be an opportunity, since African states are usually short of funding development projects (Grimm, 2014). Additionally, demand driven aid that China

¹ In this thesis, the terms traditional aid, Western aid and World Bank aid are used interchangeably

provides potentially fits the development strategy of African states better (Bracho and Grimm, 2016). However, it could also pose challenges for development if non-interference strategies enforce authoritarian regimes (Asungu and Aminking, 2013), thereby strengthening weak institutional structures and high poverty levels. Furthermore, Chinese aid as alternative to traditional aid could potentially increase the bargaining position of African states, which in turn could negatively affect the effectiveness of traditional aid (Hernandez, 2017).

In this thesis, the focus is on the effects of aid on long-term development. The central research question is: *“What is the effect of different forms of aid on human development in Sub-Saharan Africa?”*. The effects of different forms of aid are empirically researched using panel data on aid and human development in Sub-Saharan Africa. The donors of interest are the World Bank and China. The World Bank represents the traditional approach to aid advocated by Western countries. The alternative form of aid is that provided by China. This thesis aims to contribute to the existing literature in several ways. Firstly, where previous studies have mostly focused on the effects of total aid received by a recipient country, here a distinction is made between World Bank aid and Chinese aid. As such, it is tested for potential different effects of aid resulting from different donor strategies. Additionally, it allows to study if these different forms of aid also affect each other. Secondly, were most studies measure the effect of aid on GDP growth, in this thesis it will be argued that human development could be a better measure to capture the long-term effects of economic growth. As such, the change in human development is used as dependent variable in the analysis presented here. Thirdly, the analysis presented here is conducted at the regional level, which addresses the shortcoming of previous studies that have mostly been conducted on the national level. A regional analysis is possible by combining data on subnational human development (globaldatalab, 2018) with recently constructed datasets containing data on development projects in developing countries (Aiddata, 2017; Bluhm et al., 2018).

The structure of this thesis is as follows. The next section will discuss the relevant literature on development and aid. The third chapter will describe the datasets used to measure human development and aid. Chapter 4 contains the empirical model and strategy. Chapter 5 presents the main results. These are discussed in chapter 6, and this chapter also includes alternative models. Finally, Chapter 7 concludes.

2. Literature Review

2.1 Economic Development in Sub-Saharan Africa

Even though Sub-Saharan Africa is the poorest region in the world today, its prospects have not always been as pessimistic as might be expected (Collier and Cuning, 1999). After independence in the 1960s, the African region initially did grow relatively fast, under tight government control. This growth was relatively fast compared to other developing countries, for example in Asia², and endured until the mid-1970s (Fosu, 2012). In the following period, inspired by the Washington Consensus, African governments liberalized their economies with high hopes that further economic development would take of (Rodrick, 2006). However, market liberalization did not have the desired effect in the region, as a result of the weak institutional structure that Sub-Saharan Africa inherited from its colonial past³ (Acemoglu and Robinson, 2014). The liberalization of markets allowed for a re-installation of extractive policies that were already in place during colonization, which in turn led to the decline of African economies after an initial period of growth (Fosu, 2012). As a result, the net growth of the region during 1960-2000 was approximately zero (ADR, 2015). Since 2000, growth in the region has taken off again, averaging about 4% annually until 2010⁴, and growth is continuing after (ADR, 2015).

Although recent developments might be a reason for optimism, it remains to be seen whether this is sustainable in the future. It is true that the recent growth period has been accompanied by some improvements in institutional quality and poverty reduction (ADR, 2015). However, the current state of these indicators still remains the most important concern for sustainable growth in the future (IMF, 2017). Even considering recent improvements, the institutional structure of African countries still remains among the weakest in the world (Osman, Alexiou and Tsalski, 2011). Furthermore, persistent high levels of inequality have slowed down poverty reduction relative to economic growth (ADR, 2015), which further underlines the institutional weakness that still exists in the region.

2.2 Institutions and Economic Development

More recently, several authors have argued that institutions are the determinant factor in explaining sustainable economic development and triumph other explanations such as macro-economic factors and geography (Keefer and Knack, 1997; Acumoglu et al., 2003b; Rodrick, Subramanian and Trebbi, 2004). The importance of institutions in explaining growth has also been reproduced in the specific case of Sub-Saharan Africa (Osman, Alexiou and Tsalski, 2011). This literature argues that the

² Nigeria was outperforming Asia economically during the early 1970s (Collier and Cuning, 1999)

³ Botswana is the only exception and did manage to develop inclusive institutions after independence, resulting in substantial higher levels of economic development (Acemoglu and Robinson, 2014)

⁴ Excluding South-Africa

wealthiest countries are those who create inclusive institutions, where inclusive institutions refer to institutions that distribute fairly across society and creates opportunities for all (OECD, 2018). Conversely, extractive institutions create unequal opportunities and promote unfair distributions of wealth, and adopting these institutions leads to less wealthy societies.

The rationale for an institutional theory of development has been extensively discussed by Acemoglu and Robinson (2014) in *“Why Nations Fail”*. This theory holds that countries that adopt inclusive political and economic institutions will reach the highest levels of prosperity, because the incentives in this type of institutional setting create equal opportunities for all people and rewards individuals that make good use of these opportunities. Inclusive economic institutions thus create opportunities for all individuals to create their own prosperity, while at the same time inclusive political institutions guarantee that this prosperity remains secured for that individual. Politicians have to be able to facilitate prosperity creation for the population at large in order to stay in power, because those who do not can be replaced by the population through inclusive political institutions. As such, inclusive institutions reinforce themselves in a *“Virtuous Circle”*.

The reverse is true for countries with extractive institutions. Extractive regimes use the available resources in a country for the benefit of a small elite, who can enrich themselves as long as they stay in power. In order to enrich themselves, the institutional structure is set up in order to redirect as much resources as possible to the elite. This diminishes the opportunities for the population to secure their own prosperity. For its political survival, the elite has to ensure that the population cannot rise up against them. This is achieved by preventing the population to generate the resources they need to challenge the current regime. As such, extractive regimes have not only the incentive to enrich themselves, but also to deny the rest of the population to prosper. Typically, successful extractive regimes are able to deny their population the necessary education and sufficient healthcare (amongst other factors), next to the extraction of economic resources, so that the population lacks the physical and material resources to revolt (Bueno de Mesquita and Smith, 2012). The people, on the other hand, also have little incentive to create their own prosperity, because they know that the government can and will expropriate them. Consequently, extractive institutions enforce themselves in a *“Vicious Circle”*. What is important to note is that this theory does not state that economic growth cannot exist under extractive regimes. On the contrary, extractive regimes can, by allocating resources more efficiently, achieve economic growth during a substantial period⁵. However, if movements towards

⁵ In the USSR economic growth under extractive institutions exceeded that of the USA for decades after WWII, until the regime collapsed in the late 1980s (Acemoglu and Robinson, 2014)

inclusive institutions will not be made, these regimes will eventually run out of steam, and their economies will collapse (Acemoglu and Robinson, 2014).

2.3 The Poverty Trap

Next to weak institutions, it has been argued that poverty itself brings structural constraints that hamper development (Araujo, Bosch and Schady, 2017; Mani, Mullainathan, Shafir and Zhao, 2013). In the literature, different poverty traps have been identified. For example, Araujo et al., (2017) argue that the poor are liquidity-constrained, making them unable to make profitable long-term investments, such as education for their children. Even if enough liquidity is available, consumption smoothing may be another barrier that prevents long-term investments (Murdoch, 1995). Murdoch (1995) reasons that because the poor are unable to ensure themselves, they are more vulnerable to shocks. As a result, the poorest households may have a preference for less risky investments. Another argument is provided by Frankenberg and Thomas (2017), stating that because people are poor, they are unable to sufficiently feed themselves to become productive enough to escape poverty. Finally, behavioral research has argued that poverty consumes cognitive resources, due to the stress and uncertainty that comes with being poor (Haushofer and Fehr, 2014). This could generate an impediment of cognitive abilities (Mani, Mullainathan, Shafir and Zhao, 2013), which in turn could lead to poor people making poor economic decisions. Regardless whether a poverty trap arises due to a lack of material resources, or whether it results from a psychological burden of poverty, the main point of these arguments is that poverty itself is a constraint for development.

Both from institutional theory and the poverty trap perspective, it can be argued that Sub-Saharan Africa faces structural problems that it has to overcome in order to develop. Current growth statistics may indicate some signs of improvement, but this could be temporary if poor institutions and high poverty levels will not be addressed. African countries are unlikely to overcome these constraints by themselves because they are self-enforcing in multiple ways. Firstly, most African countries inherited extractive institutions from their colonial past (Fosu, 2012), which do not create the proper incentives for development in the region. Secondly, persistent high levels of poverty could hamper development in the African region, because the constraints placed on people resulting from extreme poverty may leave them unable to make optimal economic decisions. These constraints may arise either due to a lack of material or cognitive resources. As a result, in order for the poor to develop, they need to become less poor.

2.4 The Role of Aid in Development

Development aid could be the external source of help that Sub-Saharan Africa needs in order to overcome the structural problems that it faces (Moss et al., 2006). After a dip in development

assistance resulting from the its failure to enhance development during the 1990s (Rodrick, 2006), aid has regained its popularity with the introduction of the Millennium Development Goals in 2000 as means to eliminate extreme poverty (Human Development Report, 2005). Despite huge increases in development aid, still the effect of aid on development is only partly understood.

Empirical research that has focused on the effect of development aid on economic growth has found mixed results. Some authors fail to identify a robust relation between aid and growth (Rajan and Subramanian, 2008; Young and Sheehan, 2014), while others have argued that aid only enhances development in good policy environments (Burnside and Dollar, 2000; Clemens, Radelet, Rikil and Bazzi, 2011). On the other hand, Easterly, Levine and Roodman (2004) fail to reproduce the results of Burnside and Dollar (2000) when they include additional data. Additionally, Hansen and Tarp (2001) find evidence that aid positively affects growth through investments, and this relation is not conditional on good institutions. Other research has considered the effects of aid on growth through institutions. Since institutional quality is argued to be a key factor for development, aid could affect growth through institutions if it is able to facilitate the development of a good policy environment in which sustainable growth can emerge (Easterly et al., 2004). Regarding the effect of aid on institutions, Rajan and Subramanian (2007) find that development aid is negatively associated with governance. Djankov, Montalvo and Reynal-Querol (2008) find a negative effect of aid on political institutions and Young and Sheehan (2014) obtain the same result for both political and economic institutions. Jones and Tarp (2016) however, find a small positive effect of aid on institutions. These findings indicate that no consensus has yet been reached about the question whether aid can effectively promote development, nor whether this effect is conditional on good policy.

Not only does the literature present mixed evidence at best, several relevant factors that could have an influence on the aid-growth relation are left unaddressed. Firstly, the periods that these studies cover vary mostly between the 1960s and 1990s, in which the provision of aid was inspired by the Washington Consensus (Rodrick, 2006). Aid was conditioned on liberalizing economies and reducing government intervention (Adhikary, 2012), which turned out to be detrimental for growth in weak institutional environments (Rodrick, 2006). As Rajan and Subramanian (2008) already point out, even though aid in the past has not promoted growth, if significant changes are made to the aid apparatus, aid could potentially be more beneficial in the future. Since the 2000s, the rhetoric of aid has changed, and more emphasis has been placed on its social effects (Adhikary, 2012). For example, recent studies have found that more aid is disbursed to countries with higher gender inequalities (Dreher, Gehring and Klasen, 2015) and higher educational needs (Sumida, 2017). Furthermore, the conditionality that is paired with aid has shifted away from its strong emphasis on macroeconomic conditions (Review of

World Bank conditionality (ROWC), 2005). As such, the effect of aid in a post-Washington Consensus world are worth to reconsider.

Secondly, most studies measure aid by the total inflow of official development assistance (ODA). This contains both aid from official agencies as well as states and local governments (OECD, 2018). Bueno de Mesquita and Smith (2012) have argued that the provision of aid by politicians in donor countries does not need to be altruistic. Instead, these politicians have merely an incentive to provide aid to please domestic voters. As a result, the conditions under which aid by states is provided may be aimed to benefit donor⁶, while the overall effects for the recipient might be marginal. In addition, Younas (2008) provides evidence that OECD countries provide more aid if the recipient country imports goods in which the donor has a comparative advantage. While the intent of aid may still be to promote development, it also shows that more aid is disbursed when it also serves the country's self-interest. Using total ODA flows to measure aid may thus capture a substantial amount of flows that are framed as development aid, but in reality, have little aim to benefit the recipient country.

Finally, the relation between aid and growth has become more complicated since emerging countries are increasingly more important donors of aid (Foster et al., 2009). The most notable emerging donor is China, who's development assistance in Sub-Saharan Africa has rapidly increased since 2000 (Foster et al., 2009), totaling more than \$350 billion of aid over the period 2000-2014 (Dreher, et al., 2017). It has been argued that the conditions under which China provides aid differs significantly from traditional development aid from Western donor countries (McKinnon, 2010). This could indicate that aid effects could be different depending on the donor.

2.4.1 Traditional Aid

In this thesis, traditional aid refers to funding provided by the developed world. Although many different countries and organizations in the developed world act as aid donor, traditional aid will be measured as development assistance provided by the World Bank. The World Bank is the most important institution for development assistance in the world, and has funded over 12.000 projects already since 1947 (worldbank.org, 2018). Its main two goals are to eliminate extreme poverty and to promote the incomes of the poorest people in all countries, thereby contributing to the sustainable development in the recipient country (Asungu and Aminkeng, 2013). Since the 1980s, the provision of conditional aid has been a prominent tool order to achieve assist these goals (Montinola, 2010). Conditional aid holds that the funding of development projects is tied to policy outcomes in the

⁶ For example, Denmark provided aid to Indian farmers by repairing their equipment. But rather than simply funding repairs by Indian manufacturers, Denmark shipped the equipment to Danish manufacturers, who repaired them, after which the equipment was shipped back to India (Bueno de Mesquita and Smith, 2012).

recipient country. These policy outcomes are related to the maintenance of an adequate macroeconomic policy framework, implementation of the program in a suitable way, and the implementation of institutional reforms that are expected to be critical for the success of the program (ROWC, 2005).

Although the World Bank has 189-member countries all over the world, it has been argued that the conditions that accompany World Bank loans reflect mostly a neoliberal western ideology (Adhikary, 2012; Ngugi, 2006; Williams and Young, 1994). According to Adhikary (2012), the World Bank follows the neoliberal ideology that participation in the international market is the cure to eliminate poverty in developing countries. As such, the conditionality placed on World Bank loans favors a market-based approach and liberalized individuals (Williams and Young, 1994). Even though the rhetoric has shifted since the 2000s, and more emphasis is placed on the social impact of aid, the philosophy of the World Bank remains that participation in international markets is the main mechanism that promotes development (Adhikary, 2012). Another feature is that this form of development aid naturally leads to a patronized relationship between the donor and recipient (Tull, 2006), where the World Bank uses investment as a tool to influence how the recipient country is governed.

2.4.2 China as emerging donor

China has become the most important non-traditional aid donor, and the scale at which China operated has significantly increased since 2000 (Foster et al, 2009). However, the principles of equal partnerships and mutual benefits that China follows in its aid policy has been a topic of debate (e.g. Grimm, 2014; Woods, 2008). Unlike the typical divide between donor and recipient in traditional aid, Chinese development projects are structured in such a way that they also benefit China (Grimm, 2014). As a result, the provision of aid is usually bargained together with trade and investment. For example, the host country agrees to repay projects with the provision of natural resources (McKinnon, 2010). Because aid is used as barter for trade and investment deals, the distinction between those have become blurry (Strange et al, 2013), which makes the identification of aid difficult. The provision of funds is even more difficult to track since these are not always directed to the recipient country, but rather to Chinese companies that will undertake the project (McKinnon, 2010). Furthermore, Chinese aid is not conditioned on policy outcomes similar to those of traditional aid (Moss and Rose, 2006). Rather, the principle of equal partnerships makes China follow a non-interference policy with respect to the recipient's internal affairs⁷ (Grimm, 2014). Another consequence is that Chinese aid is aimed to fulfill specific requests from the recipient country (Bracho and Grimm, 2016), so that a more demand driven relationship emerges compared to traditional aid. This could possibly also explain why China

⁷ The Taiwan question is an exception in this regard (Tull, 2006)

typically invests relatively more in infrastructure in Africa in comparison to traditional donors, because Western aid in this sector usually falls short (Moss and Rose, 2009).

The different principles on which China provides development aid has for some authors been reason to be skeptical of its long-term effectiveness. Some authors have called it rogue aid (Niam, 2007), out of fear that China uses aid merely to secure resources and pursue political objectives, while this could be at the cost of enforcing authoritarian regimes in the recipient country (Asungu and Aminking, 2013). Another concern is the fact that China makes use of their own laborers in development projects, so that spillover effects are limited, which could reduce the overall effectiveness of Chinese aid (Moss and Rose, 2006). Furthermore, the fact that African countries can choose between donors could increase competition between them and potentially create more bargaining power for African states. Djankov, Montalvo and Reynal-Querol (2009) have argued that increased bargaining power could leave more opportunities for regimes to be corrupt, which in turn could decrease the efficiency of aid. Additionally, it has been argued that especially Chinese aid could reduce the effectiveness of traditional aid, because it undermines the policy changes that traditional aid tries to accomplish (Woods, 2008). Since China provides an alternative to traditional aid, African countries could choose to attract Chinese investments to avoid Western policy conditionality, while they still benefit from foreign funding. This could also leave traditional aid less effective in the presence of Chinese Aid. In support of this argument, Hernandez (2017) has shown that traditional aid in countries in which China is also present, is attached to significantly fewer policy conditions. This could indicate that critical objectives for the success of traditional aid are not met. Furthermore, Li (2017) presents evidence that development aid from OECD countries in Sub-Saharan Africa is less effective with respect to democratization in countries that also receive aid from China. These findings could indicate that the growth effects of traditional aid are negatively affected by Chinese presence.

On the other hand, some have welcomed increased Chinese engagement in development assistance. Bracho and Grimm (2016) for example, have argued that the supply of traditional aid rarely meets its demand. Chinese aid could thus be beneficial simply because it makes more resources available that the recipient region desperately needs to stimulate development. Furthermore, Chinese activity provides African states with an alternative to the one-size-fits-all approach employed by traditional donors, thereby allowing African states to choose themselves the form of aid that best fits their interests (Grimm, 2014). Finally, Chinese aid could be complementary to traditional aid, since China typically funds relatively more projects related to infrastructure (Foster et al., 2009), which could be a critical component that amplifies the effects of traditional aid.

3. Data on Human Development and Aid

This thesis will empirically research the effect of different forms of aid on human development in Sub-Saharan Africa. The data used covers 45 countries over the period 2000-2014. In contrast to many other studies, who analyzed the effect of aid on either economic growth or measures of institutional quality, this thesis regresses the effect of aid on the change in human development. Furthermore, rather than the total disbursement of aid (in most studies ODA) that is allocated to the recipient country, aid is measured as the amount provided by two specific donors, these being the World Bank and China. This section will first explain how the variables of interest are constructed and where the data is retrieved from, after which it will be discussed how these measures can contribute to the existing literature.

3.1 The Human Development Index

The Human Development Index (HDI) is an index that consists of three dimensions: a health dimension, a knowledge dimension and an income dimension. Each dimension itself consists of a different index. The health dimension consists of a life expectancy index, based on life expectancy at birth. The knowledge dimension consists of an education index, based on expected years of schooling and mean years of schooling⁸. Finally, the Income dimension consists of a GNI index, based on GNI per capita (GNIC)⁹. The logged value of GNIC is used in order to account for decreasing returns from income. From these three indexes the geometric mean is calculated in order to obtain the HDI value (UN, 2018), where the value of HDI is between 0 and 1 and a higher value relates to higher human development.

Data for HDI is retrieved from globaldatalab.org, which contains regional data of 160 countries in the developing world over 1621 sub-national regions. Almost all Sub-Saharan countries are included in this dataset (at least for a number of years), with exception of Equatorial Guinee¹⁰, Seychelles and South-Sudan¹¹, for whom no data is available. Additionally, Cape-Verde is dropped from the sample because it was not possible to match the aid project locations with certainty to the correct region, which leaves 45 different countries included in this analysis¹².

The data gathered in these countries is obtained through household surveys, which has several implications for the determination of individual indexes that construct the HDI index. The education index could be directly created using the observed data for mean years of education and expected

⁸ Expected years of education at age 6 and mean years of education of age 25+ in this thesis (Smits and Permanyer, 2018)

⁹ GNIC in PPP, USD2011 in this thesis (Smits and Permanyer, 2018)

¹⁰ Equatorial Guinee will be available in subsequent editions of the Subnational Human Development Index

¹¹ South-Sudan is available from 2010 and onwards, but since this thesis measures human development over a five-year period, South-Sudan could not be included

¹² For a complete overview of all countries and years included, see appendix A

years of education. However, the data for life expectancy index and the GNIC index could not directly be observed, so that these indexes are estimated using child mortality and household-wealth data¹³ (Smits and Permanyer, 2018). Furthermore, because household surveys are not held on a yearly basis, not all values in the dataset have been measured. Unmeasured years in-between surveys have been interpolated if possible, while all other unmeasured years have been extrapolated. Starting from the national HDI value as measured by the United Nations Development Programme (UNDP), subnational variation has been interpolated or extrapolated to determine the sub-national HDI value (Smits and Permanyer, 2018). This way, the populated weighted average of all individual regions in a country corresponds to the national average.

The use of change in human development as dependent variable fits the theory because it takes into account multiple aspects of development, rather than only an economic growth component. With the addition of health and education in HDI, it accounts for two additional dimensions in which the people in developing countries can be constrained in a way that prevents them to prosper. Extractive regimes have the incentive to prevent the population to become healthy and educated enough to revolt against the regime, while inclusive regimes have the incentive to do the opposite (Bueno de Mesquita and Smith, 2012). As such, improvements in HDI are expected to indicate that the institutions in these countries have improved, or that the state has become less effective to enforce the extractive institutions. On the other hand, decreases in HDI are expected to indicate that institutions have become less inclusive, or that extractive regimes have become more effective in suppressing the population.

Although HDI does not directly measure inequality and poverty (UN, 2018), several properties of this variable could still make this a proper measure to address the structural problems resulting from a poverty trap. Firstly, measures of health and education naturally address inequality because of physical limitations. Whereas it is easily possible that the elite in a country owns a disproportionately large amount of all wealth, it is not possible that they also 'own' similar proportions of all years lived or all years of schooling. As such, increases in average life expectancy and education can only be achieved if a substantial proportion of the population experiences improvements in this regard. Although inequality in income can be much more unequal, the HDI index used here corrects for this as well because income is measured based on a wealth index. This wealth index is an asset weighted additive scale in which a household's score improves as they own more assets (Smits and Steendijk, 2015). However, owning the same asset multiple times does not improve a household's score¹⁴. Once a household owns all assets that are listed, this household's wealth index score can no longer be

¹³ For a more detailed description of how the individual indexes were created, see Smits and Permanyer (2018)

¹⁴ However, the IWI does take into account the quality of certain assets (Smits and Steendijk, 2015)

improved, so that improvements in this index can also only be achieved if a significant proportion of the population improves in terms of wealth. Additionally, Permanyer and Smits (2019) show that the subnational HDI, especially in low- and middle-income countries, explains a substantially greater proportion of inequality¹⁵ compared to a national index.

Because the geometric mean across the three indexes is calculated to obtain the HDI value, a country needs to score high on all three indexes in order to obtain a high HDI score. As such, HDI also addresses a potential measurement problem that economic growth can still exist in extractive regimes, even over a prolonged period (Acemoglu and Robinson, 2014). It captures whether the economic growth in Sub-Saharan Africa is coupled with improvements in health and education as well, which, according to institutional theory, is a necessary condition for sustainable economic development. Finally, because this variable is measured at the subnational level, the effects of aid can be more closely related to improvements in regions where aid is disbursed. As such, the subnational HDI addresses a shortcoming of most other studies that are aggregated to the national level.

3.2 World Bank Aid

Aid provided by the World Bank is used as measure to capture the effect of traditional aid on human development. The dataset is provided by AidData¹⁶, and contains data for the total amount of disbursements at the subnational level for 1193 different projects. These projects are located in almost every country included in this analysis, with exception of Sudan, Swaziland and Somalia. The amounts in this dataset are already deflated to 2011 USD, with exception of projects in 2013 and 2014 which are in current USD. Because GNIc in the HDI is deflated to 2011 USD, the values of projects in 2013 and 2014 have also been deflated based to 2011 USD. The deflators used are retrieved from the World Bank Group (data.worldbank.org)¹⁷. Together, the projects in this dataset add up to \$47 billion worth of aid and 1192 projects, across 4739 different locations.

Some projects that took place on multiple locations, but only the total value of the project is known. In order to assign a value to each project location, this dataset has divided the total project value equally over the project locations. Although it might have been better to assign the project value based on population estimates, this is not possible because this data is not available¹⁸. A second problem is that some project locations are national governments, meaning that funds are directed to a national entity. To include these projects, the total value of these projects has been equally divided over all

¹⁵ Were inequality is measured using the Gini-coefficient

¹⁶ WorldBank Geocoded Research Release Level 1 v1.4.2 Geocoded Dataset (AidData, 2017)

¹⁷ Deflators used are 103,49 for 2013 and 105,34 for 2014.

¹⁸ The datasets on aid projects have identified project locations much more precise than the broader regions used by the globaldatalab dataset, as such population estimates are not available

regions in the country. Although subnational population estimates are available in this case, these are not used because the bias from the first problem is still present. Instead, a consistent approach is chosen here. Finally, three projects are deleted from the sample, because they could not be matched with certainty to a region¹⁹.

Considering only World Bank aid ignores that many other Western countries and institutions provide aid in Sub-Saharan Africa, so that the total amount of traditional aid received is likely underestimated. However, this choice could also have a potential advantage over the total amount of ODA. Taking into account that aid provided by states might not always be aimed at the development of the recipient country, but rather serves some domestic interest of the donor (Dreher et al., 2016), total ODA might be an overestimation of the effective amount of aid that is used to stimulate development in the recipient country. Since the World Bank is not a state, but rather an institution whose mandate requires it to stimulate development for the poorest people in the world (worldbank.org, 2018), World Bank projects could be expected to be a better reflection of the rhetoric of traditional aid. Considering solely World Bank aid may thus better isolate the effects of aid that aims to promote sustainable development, compared to total amounts of ODA.

3.3 Chinese Aid

The alternative form of aid considered here are the funds provided by China, for which the dataset used is also retrieved from AidData²⁰. The measurement of Chinese aid is more difficult for several reasons. First of all, the division between aid, investment and trade is not clear cut as a result of the different approach that China takes towards aid. Since development projects are often coupled with trade and investment deals, it becomes hard to determine what monetary amount can be considered aid and what should be considered to be other financial flows (Strange et al, 2013). A second problem is that the Chinese government does not provide detailed records of its development assistance, which complicates the tracking of Chinese activity in Africa (Strange et al., 2013). Tracking becomes even more difficult due to the fact that in many project funds do not flow to the recipient country, but to Chinese firms that undertake the project (McKinnon, 2010).

In order to overcome these problems, the dataset for Chinese development assistance has been constructed following Tracking Underreported Financial Flows (TUFF) methodology²¹. This is a media-based approach that systematically tracks not officially reported investments using four types of sources (Strange, Cheng, Russel, Ghose and Parks, 2017). These sources are: English, Chinese and local-

¹⁹ Projects P150503, P150828 and p151794 in WorldBank Geocoded Research Release Level 1 v1.4.2 Geocoded Dataset

²⁰ AidData's Geocoded Global Chinese Official Finance, Version 1.1.1 (Bluhm et al., 2018)

²¹ See Strange et al. (2017) for a detailed description of TUFF methodology

language news reports; official statements from Chinese ministries, embassies, and economic and commercial counselor offices; the aid and debt information management systems of finance and planning ministries in counterpart countries; and case study and field research undertaken by scholars and non-governmental organizations. These sources are triangulated to minimize the impact of incomplete or inaccurate information (Bluhm et al., 2018). This allows not only for a systematic identification of unreported investments, but also to investigate the intent of the investment (Dreher et al., 2017). As such, this dataset is able to distinguish between ODA-like investments and other official flows (OOF), where ODA-like investments are all investments that are primarily aimed at development, are in the form of a grant and the recipient country is eligible for ODA according to OECD standards (Bluhm et al., 2018).

However, this dataset has encountered several limitations in terms of missing data. First of all, some projects could not be identified as either ODA-like or OOF, so they are qualified as vague flows (Bluhm et al., 2018). Secondly, although ideally disbursements are measured to capture the actual amount of aid that is provided, this dataset could only determine financial values in terms of commitments rather than disbursements. Thirdly, for a substantial number of projects, the financial value is missing (Dreher, 2017). In the sample considered in this thesis, 44% of the financial number of projects are missing²². As a result, the total nominal amount of aid provided may reflect a significant underestimation of the aid provided. Finally, although Muchapondwa, Nielson, Parks, Strange and Tierney (2016) find evidence that this methodology leads to credible data collection, the possibility that a detection bias could be present cannot be ruled out (Dreher et al. 2017). A detection bias could arise if certain types of projects are more likely to be detected than others. This could bias the data if the projects detected differ systematically in their effects on human development compared to undetected projects.

Similar to World Bank projects, some Chinese projects also took place on multiple locations or consisted of transferring funds to national governments. The value of these projects has also been evenly distributed over all project's locations, or over all regions within a country if it was directed to a national body. One project has been deleted since implementation years were missing²³. Since all projects are deflated to 2014 USD, their values have been recalculated to 2011 USD, so that they are directly comparable to HDI and World Bank aid²⁴. Furthermore, some projects have been labelled emergency funding, indicating that these projects were in response to particular events in the recipient country. Because aim of these projects is to mitigate losses, rather than to promote development (Clements et al. 2012), these projects are left out of the sample.

²² This is comparable to missing values in the entire dataset, which are 39% (Dreher et al., 2017)

²³ Project 31077 in AidData's Geocoded Global Chinese Official Finance, Version 1.1.1

²⁴ The same deflator has been used as for World Bank projects in 2014: 105,34

Although this dataset covers development projects of China all over the world, in this thesis only those projects taken place in Sub-Saharan Africa are considered. In total, Chinese aid in Sub-Saharan Africa amounts to 1728 projects²⁵ across 1460 locations and reports a nominal value just under \$80 billion²⁶ in commitments. This may seem a rather high number compared to the \$47 billion that the World Bank has provided over the same period, and considering that the actual number might be higher due to the fact that 44% of the observations are missing. There might be several reasons that could explain this though. Firstly, Chinese aid goes together with trade and investments, so that not all projects are intended to support development. When only projects are considered that are identified as ODA-like projects, total Chinese development aid still adds up to 1412²⁷ projects, but only to \$30 billion total worth, which is considerably lower than the amount provided by the World Bank. Secondly, China disproportionately targets the African continent compared to other developing parts of the world. Of all projects financed by China, 58% took place in Africa (Dreher et al., 2017).

²⁵ This number does include projects for which the amount of aid is missing. Excluding these observations, the dataset contains 970 different projects

²⁶ In 2011 USD

²⁷ Excluding projects that have the amount missing, 690 projects

4. Research Design

The main question that the empirical model aims to answer is: *What is the effect of different forms of aid on subnational human development in Sub-Saharan Africa?* To analyze the effects of aid, several variants of the following equation are estimated:

$$\Delta HDI_{i,t} = \beta_0 + \beta_1 WB\ Dummy_{i,t} + \beta_2 WB\ Aid_{it} + \beta_3 CH\ Dummy_{i,t} + \beta_4 CH\ Aid_{it} + \beta_5 C_{it} + \beta_6 C_{it} * Aid_{it} + \beta_6 a_{it} + \varepsilon_t \quad (1)$$

Where ΔHDI is the change in human development from one period to the next. WB Dummy is a dummy variable that takes the value of 1 when the World Bank is a donor in region i in year t and 0 otherwise. WB Aid is the amount of aid disbursed by the World Bank, measured as the financial value in 2011 USD. CH dummy and CH Aid are similar variables but for China. C denotes a set of control variables, which are expected to influence human development in addition to aid. These controls are interacted with both World Bank aid and Chinese aid, which is represented by the term $C * Aid$. a denotes region fixed effects and ε is an error term²⁸.

In order to capture the long-term relation between aid and human development, all variables are measured as their average over a five-year period. This serves to minimize the impact of short-term deviations that are not persistent over time, and to increase the chances that the model will capture only long-term aid effects. Furthermore, even though some projects took several years to implement, aid is measured only in the year that the projects are finalized. Although five-year periods might still be too short of a time window to capture all long-term aid effects, this time window is often used in the aid literature (e.g. Djankov et al., 2008; Young and Sheehan, 2014). However, using five-year panels would reduce the sample considered here to only three periods, which turned out to severely reduce the explanatory power of the model. To make up for this, five-year moving averages are used, although this is at the cost of having overlap between observations.

Many observations lack either World Bank aid or Chinese aid, or both²⁹. Including zero-inflated continuous variables could bias these estimates if this is left unaddressed (Robertson et al., 1994). The variables WB Dummy and CH Dummy serve to correct for zero-inflated values of World Bank and Chinese aid. These dummies indicate whether the World Bank or China provided aid in a region during each year, and allow observations that contain World Bank aid to be treated separately from observations that did not, and the same is true for Chinese aid. As such, zero-inflated data causes aid estimates no longer to be biased (Robertson et al., 1994). The dummies capture whether growth in

²⁸ For a complete overview of all variables and sources, see appendix B

²⁹ 39% of all observations lack World Bank aid and 53% lacks Chinese aid. 23% reported aid from neither of the donors.

human development is different if the donor is present, compared to when the donor is not present. This effect will be referred to as the aid effect of the respective donor. The coefficients for World Bank aid and Chinese aid represents the effect of an increase the amount of aid on the dependent variable. For normality, the logged amount of aid is used. Both variables together give an indication how the presence of aid from each donor, as well as increases in aid, relate to changes in human development.

4.1 Control variables

Several controls are added to account for other factors that influence human development. Since institutions have been identified as key driver of economic development (e.g. Rodrick et al., 2004), two variables are added to capture the effect of institutional quality. These are corruption and institutional democracy. Corruption is measured using the country level corruption perceptions index (CPI) score. This index measures the perceived level of public corruption on a 0 to 100 scale, where 0 means highly corrupt ('Corruption Perceptions Index 2017', 2018). Institutional democracy is a measure that is constructed based on three elements: the presence of institutions and procedures through which citizens can effectively express preferences about alternative policies and leaders, the existence of institutionalized constraints on the exercise of power by the executive, and the guarantee of civil liberties to all citizens in their daily lives and in acts of political participation. Based on these three dimensions, a 0-10-point country level scale is constructed, in which a higher score relates to a more democratic regime. Points are attributed to specific characteristics related to the competitiveness and openness of a political participation which together lead to a score between 0-10 (Marshall, Kur and Jagers, 2018). The expectation is that higher institutional development leads to more efficient usage of the available means of production to promote development, so that institutions positively affect human development.

Both variables report a substantial amount of missing observations, which is interpolated using the average trend from the closest known observations. Whenever interpolation was not possible, dummy variable adjustment has been used to make up for missing data³⁰. For both variables a dummy is added to indicate the impact of the adjusted data. Although these dummies are sometimes significant, which indicates that the estimates of institutional democracy and corruption could be biased (Allison, 2001), this method is preferred over deleting these observations, since deleting could create a selection bias in aid estimates.

Additionally, many African countries have a reserve in natural resources, while other countries do not. Bueno de Mesquita and Smith (2012) argue that regimes that control these resources can more easily suppress their population, so that increases in human development may be more difficult to realize in

³⁰ After interpolating, 15% of all observations of CPI were missing, and 8% of DEMO observations

these counties. To account for this, a dummy variable is added that takes the value of 1 when the region is located in a country that has been identified as resource rich. A country is considered resource rich if its exports of raw materials amount to 25% or more of its GDP (Blomqvist, and Thorborg, 2015).

Since institutions and the availability of natural resources are expected to affect growth, these factors could also influence the extent to which aid can be used effectively (Burnside and Dollar, 2000). To control for this, institutional variables and the natural resource dummy are interacted with aid. If more aid resources can be spent effectively in good policy environments, the interactions between institutions and aid could show a positive coefficient. If the availability of natural resources makes the government less accountable to its population (Bueno de Mesquita and Smith, 2012), this could mean that fewer aid resources can be used productively which could result in a negative coefficient of the interaction between aid and natural resources.

Other controls include the level of human development at the start of the period. Because human development takes a value between 0 and 1, increases in human development are harder to achieve at higher initial level of human development. Furthermore, the model controls for population size and includes regions fixed effects. Since the resource dummy as well as institutional controls are measured at the country level, this could indicate that a multilevel model would be more suitable here. However, the country level variance explained in a multilevel analysis was close to zero, and an LR test comparing the multilevel model with a one-level linear one indicated that these models are statistically identical, which indicates that region fixed effects sufficiently capture any potential country level clustering that might be present in the data. Finally, summary statistics for the core variables of the model is presented in the appendix³¹.

4.2 Do Donors affect each other?

Several authors have raised concerns that Chinese aid also affects World Bank aid effectiveness (e.g. Woods, 2008). Increased competition for aid could decrease bargaining power of the World Bank, which could be reflected in fewer conditions attached to aid, what in turn can reduce its overall effectiveness (Hernandez, 2017). However, it has been argued that Chinese aid has a different focus, with more emphasis on infrastructure for example (Foster et al. 2009). Since a good infrastructure is also a critical component for well-functioning institutions and development (Acemoglu and Robinson, 2014), World Bank aid could also benefit from Chinese presence. These effects are accounted for by two interactions: one between the aid dummies and one between the logged values of aid. The interaction between the aid dummies captures the differences in growth in a region in which both donors are active, relative to growth when the other donor is not present. The interaction between

³¹ Appendix C

the logged values of aid captures the different effects of increases in aid of the respective donor, conditioned on the amount of aid provided by the other donor.

Although the literature is mostly concerned with the externalities of Chinese aid on World Bank aid, opposite effects are of course also possible. For example, it could be that World Bank conditionality also affects Chinese aid, so that this becomes more effective in regions in which the World Bank is also active. Furthermore, it has been argued that the World Bank may lose bargaining power towards African states (Djankov et al. 2009), but the same may be true for China. This could possibly enhance Chinese aid, since an increased bargaining position for African states could mean that they need to provide fewer natural resources in return for Chinese aid, so that more of these resources could be used productively to enhance development. However, this could also negatively affect Chinese aid effectiveness if increased bargaining power leads to fewer aid resources being used effectively to stimulate development. Since both forms of aid could affect each other positively, as well as negatively, the expected sign of the interaction coefficients is also unknown beforehand.

4.3 Endogeneity

Much of the existing literature accounts for endogeneity in the aid-growth relation. According to many authors (e.g. Arndt et al, 2010; Rajan and Subramanian, 2008), aid could be endogenous with growth if donors actively target countries based on their current performance in terms of development. The direction of the bias is unknown, since good performing countries could be targeted because they provide more growth opportunities, while aid could also be directed to poor performing countries that need it most (Dreher et al., 2017). The relative high amount of observations that lack at least aid from one of the donors could be an indication that endogeneity could be present here.

Although in the existing literature, this is often treated as a simultaneity problem, treating this as a selection problem seems more appropriate here. Treating this as simultaneity problem, would suggest that donors reallocate aid budgets from one region to another based observed growth performance³². In case of the World Bank, this seems unlikely, since predictability of aid flows is regarded as important factor for the success of a project (RWBC, 2005). Considering China, endogeneity resulting from simultaneity does not seem plausible either, since aid is usually negotiated together with trade and investment deals (Strange et al, 2013), so that reallocating aid resources becomes more difficult. As such, it is more likely that endogeneity of aid results from a selection process. If some of the variables that determine this selection are not present in the model, this could lead to an interpretation problem. Although, by controlling for institutional factors and natural resources, the model controls for many of the most relevant factors that could explain the allocation of aid, it cannot be ruled out

³² It is assumed that aid budgets are to some extent fixed (Dreher et al., 2017)

that all factors are accounted for. For example, since corruption and institutionalized democracy are only indicators of institutional quality, other institutional effects that are not captured by these variables could cause a bias in the data.

Ideally, a selection procedure would be followed to account for the possibility of an omitted variable bias. However, finding a good instrument turned out to be problematic. Many of the often-used instruments, such as population size, child mortality and colonial ties with the donor country are not possible here for various reasons. Population is already controlled for in the model, child mortality is used to estimate regional variation in life expectancy of the health dimension, and colonial ties are not applicable here. Following Dreher et al. (2017), an interaction between the regions' probability of receiving aid and the yearly budget of each donor was tried instead. The probability of receiving aid is calculated as the total amount of years that a region received aid from the respective donor, divided by the number of years in this sample. The yearly aid budget of a donor equals the sum of aid to all regions in a given year. However, due to multicollinearity, this instrument turned out to be unsuitable. In absence of an alternative instrument, the possibility of endogeneity is unaddressed in this thesis. As such, the interpretation of the results should take into account the possibility that some regions were selected for aid while others were not.

5. Main Results

The results without interaction terms between both forms of aid are displayed in table 1. The first model contains all control variables with exception of region fixed effects, and serves as benchmark model. In the second model, region fixed effects are added. The third model is an extension of model 2 that also contains interactions between aid and controls. The dependent variable in all regressions is the change in human development. Aid is measured in logged financial values converted to 2011 USD. The sample contains 4195 observations, of which 3238 contain aid by either the World Bank or China, or both. Out of 384 regions, 11 regions are included that did not receive aid during the entire period 2000-2014. All coefficients represent correlations, and not causal relationships. To account for possible heteroscedasticity, all regressions use robust standard errors.

The first model shows an insignificant coefficient of the World Bank dummy, which indicates that it cannot be concluded that changes in human development in regions that are supported by World Bank aid are different from regions that did not receive any World Bank aid. However, increases in the amount of aid provided, relate to fewer improvements in HDI. Concerning China, regions that receive Chinese support show greater improvements in human development, and this effect is stronger as the amount of Chinese aid increases. Corruption (CPI) and institutionalized democracy (DEMO) are insignificant, while being resource rich (RES) correlates with higher growth. The initial level of human development has a negative coefficient, while that of population size is positive. Since this regression serve only as benchmark, these results are not further interpreted.

If region fixed effects are included, World Bank aid correlates with greater improvements in human development, although no evidence is found that increases in World Bank aid improves growth any further. The dummy for China has become insignificant, which indicates that, on average, Chinese support cannot be related to changes in growth. However, as the amount of Chinese aid increases, changes in human development are greater as well.

Furthermore, a higher CPI score relates to lower improvements in human development, while DEMO is positively correlated with growth. When interactions terms between aid and institutions are added, the main effects of CPI and DEMO do not change and the interactions terms are mostly insignificant. The only significant result obtained is that Chinese aid relates to greater changes in human development in less corrupt regions. Although the main effect of RES is insignificant, World Bank aid correlates with higher growth in regions that are part of a resource rich country, whereas the opposite effect is found for Chinese aid.

Table 1. Regression output

| | (1) | (2) | (3) |
|-----------------------------|------------------------|-------------------------|-------------------------|
| <i>WB Dummy</i> | 0.000483 (0.43) | 0.00211** (2.07) | 0.00221** (2.17) |
| <i>World Bank Aid (WB)</i> | -0.000188** (-2.27) | 0.00000977 (0.10) | -0.000153 (-1.37) |
| <i>CH Dummy</i> | 0.00270*** (3.06) | 0.000661 (0.90) | 0.000820 (1.11) |
| <i>Chinese Aid (CH)</i> | 0.000314*** (4.32) | 0.000660*** (7.36) | 0.000669*** (7.12) |
| <i>CPI</i> | 0.0000656 (1.15) | -0.000436*** (-4.44) | -0.000413*** (-3.94) |
| <i>CPI * WB</i> | | | 0.0000106 (1.23) |
| <i>CPI * CH</i> | | | 0.0000179* (1.69) |
| <i>DEMO</i> | 0.000143 (0.93) | 0.00124*** (3.25) | 0.00135*** (3.45) |
| <i>DEMO * WB</i> | | | 0.0000603 (1.53) |
| <i>DEMO * CH</i> | | | 0.0000106 (0.36) |
| <i>RES</i> | 0.00529*** (6.76) | 0.0144 (1.32) | 0.0161 (1.47) |
| <i>RES * WB</i> | | | 0.000595*** (2.91) |
| <i>RES * CH</i> | | | -0.000475*** (-2.73) |
| <i>HDIO</i> | -0.0444*** (-10.17) | -0.455*** (-36.46) | -0.458*** (-36.46) |
| <i>POP</i> | 0.000575* (1.93) | 0.00215 (1.21) | 0.00160 (0.89) |
| <i>N</i> | 4195 | 4195 | 4195 |
| <i>Countries</i> | 45 | 45 | 45 |
| <i>Regions</i> | 384 | 384 | 384 |
| <i>Region Fixed Effects</i> | No | Yes | Yes |

t statistics in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The results for the regressions that include interactions between World Bank and Chinese aid are presented in table 2. Since these interactions are not centered, their main effects refer to the effect of a donor, when the value of the other donor is equal to 0. As such, the main effects refer to the counterfactual, that indicates what the aid effects of each donor would have been in absence of the other donor. Model 4 contains only the interactions between both forms of aid, model 5 also included the interactions between aid and controls.

These results indicate that growth in regions that received World Bank aid was not significantly different from regions that did not receive any aid. Furthermore, some evidence is found that increases in World Bank aid are negatively correlated with changes in human development. Additionally, regions that received aid from China grew significantly less, but increases in Chinese aid do relate to more growth. Growth in regions that received aid from both donors is higher compared to regions that received aid from only a single donor. Because the coefficient of the interaction is more positive than coefficients of the main effects are negative, this indicates that regions that received aid from both donors also grew more compared to regions that did not receive aid at all. The interaction between the amounts of aid is also significantly positive, which indicates that both forms of aid are related to greater increases in human development as the amount of the other donor increases. However, the size of the interaction coefficient is small compared to that of the main effects, which suggests that aid affects human development positively only at high levels of aid.

Lower levels of corruption are associated with smaller growth. In the interactions between World Bank aid and CPI and Chinese aid and CPI are both negative, indicating that both forms of aid are less effective as corruption decreases, when the other donor provides no aid. However, the interaction between CPI and both forms of aid is positive, meaning that increases in aid are related to higher growth as the other donor provides more. Furthermore, DEMO is again positive in model 4, but no significant coefficients are obtained if interactions with aid are included. Finally, being part of a resource rich country is related to higher growth in model 5. The effects of both World Bank aid and Chinese aid are more positive in resource rich countries if the other donor is not present, but this effect is weakened as the other donor provides more aid.

Table 2. Regression output extended with interactions between aid donors

| | (4) | (5) |
|-----------------------------|-------------------------|--------------------------|
| <i>WB Dummy</i> | -0.000186 (-0.17) | -0.000741 (-0.66) |
| <i>World Bank Aid (WB)</i> | -0.000198 (-1.61) | -0.000412*** (-2.87) |
| <i>CH Dummy</i> | -0.00339*** (-2.90) | -0.00378*** (-3.22) |
| <i>Chinese Aid (CH)</i> | 0.000386** (2.28) | 0.000188 (0.89) |
| <i>WB Dummy * CH Dummy</i> | 0.00590*** (4.28) | 0.00667*** (4.77) |
| <i>WB * CH</i> | 0.0000213* (1.92) | 0.0000324** (2.40) |
| <i>CPI</i> | -0.000417*** (-3.75) | -0.00154*** (-5.42) |
| <i>CPI * WB</i> | | -0.0000880*** (-3.51) |
| <i>CPI * CH</i> | | -0.0000463** (-2.14) |
| <i>CPI * WB * CH</i> | | 0.00000803*** (4.11) |
| <i>DEMO</i> | 0.000965** (2.16) | -0.0000866 (-0.12) |
| <i>DEMO * WB</i> | | -0.0000109 (-0.19) |
| <i>DEMO * CH</i> | | -0.0000917 (-1.42) |
| <i>DEMO * WB * CH</i> | | 0.00000680 (1.50) |
| <i>RES</i> | 0.0183 (1.28) | 0.0258* (1.80) |
| <i>RES * WB</i> | | 0.00130*** (5.37) |
| <i>RES * CH</i> | | 0.00101*** (2.60) |
| <i>RES * WB * CH</i> | | -0.0000864*** (-3.64) |
| <i>HDIO</i> | -0.458*** (-17.99) | -0.468*** (-17.90) |
| <i>POP</i> | 0.00213 (0.99) | 0.00190 (0.89) |
| <i>N</i> | 4195 | 4195 |
| <i>Countries</i> | 45 | 45 |
| <i>Regions</i> | 384 | 384 |
| <i>Region Fixed Effects</i> | Yes | Yes |

t statistics in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

6. Discussion

The results obtained in the previous chapter suggest that World Bank aid effectively promotes human development in recipient regions under certain conditions. From table 1, it can be concluded that the overall aid effect of the World Bank is positive, although increases in World Bank aid do not relate to greater improvements in human development. It could be that the positive World Bank dummy means that positive effects from World Bank aid result from policy objectives attached from aid, rather than the effects of the project itself. Because the implementation of policy objectives is not necessarily dependent on the amount of aid disbursed, more sizable projects might not lead to more growth, if the conditionality tied to aid is similar across those projects. However, this explanation does not seem plausible, since conditionality attached to aid serves to guarantee the success of the project (ROWC, 2005). Additionally, Montinola (2010) argues that recipient regimes consider the costs of policy changes, that could challenge the political survival of the current regimes. Since more sizable aid could compensate more for potential costs, the chance that policy changes are successfully implemented likely increases if more aid is disbursed. Consequently, if conditionality attached to World Bank aid is effective, it would be expected that more sizable projects would lead to greater improvements in human development. Since increases in World Bank aid do not relate to more growth, it is unlikely that the World Bank dummy represents a causal effect of aid on growth. Instead, because selection cannot be ruled out, the causality might be reversed, which could indicate that factors not included in this model, that do influence growth, also increase the probability of receiving World Bank aid.

If conditional effects of Chinese aid on World Bank aid are taken into account, it is obtained that World Bank aid becomes more effective in the presence of Chinese aid. While the World Bank dummy is insignificant when the China dummy is equal to zero, the interaction term between these dummies indicates that the World Bank aid effect increases if China is also an aid donor in the region. This could again result from selection, and indicate that regions that grow more are also able to attract aid from both donors. However, even though additional World Bank aid might be counterproductive for growth when Chinese aid is equal to zero, this effect becomes more positive as the volume of Chinese aid increases. From the estimations obtained here, it can be calculated that the World Bank coefficient becomes positive at a logged financial value of 9.29 and 12.72 of Chinese aid³³, in model 4 and 5 respectively. Given that the average logged financial value of Chinese aid is 11.25 in this sample³⁴, this indicates that, roughly speaking, the effect of World Bank aid is positive when Chinese aid is higher

³³ Since the interaction coefficient represents the change in the effect of World Bank aid, as result of an increase of the logged financial value of Chinese aid by one unit, the turning-point values are obtained by dividing the interaction coefficient with the coefficient representing the main effect of World Bank aid when Chinese aid is equal to zero

³⁴ See Appendix B

than average, and negative when Chinese aid is lower than average. As such, these results could suggest that Chinese aid could both reduce as well as amplify World Bank effectiveness. When China provides below average amounts of aid, competition that results in less bargaining power, that could be reflected in fewer policy conditions attached to aid (Hernandez, 2017), could undo the potential positive effects of World Bank aid (Woods, 2008). However, if Chinese aid is above average, the different emphasis of Chinese projects, such as on infrastructure, could be complementary to World Bank aid because both forms of aid promote different elements that are both essential to structural development (Foster et al., 2009).

Considering aid from China, evidence has been found in favor of the claim that Chinese aid promotes growth in recipient regions (Grimm, 2014). Even though the aid effect of China is insignificant, increases in Chinese aid relate to greater improvements in human development. If the model accounts for conditional effects of World Bank aid, it is obtained that the China dummy is negative if the World Bank dummy is equal to zero, but becomes positive as the World Bank is a donor in the region. Since regions that receive aid from China grow less if World Bank aid is equal to zero, this could support the claim that China enforces authoritarian regimes (Asungu and Aminking, 2013). However, aid that supports authoritarian regimes is expected to provide additional resources that make it easier for the recipient regime to suppress the population (Bueno de Mesquita and Smith, 2012). As such, it would be expected that increases in aid to promote authoritarian regimes would have additional negative effects on human development as well. Since it is obtained that Chinese aid relates to increased growth, even if World Bank aid is equal to zero, and this effect is amplified as World Bank aid increases, this explanation is not plausible. More likely, this effect could be obtained because of selection, which indicates that regions that grow less are more likely to receive aid from China. Regions that grow less are likely more in demand of aid, and Chinese aid is argued to be more responsive to demand compared to World Bank aid (McKinnon, 2010), which could together explain why this negative dummy coefficient is obtained. Since increases in Chinese aid relate to greater improvements in human development, this could indicate that Chinese aid promotes development because it fits the needs of the recipient country (Bracho and Grimm, 2016).

Mixed evidence has been found in the relation between aid and growth, conditioned on good institutions. The main effect of CPI is consistently negative, which could be surprising since better institutions are expected to relate to more growth. However, this finding is not uncommon in the literature. For example, Meon and Weil (2010) find that corruption could potentially be beneficial for growth when institutions are poorly developed, as is the case in Sub-Saharan Africa (ADR, 2014), because it compensates for the distortions caused by poor institutions. Furthermore, Dreher, Kotsogiannis and Corrison (2009) argue that higher levels of corruption typically create a larger

shadow economy, to avoid expropriation through corruption. They also show that institutional quality has a negative effect on the shadow economy. Since the subnational human development index is constructed based on health, education and a wealth index (rather than official documentation of income), possible negative growth effects of a reduction in the shadow economy could be captured here, which could also explain why the coefficient of corruption turns out to be negative. Since more institutionalized democracy does relate to greater increases in human development, it is also found here that better institutions do relate to more growth. As such, it becomes more likely that the finding that less corruption reduces growth, is only relevant in weak institutional structures (Meon and Weil, 2010), and this does not reflect a general negative relation between CPI and growth. Even though the main effect of CPI is negative, the interaction between CPI and Chinese aid is positive in table 1, which supports the argument that aid is more effective in good policy environments (Burnside and Dollar, 2000). On the other hand, in table 2 both the interaction between CPI and World Bank aid and CPI and Chinese aid are negative, indicating that both forms of aid become less effective in less corrupt countries when aid from the other donor is equal to zero. This effect becomes less negative as the amount of aid from the other donor increases³⁵. No evidence has been found that aid is conditional on institutional democracy in any of these estimations. As such, these results partly indicate that aid could be more effective in good policy environments, but only if there is sufficient competition between donors.

A similar but reversed conclusion could be drawn for aid effects conditional on the recipient region being part of a resource rich country. Although the main effect of this dummy is mostly insignificant, some evidence has been found that being part of a resource rich country relates to more growth. This coefficient was expected to be negative, because in weak institutional structures, regimes that have access to natural resources have more incentive to install extractive institutions (Bueno de Mesquita and Smith, 2012). However, the increase in commodity prices during the sample period has also been mentioned to contribute to economic growth in Sub-Saharan Africa (ADR, 2015), so that this result is not entirely surprising. In table 1, it is found that World Bank aid becomes more effective in regions that are part of a resource rich countries, which could indicate that conditional World Bank aid enables a greater proportion of natural resources to be devoted to development. On the other hand, the interaction between CPI and Chinese aid indicates that Chinese aid is less beneficial for growth in resource rich countries. Since the main effects of Chinese aid are positive, the claim that China provides rogue aid (Niam, 2007) seems somewhat excessive. Nevertheless, the negative interaction between

³⁵ Using a similar procedure as described earlier in this chapter (see footnote 32), to calculate the turning-point values in this estimation, it is obtained that the interaction between CPI and World Bank aid becomes positive if the logged financial value of Chinese aid exceeds 10.96, and the interaction between CPI and Chinese aid when logged World Bank aid exceeds 5.77.

the resources dummy and Chinese aid could indicate that China does consider its own interest (Grimm, 2014), and could be an indication that China's bargaining position allows it to demand relatively more compensation in for aid in resource rich countries, which is at the cost of development. When interactions between World Bank aid and Chinese aid are added, it is obtained that the conditional effects on natural resources for both World Bank and Chinese aid are positive when aid of the other donor is equal to zero. As aid from the other donor increases, both effects become more negative³⁶. As such, it can be concluded aid could be less effective in resource rich countries, but only when there is sufficient competition between donors.

6.1 Alternative Estimations

Since the data sources used here faced many limitations in term of measurement, which is especially true for Chinese aid, the results obtained here could contain some bias. No financial value could be determined for 44% of all identified Chinese projects, and these projects are thus not taken into account. Dreher et al. (2017) proposed the number of projects as alternative measure to test the robustness of the effects of Chinese aid. However, since this measure could inflate total aid received if many smaller projects are captured (or deflate in case of a single huge project), the validity of this measure is questionable. Although the use of number of projects did not result in any changes in the effect of Chinese aid, these regressions showed differences in World Bank aid that were difficult to explain. As such, these outcomes are not reported here.

Another factor that could have biased the effects of Chinese aid, is that this measure is composed of ODA-like aid, OOF and vague flows. Since OOF and vague flows might only to a lesser extent be aimed at development, inclusion of these flows might underestimate the effects of Chinese aid (Dreher et al., 2017). Appendix D shows the estimates obtained when only ODA-like Chinese aid is taken into account. These indicate some minor differences compared to when all Chinese aid is taken into account. Regions that receive ODA-like aid show greater improvements in human development, as represented by the positive aid dummy. As such, this result could indicate that ODA-like aid is more effective (Dreher et al. 2017), but again, it cannot be ruled out that this result is obtained due to a selection problem. Another difference is that the interactions between CPI and aid are not significant anymore.

Until now, it is assumed that World Bank aid in regions that receive no Chinese aid is comparable to World Bank aid in regions that do receive Chinese aid. However, as Hernandez (2017) shows, conditionality on World Bank aid is significantly reduced as Chinese aid increases. Since it is argued here that conditionality is a critical component that makes World Bank aid different from Chinese aid (Moss and Rose, 2006), it could make sense to treat World Bank aid separately in regions when it is

³⁶ Turning points are at a logged value of 11.69 World Bank aid and 15.05 Chinese aid respectively

exposed to Chinese presence, compared to when it is not. As such, the model is estimated three more times, where regions that received only World Bank aid, only Chinese aid, and aid from both are considered separately. This has the added benefit that selection does not affect the estimates, because all unselected regions are left out. Consequently, the interpretation of the aid coefficients becomes the effect of an increase in aid, given that the region is selected by the respective donor or donors. The results of these estimations are presented in appendix E.

These indicate that when the World Bank and China are single donors, both forms of aid positively affect growth, and these effects are not conditional on institutional quality or natural resources. However, if Chinese aid is measured using only ODA-like projects, no significant effects of Chinese aid are obtained. Furthermore, it is found that ODA-like Chinese projects relate to lower growth in resource rich countries. As such, these estimations do not find evidence that ODA-like Chinese aid is more effective for development than total Chinese aid (Dreher et al. 2017). Instead, ODA-like aid might even be less effective, especially in regions that are located in resource rich countries.

Conversely, when regions that receive aid from both donors are treated separately, no significant relation between aid and growth is found. If only ODA-like Chinese projects are considered, it is obtained that World Bank aid and Chinese aid both negatively affect human development, when the amount of aid from the other donor is equal to the average. The positive interaction term indicates that both World Bank aid and Chinese aid become more effective when the amount of the other donor increases. Since the size of the interaction coefficient is small compared to its main effects, both forms of aid are negatively related to growth in the entire sample³⁷. As such, this could indicate that Chinese presence undermines the effectiveness of World Bank aid (Woods, 2008). However, since Chinese aid appears to be also affected by World Bank presence, it seems more likely that competition between donors undermines the effectiveness of both World Bank and Chinese aid. Consequently, this result suggests that competition between donors increases bargaining power for the recipient country, so that a smaller proportion of aid resources might be devoted to development (Djankov et al. 2009). While it is still obtained that both forms of aid are complementary (Foster et al, 2009), this does not compensate enough for the negative impact that competition has on aid. Finally, little evidence has been found that any form of Chinese aid is conditional on good institutions or natural resources.

³⁷ Calculating the turning points yields that World Bank aid becomes positive at a logged financial value of 20.5, and Chinese aid at a logged financial value of World Bank aid higher than 19.8. Since the maximum values of World Bank aid and Chinese aid in this sample are 18.4 and 20.6 respectively, the estimates obtained here indicate that both forms of aid are almost always negatively related to change in human development in these regions, but less so if the amount provided by the other donor increases.

7. Conclusion

This thesis started with the observation that Sub-Saharan Africa has finally faced a prolonged period of economic growth since the 2000s. Amongst other factors, it has been argued that foreign aid has contributed to this growth. However, no consensus has yet been reached about the effectiveness of aid to enhance sustainable development in the recipient country. Additionally, the relation between aid and growth has become more complicated as a result of China becoming increasingly important as alternative to traditional aid. Taking this into account, the central question that has been tried to answer here is: *What is the effect of different forms of aid on human development in Sub-Saharan Africa?* This thesis has distinguished itself from the existing literature in multiple ways. Firstly, the effect of aid is measured at the regional level, rather than aggregated to the country level. Secondly, the dependent variable used here is the change in human development over economic growth, which is potentially a better measure for sustainable economic growth. Thirdly, a distinction is made between World Bank aid and Chinese aid, to account for the possibility that different forms of aid might have different effects on human development. Additionally, this thesis has also taken into account that the presence of multiple donors might influence aid effectiveness.

The results presented here indicate that the effectiveness of aid depends on how aid is measured. If the overall effects of aid are taken into account, it is obtained that World Bank aid does not enhance human development, while Chinese aid does. Furthermore, evidence has been found that both forms of aid are complementary to each other. Additionally, these results suggest that aid is more effective in good policy environments and less effective in resource rich countries, but only when there is sufficient competition between donors. However, if regions that receive World Bank aid but no Chinese aid are considered, it is found that World Bank aid does enhance human development. Furthermore, Chinese aid positively affects growth in regions that do not receive World Bank aid, but this effect disappears when only ODA-like Chinese projects are measured. When regions are considered that received aid from both donors, neither form of aid can be related to growth. Additionally, it is found that both forms of aid negatively affect growth in these regions when only ODA-like Chinese aid is taken into account, but it is also obtained that World Bank aid and ODA-like Chinese aid are complementary to each other. Finally, in the separated regressions, no evidence has been found that aid is conditional on good policy or natural resources.

Although these results suggest that increases in aid has complementary effects in regions in which both donors are present, competition could be devastating for the effectiveness of aid of both donors. Since both World Bank aid and Chinese aid are found to be less effective in regions that receive aid from both donors, this could indicate that competition increases bargaining power for the recipient region. Additionally, ODA-like Chinese aid is found to be less effective than total Chinese aid, which

indicates that different forms of Chinese aid also have different effects on growth. This is a surprising result, and cannot be explained by the existing literature.

The analysis presented here has faced several limitations. Since some results in this thesis might be influenced by selection, this analysis could be improved by finding a suitable instrument to address this issue. Additionally, the sample used here covers a relatively short time-period. As such, it cannot be ruled out that some long-term effects of aid could not be captured. Further research that is able to extend the current sample could test the robustness of these results over a longer period. Finally, the results in this thesis are only applicable to Sub-Saharan Africa. Future research that includes other developing regions could test whether the results obtained here can be generalized to other developing regions.

The findings of this thesis could be the starting point for further research. It is obtained that the effectiveness of aid depends on how aid is measured. Although some evidence has been presented that competition has negative consequences for the effects of aid on growth, further research is needed to better explain the channels through which donors affect each other. This research could focus on the policy conditions attached to aid, and study which policy conditions are more likely to be cut if China is also a donor in the region. Additionally, further research could explore whether World Bank presence also affects Chinese aid. Furthermore, although it was expected that ODA-like Chinese investments would be more effectively aimed at development, the opposite result was obtained. Based on the current literature, this effect cannot be explained, which shows that additional research is needed to improve the understanding of Chinese aid.

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Appendix A: List of Countries included

Table 3. Countries, regions and years included

| COUNTRY | NUMBER OF REGIONS | YEARS INCLUDED |
|--------------------------|-------------------|----------------|
| ANGOLA | 6 | 2000-2014 |
| BENIN | 6 | 2000-2014 |
| BOTSWANA | 10 | 2000-2014 |
| BURKINA FASO | 13 | 2005-2014 |
| BURUNDI | 5 | 2000-2014 |
| CAMEROON | 10 | 2000-2014 |
| CENTRAL AFRICAN REPUBLIC | 6 | 2000-2014 |
| CHAD | 8 | 2000-2014 |
| COMOROS | 3 | 2004-2014 |
| CONGO BRAZZAVILLE | 4 | 2000-2014 |
| CONGO DR | 11 | 2000-2014 |
| COTE D'IVOIRE | 10 | 2000-2014 |
| DJIBOUTI | 2 | 2000-2014 |
| ERITREA | 6 | 2005-2014 |
| ETHIOPIA | 11 | 2000-2014 |
| GABON | 10 | 2000-2014 |
| GAMBIA | 8 | 2000-2014 |
| GHANA | 10 | 2000-2014 |
| GUINEA | 8 | 2000-2014 |
| GUINEA BISSAU | 9 | 2005-2014 |
| KENYA | 8 | 2000-2014 |
| LESHOTO | 10 | 2000-2014 |
| LIBERIA | 15 | 2000-2014 |
| MADAGASCAR | 6 | 2000-2014 |
| MALAWI | 8 | 2000-2014 |
| MALI | 8 | 2000-2014 |
| MAURITANIA | 9 | 2000-2014 |
| MAURITIUS | 3 | 2000-2014 |
| MOZAMBIQUE | 11 | 2000-2014 |
| NAMIBIA | 13 | 2000-2014 |
| NIGER | 7 | 2000-2014 |
| NIGERIA | 6 | 2003-2014 |
| RWANDA | 5 | 2000-2014 |
| SAO TOME & PRINCIPE | 4 | 2000-2014 |
| SENEGAL | 10 | 2000-2014 |
| SIERRA LEONE | 14 | 2000-2014 |
| SOMALIA | 18 | 2000-2014 |
| SOUTH AFRICA | 9 | 2000-2014 |
| SUDAN | 15 | 2000-2014 |
| SWAZILAND | 4 | 2000-2014 |
| TANZANIA | 8 | 2000-2014 |
| TOGO | 6 | 2000-2014 |
| UGANDA | 4 | 2000-2014 |
| ZAMBIA | 9 | 2000-2014 |
| ZIMBABWE | 10 | 2000-2014 |

Appendix B: Variables, Description and Sources

Table 5. Variables, description and sources

| Variable | Description | Source |
|----------------|--|---|
| ΔHDI | The change in human development compared to the beginning of the period over which aid is measured, where both HDI values calculated as the average HDI value of the previous, current and next year | GDL Subnational Human Development Index Database V2.1 |
| WB Dummy | Dummy variable that takes the value of 1 if the World Bank has provided aid and 0 otherwise | AidData (2017) WorldBank Geocoded Research Release Level 1 v1.4.2 Geocoded Dataset |
| CH Dummy | Dummy variable that takes the value of 1 if China has provided aid and 0 otherwise | Bluhm et al. (2018) AidData's Geocoded Global Chinese Official Finance, Version 1.1.1 |
| World Bank Aid | Total amount of aid provided by the World Bank, measured as financial value in 2011USD in terms of disbursements if possible, else commitments were used. Also measured in number of projects. Both values are measured as the average value over the previous 5 years | AidData (2017) WorldBank Geocoded Research Release Level 1 v1.4.2 Geocoded Dataset |
| Chinese Aid | Total amount of aid provided China, measured as financial value in 2011USD in terms of commitments is used. Also measured in number of projects. Both values are measured as the average value over the previous 5 years | Bluhm et al. (2018) AidData's Geocoded Global Chinese Official Finance, Version 1.1.1 |
| HDI0 | The HDI value at the start of the period over which aid is measured, calculated as the average HDI value of the previous, current and next year | Globaldatalab.org Human Development Index Database V2.1 |
| CPI | Country level measure of perceived corruption, scaling from 0-100, where 0 means highly corrupt, measured as the average CPI value over the previous five years | Corruption Perceptions Index |
| DEMO | A measure of institutionalized democracy, scaling from 0-10, where | Polity IV Project: Regime Authority Characteristics and Transitions Datasets, Annual Time Series, 1800-2017 |
| POP | Subnational population, measured as the logged average subnational population over the previous five years | GDL Area Database 3.3.1 |
| RES | Dummy variable that takes the value of 1 if a country is considered resource rich and 0 otherwise | Blomqvist, M., Thorborg, N., (2015), missing data has been completed with wits.worldbank.org |

Appendix C: Descriptive Table of Statistics

Table 4. Descriptive table of statistics

| Variables | (1) N | (2) mean | (3) sd | (4) min | (5) max |
|---------------------|----------|-------------|-----------|------------|------------|
| <i>WB Dummy</i> | 4195 | .6091516 | .4879987 | 0 | 1 |
| <i>WB Aid (Log)</i> | 4195 | 12.26436 | 6.497165 | 0 | 18.63635 |
| <i>CH Dummy</i> | 4195 | .465205 | .4988473 | 0 | 1 |
| <i>CH Aid (Log)</i> | 4195 | 11.25028 | 6.427436 | 0 | 20.61359 |
| <i>CPI</i> | 3282 | 28.80293 | 9.967946 | 8.8 | 62 |
| <i>DEMO</i> | 3534 | 4.111262 | 3.066303 | 0 | 10 |
| <i>RES</i> | 4195 | .4482841 | .4973775 | 0 | 1 |
| <i>HDIO</i> | 4195 | .4350786 | .1019375 | .1923333 | .7666667 |
| <i>POP</i> | 4195 | 2115533 | 4115372 | 10000 | 5.16e+07 |

Appendix D: Regression output including only ODA-like Chinese projects

Table 6. Regression output excluding interactions between aid donors

| | (1) | (2) |
|-----------------------------|-------------------------------------|-------------------------------------|
| <i>WB Dummy</i> | 0.00210 [*] (2.06) | 0.00215 ^{**} (2.11) |
| <i>World Bank Aid (WB)</i> | -0.0000319 (-0.32) | -0.000186 [*] (-1.68) |
| <i>CH Dummy</i> | 0.00158 ^{**} (2.13) | 0.00168 ^{**} (2.28) |
| <i>Chinese Aid (CH)</i> | 0.000461 ^{***} (5.36) | 0.000443 ^{***} (5.06) |
| <i>CPI</i> | -0.000462 ^{***} (-4.70) | -0.000441 ^{***} (-4.21) |
| <i>CPI * WB</i> | | 0.00000764 (0.89) |
| <i>CPI * CH</i> | | 0.0000204 ^{**} (2.14) |
| <i>DEMO</i> | 0.00117 ^{***} (3.05) | 0.00116 ^{***} (2.96) |
| <i>DEMO * WB</i> | | 0.0000229 (0.59) |
| <i>DEMO * CH</i> | | 0.00000380 (0.13) |
| <i>RES</i> | 0.0146 (1.33) | 0.0166 (1.50) |
| <i>RES * WB</i> | | 0.000514 ^{**} (2.51) |
| <i>RES * CH</i> | | -0.000326 ^{**} (-1.97) |
| <i>HDIO</i> | -0.448 ^{***} (-36.18) | -0.451 ^{***} (-36.18) |
| <i>POP</i> | 0.00257 (1.44) | 0.00210 (1.17) |
| <i>N</i> | 4195 | 4195 |
| <i>Countries</i> | 45 | 45 |
| <i>Regions</i> | 384 | 384 |
| <i>Region Fixed Effects</i> | Yes | Yes |

t statistics in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 7. Regression output including interactions between aid donors

| | (1) | (2) |
|-----------------------------|-------------------------|-------------------------|
| <i>WB Dummy</i> | 0.000837 (0.79) | 0.000253 (0.23) |
| <i>World Bank Aid (WB)</i> | 0.00000351 (0.03) | -0.000282** (-2.37) |
| <i>CH Dummy</i> | -0.000771 (-0.69) | -0.00141 (-1.28) |
| <i>Chinese Aid (CH)</i> | 0.000534*** (3.04) | 0.00000647 (0.03) |
| <i>WB Dummy * CH Dummy</i> | 0.00361*** (2.66) | 0.00449*** (3.30) |
| <i>WB * CH</i> | -0.00000553 (-0.49) | 0.0000254** (2.11) |
| <i>CPI</i> | -0.000458*** (-4.13) | -0.000543** (-2.54) |
| <i>CPI * WB</i> | | 0.00000183 (0.10) |
| <i>CPI * CH</i> | | 0.0000230 (1.37) |
| <i>CPI * WB * CH</i> | | 0.000000386 (0.24) |
| <i>DEMO</i> | 0.00108** (2.43) | -0.000832 (-1.19) |
| <i>DEMO * WB</i> | | -0.0000678 (-1.43) |
| <i>DEMO * CH</i> | | -0.000202*** (-2.72) |
| <i>DEMO * WB * CH</i> | | 0.0000145*** (3.03) |
| <i>RES</i> | 0.0156 (1.10) | 0.0269* (1.86) |
| <i>RES * WB</i> | | 0.00131*** (5.72) |
| <i>RES * CH</i> | | 0.00133*** (3.38) |
| <i>RES * WB * CH</i> | | -0.000109*** (-4.52) |
| <i>HDIO</i> | -0.448** (-17.80) | -0.450*** (-17.51) |
| <i>POP</i> | 0.00241 (1.11) | 0.00213 (0.98) |
| <i>N</i> | 4195 | 4195 |
| <i>Countries</i> | 45 | 45 |
| <i>Regions</i> | 384 | 384 |
| <i>Region Fixed Effects</i> | Yes | Yes |

t statistics in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Appendix E: Regression output when aid forms are treated separately

Table 8. World Bank aid treated separately

| | (1) | (2) |
|-----------------------------|------------------------|------------------------|
| World Bank Aid (WB) | 0.00375** (2.51) | 0.00281* (1.90) |
| CPI | -0.00100*** (-3.93) | -0.000168 (-0.21) |
| DEMO | 0.00282*** (2.77) | 0.000694 (0.36) |
| RES | 0.0900*** (4.79) | -0.0403*** (-2.71) |
| HDIO | -0.580*** (-12.77) | -0.635*** (-13.05) |
| POP | 0.0194*** (2.91) | 0.0154** (2.48) |
| CPI * WB | | -0.00000346 (-0.02) |
| DEMO * WB | | -0.000209 (-0.56) |
| RES * WB | | 0.00103 (0.37) |
| <i>N</i> | 1286 | 1286 |
| <i>Countries</i> | 41 | 41 |
| <i>Regions</i> | 324 | 324 |
| <i>Region Fixed Effects</i> | yes | yes |

t statistics in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 9. Chinese Aid treated separately

| | (1) | (2) | (3) | (4) |
|-----------------------------|-------------|-------------|----------------|----------------|
| | China All | China All | China ODA-like | China ODA-like |
| Chinese Aid (CH) | 0.00120* | 0.00160* | -0.000169 | -0.000706 |
| | (1.84) | (1.95) | (-0.30) | (-0.99) |
| CPI | -0.000523** | -0.00143*** | -0.000501** | -0.000519 |
| | (-2.54) | (-3.35) | (-2.16) | (-0.94) |
| DEMO | 0.0113*** | 0.0178*** | 0.0109** | 0.0215*** |
| | (2.93) | (5.94) | (2.30) | (7.88) |
| RES | 0.117*** | 0.140*** | 0.0167 | 0.195*** |
| | (3.74) | (6.00) | (1.31) | (8.11) |
| HDIO | -0.297*** | -0.303*** | -0.352*** | -0.437*** |
| | (-4.85) | (-4.60) | (-5.31) | (-6.40) |
| POP | -0.00631* | -0.00817** | -0.00382 | -0.00589 |
| | (-1.74) | (-2.11) | (-1.04) | (-1.51) |
| CPI * CH | | -0.0000236 | | -0.0000186 |
| | | (-0.33) | | (-0.24) |
| DEMO * CH | | -0.0000815 | | -0.000183 |
| | | (-0.23) | | (-0.61) |
| RES * CH | | -0.000442 | | -0.00320** |
| | | (-0.34) | | (-2.58) |
| <i>N</i> | 681 | 681 | 573 | 573 |
| <i>Countries</i> | 33 | 33 | 32 | 32 |
| <i>Regions</i> | 234 | 234 | 226 | 226 |
| <i>Region Fixed Effects</i> | yes | yes | yes | yes |

t statistics in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 10. Aid from both donors treated separately

| | (1) | (2) | (3) | (4) |
|----------------------|------------------------|------------------------|-------------------------|------------------------|
| | China All | China All | China ODA-like | China ODA-like |
| LWB | -0.00160 (-1.11) | -0.00121 (-0.49) | -0.00620*** (-3.91) | -0.00569*** (-2.61) |
| LCH | 0.00137 (0.95) | 0.00186 (1.09) | -0.00376** (-2.50) | -0.00320* (-1.74) |
| INTER | 0.0000867 (0.25) | -0.0000511 (-0.12) | 0.00108*** (3.06) | 0.000873* (1.95) |
| CPI | -0.000462** (-2.38) | 0.00297** (2.54) | -0.000663*** (-3.51) | 0.00195 (1.27) |
| CPI * WB | | -0.000828** (-2.41) | | -0.000691* (-1.72) |
| CPI * CH | | -0.000494 (-1.50) | | -0.0000943 (-0.25) |
| CPI * WB * CH | | 0.000113 (1.36) | | 0.0000233 (0.25) |
| DEMO | 0.000318 (0.50) | -0.000639 (-0.21) | -0.000164 (-0.26) | 0.00510 (1.36) |
| DEMO * WB | | 0.000251 (0.33) | | -0.00119 (-1.20) |
| DEMO * CH | | 0.00117* (1.91) | | -0.000569 (-0.75) |
| DEMO * WB * CH | | -0.000282* (-1.82) | | 0.000129 (0.70) |
| RES | 0.0313 (1.38) | -0.101* (-1.73) | 0.0676*** (3.02) | 0.120** (2.14) |
| RES * WB | | 0.00242 (0.44) | | 0.00190 (0.38) |
| RES * CH | | 0.00366 (0.87) | | 0.00385 (0.92) |
| RES * WB * CH | | -0.000838 (-0.83) | | -0.000371 (-0.38) |
| HDIO | -0.393*** (-16.67) | -0.407*** (-7.21) | -0.246*** (-9.39) | -0.238*** (-7.04) |
| POP | 0.00852 (1.62) | 0.00837 (0.78) | -0.0162*** (-2.67) | -0.0159* (-1.88) |
| N | 1270 | 1270 | 1064 | 1064 |
| Countries | 37 | 37 | 35 | 35 |
| Regions | 264 | 264 | 233 | 233 |
| Region Fixed Effects | yes | yes | yes | yes |

t statistics in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$