Does Foreign Aid Equal Welfare?

Impact of sectoral foreign aid on the Human Development Index - A panel data study

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Abstract

For decades, foreign aid has been a way to uphold political relationships, promote growth and development as well as a response during emergencies. Research on the relationship between foreign aid and economic growth has been done extensively. However, research on aspects beyond economic ones is far more limited. To extend the discussion regarding foreign aid, this thesis examines foreign aid and its relationship with the Human Development Index to capture more aspects of development than sole economic ones. As previous research has given ambiguous results on the effects of foreign aid on human development, we disaggregate the aid term to see how the effects vary depending on which sector it is allocated to. Specifically, this thesis examines how the three largest foreign aid sectors affect HDI. These sectors are: social infrastructure, economic infrastructure and production. Through a panel data study spanning 21 years and 84 countries, the objective is to better understand where aid should be allocated to reach the best results on overall welfare. Our results display a significant relationship between the social infrastructure sector and HDI which is our most important finding. Further, no significant effect is found from aid in economic infrastructure, or in the production sector on HDI.

Keywords: *foreign aid, sectoral aid, HDI, human development*

Acknowledgements

We would like to thank each other for staying positive and supportive throughout the process of writing this thesis. It is even probable that we will remain friends after this. We also wish to thank Karin Bergman for your feedback and input whenever we have felt lost.

List of abbreviations

DAC Development Assistance Committee

GDP Gross domestic product

GNI Gross national income

HDI Human Development Index

MDGs Millennium Development Goals

ODA Official Development Assistance

OECD The organisation for Economic Co-operation and Development

UNDP United Nations Development Programme

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1. Introduction

We live and operate in an unequal world. One individual's share of the wealth and possibilities offered, can be fundamentally different from another's. The World Bank (2013) reports that more than 787 million people live under the international poverty line with less than $1.90 a day. The lack of access to clean drinking water, proper sanitation, food and other basic needs is extensive (The World Bank 2018). Changing these facts is a challenging task requiring international cooperation. One of the measures taken to tackle these inequalities is foreign aid.

Foreign aid is voluntarily transferred money sent by individuals, organizations, foundations, religious groups or governments. It can be a grant or a loan with the aim to assist social and economic development, or as a response to a disaster in a receiving country. The most recognized form is Official Development Assistance (ODA) which is limited to aid undertaken by governments.

Increasing volumes of ODA have raised a discussion on aid effectiveness. Several studies have investigated the impact of aggregated aid on economic growth and human welfare, with ambiguous results. It is therefore essential to develop a greater understanding of the effects of foreign aid to be able to improve living conditions in the recipient countries. As aid allocated to different sectors are probable to promote welfare in various ways, we argue that it is necessary to investigate aid in its disaggregated form to see the separate effects on human welfare. Through this, it is possible to allocate aid in the sector which is most likely to correspond with development policy. Further, this evokes the question of how to measure development. It has traditionally been done by using economic growth as an indicator of societal progress and development. However, an increase in DP says little about the distribution of income, and thereby not enough of overall development. The Human Development Index (HDI) has therefore emerged as an alternative measure to account for progress made within health and education, in addition to the economic dimension.

Thus, the overarching objective of this thesis is to investigate foreign aid and its effect on human welfare measured by the Human Development Index. The primary interest lies in the sectoral allocation and how the effects on HDI differ among these sectors. By examining the sectors receiving the largest amounts of aid, we aim to analyze the effects on welfare in recipient

countries. The usage of HDI aim to widen the concept of development by not solely looking at economic growth, but rather how countries succeed in converting growth to increased health and education. As increased living standards is what we want to achieve with economic growth, it is of more reason to investigate this directly rather than indirectly through growth.

We hope to contribute to existing research by obtaining an increased understanding of the effects of foreign aid. More research and knowledge within the field could facilitate for donors and recipients in future decisions and policy making. Since targeted aid, development aid programs and donor interest largely determine where aid ends up, insights in sectoral effects on HDI could hopefully increase the effectiveness of these allocations and make them more precise. In order to achieve the research objectives, we perform a panel data analysis on 84 countries spanning the years 1995 to 2015. Our key independent variables consist of sector data from OECD and are in conjunction with five control variables: political instability, openness, government consumption, government investment and GDP growth. Our results indicate a positive and significant relationship between the social infrastructure sector and HDI. Further, neither the economic infrastructure sector nor the production sector indicates a significant effect on HDI.

Following this introduction, our background is outlined in the second section. The third section presents an overview of previous conducted research. The fourth section provides a more exhaustive description of our included variables as well as the econometrics used to perform the study. In section five, our results are presented and in the following section, six, a discussion in relation with our theoretical framework and results is done. Lastly, section seven, we give a brief conclusion of our results followed by a wish of further research.

2. Background

This section presents the concept of foreign aid, its objectives and a closer examination of how international policies have shaped aid distribution. Further, we examine the sectors receiving the most aid and their presumed effects on welfare. This is followed by a section concerning the Human Development Index and its ability to measure welfare. Lastly, we outline some of the problems and challenges with foreign aid.

2.1 An overview of foreign aid

To realise international development strategies foreign aid is distributed through, inter alia, projects, loans and emergency relief. The aim with foreign aid is to increase economic growth as well as other human welfare indicators in developing countries (OECD 1 2018). During the last decades, significant amounts have been yearly transferred, mainly to developing countries. Due to the complexity of foreign aid, examining its societal effects is important. When aspiring to improve the allocation and effectiveness of aid, one must locate its determinants. Since access to basic needs such as health and education are largely determined by aspects such as gender, geographical location, ethnicity and socioeconomic status, these must be taken into account. Two thirds of all aid is allocated in this thesis target sectors: social infrastructure, economic infrastructure and production (OECD 2 2018) . The components in each of these sectors, which will be addressed shortly, are connected to different assumptions regarding the expected effects they should have on HDI.

Foreign aid and its relationship with economic growth has been subject to extensive research and debate. Both at the macro level, if foreign aid can stimulate growth and eliminate poverty, and at the micro level, focusing on more project based development (Deaton 2008). Still, there is no consensus on whether foreign aid has a positive or a negative effect on economic growth. Neither cross country nor country specific studies have brought conclusive results (Mallik 2014). This has lead scholars and researchers into a new direction towards the Human Development Index. Since welfare cannot only be measured through economic devices, HDI was introduced to emphasize the importance of people's capabilities and has become a frequently used measure in the last 20 years.

2.2 Official Development Assistance

The concept of aid typically refers to Official Development Assistance as this is the most commonly used measure, and therefore what we will refer to when discussing aid. ODA refers to aid in the form of grants and loans with grant elements provided by official agencies such as governments as well as multilateral organizations. Military aid is not included in ODA. Countries eligible for receiving foreign aid are chosen based on per capita income by the Development Assistance Committee (DAC) which is a forum consisting of 30 of the largest donors with the aim to coordinate aid efforts. A UN-defined target level of aid has been set in which donors are encouraged to donate 0.7 per cent of GNI (OECD 1 2018). This is generally accepted by the DAC-members, and nowadays also non-DAC members who are emerging as large donors (OECD 3 2018). Statistics indicate that almost 90 percent of the ODA is represented by grants and 70 percent of the aid flows are through bilateral agreements (Staicu and Barbulescu 2017). The channels in which aid can be transferred are multiple. It can be transferred through bilateral agreements where the donor provides the funds directly to the recipient, or multilateral where the aid is canalized through organizations such as the World Bank or the UN (OECD 4 2018). Further, ODA can be measured either through commitments or through disbursements. Commitments are defined as "a firm obligation expressed in writing", whereas disbursements "record the actual international transfer of financial resources" (OECD 5 2018).

The reason for donors to provide aid can be motivated by either humanitarian or ethical reasons. However, most research indicate that donors to some extent are motivated through self-interest and expect something in return. The self-interest can be political in terms of supporting countries with corresponding ideologies or the donor can expect to benefit economically (Todaro and Smith 2012: 701).

The development of aid objectives and approaches towards these have been evolved through decades of cooperation between the large donors. In 2000, aid policies experienced a paradigm shift when the Millennium Project was launched by the UN. The Millennium Development Goals (MDGs) were set up as a concrete action plan to strongly target extreme poverty and increase global education, health and equality (UN 2000). An impediment to achieving the MDGs were however found in the necessary financing. The deficit in resources led to the Monterrey Conference in 2002 where world leaders gathered to discuss the challenges of

providing the financial means. The conference resulted in an agreement where the participants acknowledged the importance of ODA to pave the way for development. In the agreement, developed countries were urged to make efforts to reach the UN-defined target level of 0.7 percent of GNI (UN 2003). The large increase in volumes of ODA resulted in a wish for more efficiency. This lead to the Paris Declaration of Aid Effectiveness in 2005 where the countries agreed on increased monitoring and harmonisation between states to achieve development goals (OECD 2005). Consequently, constant measures are taken to improve the effectiveness of aid flows in order to attain the set objectives and increase the global well-being. The diagram below illustrates the development of total ODA from 1995 to 2015 as well as the changes in the largest sectors. As seen, the amounts have steadily increased.
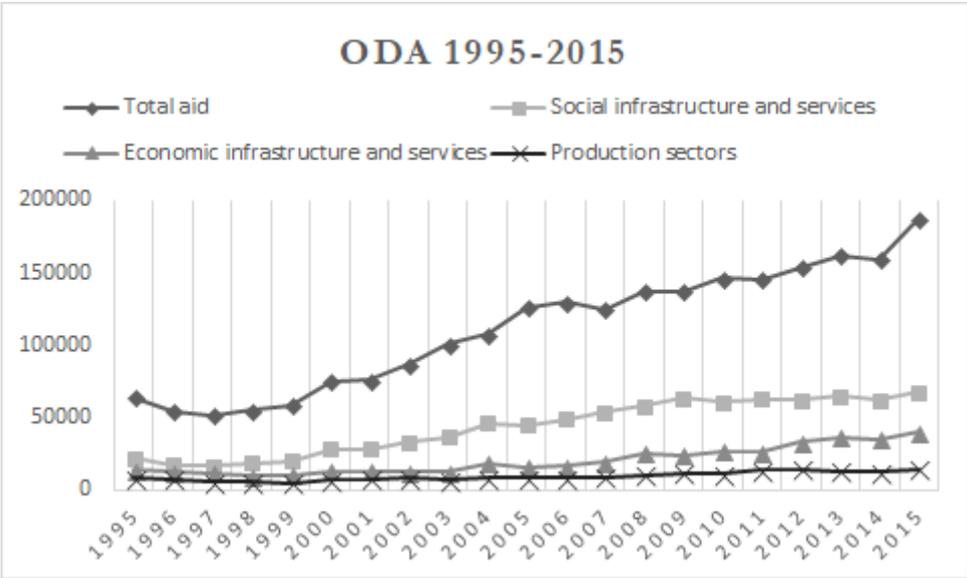
Diagram 1. Amount of total Official Development Assistance 1995 to 2015, expressed in constant millions 2015 $USD

2.3 Sectoral aid

Along with policy development there has been a larger emphasis on sector specific aid to target certain goals (Akramov 2006). The reason is simply that not all aid is for growth purposes. Aid can be provided to spur education and health, to facilitate political stability or to provide support in emergency situations. The allocation of the aid should therefore be adjusted to cohere with the objective.

The sectors receiving the largest amounts of aid are as mentioned social infrastructure, economic infrastructure and production. Below are the different components in each of the sectors presented. Their evolvement over the years as well as their relationship to HDI will be outlined in the following section. The rationale behind examining aid categorized in sectors is the idea that aid into the social sector will affect human welfare and development through other channels than if it goes into the production sector or economic infrastructure. It is therefore of importance to examine how the effects of aid can vary depending on which sector it is allocated to.

Social infrastructure sector	Economic infrastructure sector	Production sector
Education	Transport and Storage	Agriculture, Forestry, Fishing
Health	Communications	Industry, Mining, Construction
Population Pol./Progr. And Reproductive Health	Energy	Trade Policies and Regulations
Water supply and sanitation	Banking and Financial Services	Tourism
Government and civil society	Business and other services	

Table 1 presents the divisions in which aid is allocated.

2.3.1 Social infrastructure sector

Social infrastructure includes investments in education, health, sanitation and access to water, but also aims to strengthen the government and civil society. As aid to the social sector directly targets two of the components in HDI, namely health and education, it is expected to have a larger effect on HDI rather than on growth. Health and education can also be viewed to have simultaneous relationship. Healthy individuals are more likely to invest in education, in the same way as individuals who are educated tend to be more aware of the importance of a healthy lifestyle (Lebre de Freitas 2015). It is, however, possible to examine the effects of aid to social infrastructure from the economic dimension as well. When aid is located in this sector, one objective is to enhance human capital. Drawing from economic growth theory, we assume that investments in human capital will generate growth. In the same way as physical capital will

generate returns, we can treat aid aimed at social infrastructure as an investment in health and knowledge which will also bring societal returns. As human capital, in similarity with physical capital, depreciates with time it is not a onetime investment, rather something that continuously has to be maintained. Allocating aid into this sector should thereby correspond well with the dimensions included in the Human Development Index (Akramov 2006).

2.3.2 Economic infrastructure and service sector

Communications, transportations, financial institutions and markets stimulate business opportunities and activities. These play core roles in maintaining economic performance and is therefore more directly correlated to the income component of HDI. Investments in economic infrastructure are meant to facilitate economic efficiency through improved communications, energy and road construction. Moreover, it is targeted towards economic institutions to strengthen the financial system. Improved economic infrastructure is intended to attract foreign investors which in return will help boost the economy (Akramov 2006). Peoples' chances of starting a business or a country´s prospect of developing highly depends on these mechanisms. Furthermore, when the economic infrastructure is in place, there is a better chance of reducing poverty and stimulate growth (JICA 2017). Facilitation of economic societal aspects are thereby stimulated through allocation in this sector (Pöntinen 2014).

2.3.3 Production

Aid to production sectors is meant to ease accumulation of physical capital through investments in agriculture, manufacturing, mining, construction, trade, and tourism industries (Akramov 2006). As the share of manufacturing in GDP is an important determinant of economic growth (Cheng and Haraguchi 2016), the production sector has more close connection to economic development aspects. Therefore, the elements within this sector should correspond to a larger extent with the economic aspects of HDI. However, sceptics claim that aid allocated to the production sector tends to favour modern technology which is capital-intensive rather than labor-intense. This could instead result in unemployment which would lead to welfare losses (Todaro and Smith 2012: 699).
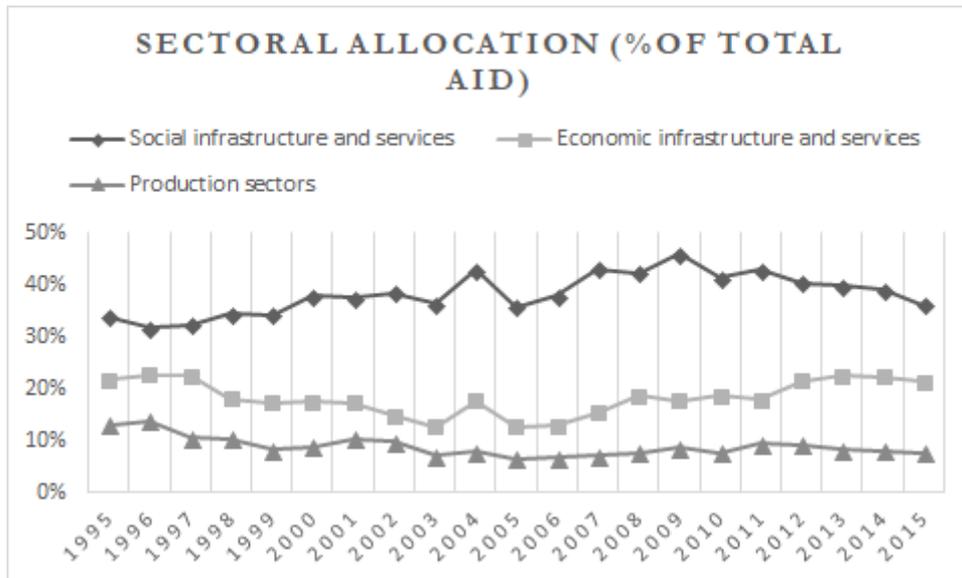
Diagram 2. Sector allocation of aid for the three largest sectors, here presented as a share of total aid

Above, the diagram illustrates the sectoral allocation of aid throughout the years 1995 to 2015. Note that this only presents aid allocated to our sectors of interest. Aid going to social infrastructure increased at the start of the period examined, peaking at a receivement of 46 percent of total ODA. The share has however slightly decreased. Seemingly, this has been met by the opposite trend in aid allocated to economic infrastructure. The share going into the production sector severely decreased previous to the examined period, due to a declining commitment towards agriculture (Akramov 2012). During the examined period, the share going to the production sector has continued to experience a slight decrease. Declining aid to the agricultural sector has been met with criticism due to the fact that this sector often has a close connection to a large part of the population through employment and livelihood in developing countries (Pöntinen 2014).

2.4 Measuring welfare

When examining the effects of aid, one must first define how to measure this. Development is commonly measured in terms of economic development, leading to a majority of studies focusing on economic growth. However, using economic growth as an indicator of development and well-being can be widely misleading. It is not wrong to assume that economic growth is an important tool in increasing human development, but one leaves out many aspects when only considering this. Measuring development from the perspective of a country's growth rate

excludes consideration of how the country make use of the growth and increased possibilities. As the aim of economic development is to increase living standards, development should be measured by how well this is done. We therefore argue that it is appropriate to investigate the effects of aid from the perspective of another measure than economic growth. A range of indicators can be used to assess a country's development, but as previously mentioned, a widely used one is the Human Development Index (HDI) which we in this paper will use to measure welfare and development.

HDI was created for the United Nations Development Programme (UNDP) and is used to assess other aspects of development rather than solely monetary ones. Thus, it examines both the economic and social aspects of development. The reason for using HDI as a measure has a close connection to Amartya Sen's theory of functioning's and capabilities. Functioning's refer to seeing income as a mean to other ends and that the value of growth lies in what can be achieved from it, whereas capabilities are the freedoms people have, given their personal features (Sen 1998). During the 1950s and 1960s several developing countries reached their economic growth targets, yet the majority of people in those countries still suffered from low living standards, also called "growth without development". This indicated that there was a narrowness of defining development with only economic terms (Smith and Todaro 2012: 15). The poorest can be deprived of the basic means they need to be able to take valuable actions as well as the capabilities to make substantial choices. This further stress the importance of looking beyond economic measure (Todaro and Smith 2012: 19)

To widen the concept of development, HDI includes three different components: health, education and standard of living. The health dimension is measured by life expectancy at birth and education by mean years of schooling for adults above 25 years old and expected years of schooling for children entering school age. Further, standard of living is measured by per capita GNI. The importance of human capital is emphasised together with GNI with the aim to provide and identify the most deterministic parts of development (UNDP, 2018). By using HDI, the aim is to get a broader understanding of how wealth is distributed as this is not observable through solely looking at GDP. If the distribution is unequal it will result in a lower HDI as the economic development only constitute a third of the index. Conclusively, the relevance of HDI as a measurement in examining the effects of aid lies in the possibility to both see how it lifts the economy, but also to which extent this improves living conditions and opportunities for the people.

When examining the effects of aid, it is reasonable to believe that the sectoral allocation has various effects depending on if HDI or economic growth is used as a measure. Although increased schooling and thereby human capital is believed to be associated with growth, the effects are more indirect whereas HDI may be affected within a shorter time-frame. This would be demonstrated by an increase in HDI but may not be reflected simultaneously in growth. Similarly, investments in health are likely to lead to a stronger economy as more people are able to work for a longer time, but the increased life expectancy will be more strongly reflected in the change in HDI rather than in economic growth. In conclusion, the usage of HDI does not mean that economic growth is not an important tool in increasing welfare, merely that further aspects are important to consider. Looking at how the sectoral allocation of aid affects HDI rather than economic growth does not remove the importance of this but instead includes a broader perspective.

It is, however, of importance to mention shortcomings with measuring welfare through HDI. Being an index, it ranges between 0 to 1 meaning that a country's increase or decrease of the HDI components is put in relation to other countries performances. If the top country increases their HDI in a faster pace it may appear as if other countries do not improve the well-being measured by HDI. Moreover, values are missing for some countries and components and the imputation of numbers may be a source of misleading results (UNDP 2018). Criticism has also been directed at the calculation of HDI. The index is insensitive to imbalance between variables as it indicates perfect substitution and alternative calculations, for example that the product of the three dimensions should be used instead, have been suggested (Sagar and Najam 1998). Also, as HDI says nothing about the quality of each component, we cannot say that the quality of life increases when a person gets an extra year to live. Lastly, the UNDP states the well-known fact of using models or indexes to assess actual societal change or state. When one uses a constructed index, it will never be a correct reflection of society as it is merely indicators of human welfare and does not give a complete picture of human development.

2.5 Challenges with foreign aid

The debate concerning the efficiency of foreign aid is derived from its complexity and the difficulties in determining a positive relationship between aid and welfare. An extensive amount of literature has therefore focused on the challenges with aid and why it may be unsuccessful

in generating increased growth and welfare. Most frequently mentioned when discussing why no significant impact of aid is found are the problems with fungibility and crowding out, which are outlined below.

A widely acknowledged challenge is to assure that money from aid end up where it is intended to. It lies within donors interests that aid is allocated effectively and that it promotes the set objective (Akramov 2006). However, the relationship between foreign aid and government spending is not straightforward. Over 50 percent of government spending in the largest aid recipients originates from foreign aid. If aid intended for expenditure in certain sectors instead is used in another sector, aid is called fungible. One example could be that aid donors wish to finance the construction of a new school in a recipient country, and the government already has undertaken funds to build the school. The school will still get built, but the donors money will be used elsewhere and could thereby finance something donors do not support or reduce the recipient county's tax efforts within that sector (Devarajan and Swaroop 1998). A reduction of tax efforts is also called a crowding out effect, which is an unwanted response of fungible aid. In a working paper presented by IMF employees, a negative relationship between ODA and domestic tax revenues is found. However, this relationship seems to have weakened as efforts to mobilize domestic revenues have increased (Bendek et al. 2012). Identifying fungibility tends to be difficult (van de Walle and Mu 2007), nonetheless, there is no evidence claiming that fungibility will offset the positive effects from foreign aid. An examination of aid recipients does show that some sectoral aid is partially fungible. Yet, if aid proves to be effective despite fungibility, donors do not have to put too much emphasis on this (Pettersson 2007).

In contrast to fungibility and the crowding out effect, the flypaper theory builds on the idea that aid will expand government spending and thereby increase spending in the sectors concerned, more than an equivalent increase in income would. According to this theory foreign aid is associated with both increased tax efforts as well as increased expenditure (Remmer 2004). Empirical research of a roads program in Vietnam conducted by the World Bank indicates that even though the project suffers from partial fungibility, there is a sectoral flypaper effect where areas which were a part of the road program built far more roads than those who were not a part of it (van de Walle and Mu 2007). In conclusion, the challenges of foreign aid do not seem to offset the positive effects it generates.

3. Previous research

This section wishes to outline the previous research on HDI and development. As research on sectoral aid is quite limited, this literary review mostly covers aggregated aid and its effect on human welfare. Articles with varying results will be reviewed, which demonstrates the ambiguity within the area. Further, literature examining under which conditions aid is more effective will be reviewed to get a more cohesive understanding of why results may differ.

3.1 Positive relationship between aid and HDI

Previous research which is adjacent to our field of study has been made with ambiguous results. Gomanee et al. (2005a) use panel data on 104 countries over the period 1980 to 2000 to investigate whether aid has a positive effect on human welfare. Welfare is measured by HDI and infant mortality, and the effect is anticipated to be either direct or through economic growth. Moreover, the authors consider whether aid increase welfare by increasing government expenditure directed at sanitation, education, and health. The findings indicate a positive effect of aid on the aggregated welfare, though not through increased expenditures to the social sector. In a further quantile regression on 38 countries over 1980 to 1998, Gomanee et al. (2005b) get additional significant results on the positive effect of aid on human welfare. This study does, however, indicate an impact through increased public expenditures. Common in both studies is the tendency to convergence, as the results are stronger for countries with a lower initial level of welfare. The results suggest that it is the level of welfare that affects the effectiveness of aid and not the quality of policies, even though it might ease the process. To achieve a greater understanding, Mohamed and Mzee (2017) examine the impact of foreign aid on welfare by doing split regressions on the variables making up the HDI. The study covers 124 countries over the period 1980 to 2013 and a quantile regression is performed to analyse how the indices of HDI are affected at different stages of welfare. First, the results imply aid is successful in promoting overall human development. Second, this study also exhibit tendencies to convergence as the largest effects on the overall HDI are seen on countries in the lower quantiles. Moreover, the results suggest a positive impact of aid on all three indices. There is, however, different impact on the quantiles depending on which part of the index that is investigated. Aid seems to have a larger impact on the lower quantiles when considering the income and educational index while aid's impact on the health index only is significant on the

median and upper quantiles. The results therefore emphasise the importance of aid allocation to promote human development.

Article	Author	Summary	Econometric procedure
Aid, Government Expenditure, and Aggregate Welfare (2005)	Karuna Gomanee, Oliver Morrissey, Paul Mosley and Arjan Verschoor	**Main focus**: If aid increase aggregate welfare, directly and indirectly through growth and public expenditure **Main results:** Aid has a positive effect on welfare, though not through public expenditures.	Panel data for 104 countries over the time period 1980-2000. Accounts for government expenditures.
Aid, Public Spending and Human Welfare: Evidence from Quantile Regressions (2005)	Karuna Gomanee, Sourafel Girma and Oliver Morrissey	**Main focus**: Aid´s effect on human development in excess of increasing growth. **Main result**: Aid is more effective in countries with low levels of human development.	Panel data for 38 countries between 1980-1998. Quantile regression to estimate effect on different levels of welfare.
Foreign Aid And Human Development: A Quantile Regression Approach (2017)	Masoud Rashid Mohamed and Said Seif Mzee	**Main focus:** Examine if aid affects aggregate welfare as well as all HDI components **Main results:** Positive effect on aggregate welfare. Effects on the indices differ among the quantiles.	Panel data (unbalanced) and quantile regression approach for the data from 124 developing countries covering the period 1980 to 2013.

3.2 Negative relationship between foreign aid and HDI

There is also previous research that find a negative relationship between foreign aid and HDI. In a well cited article, Boone (1996) examines the relationship between aid and governance, growth and also human development indicators. The results indicate a negative relationship between aid and human welfare indicators such as infant mortality, life expectancy and schooling. He suggests that aid is used by the political elite and is therefore not successful in preventing poverty and promoting human development. However, that study did not allow for

aid affecting the allocation of government spending. Further, Kumler (2007) use HDI to measure aggregate welfare in 87 countries covering the span 1980 to 2000. Similar to Gomanee et al. (2005a) and Gomanee et al. (2005b) Kumler accounts for expenditures aimed at the social sector and its influence on HDI. However, the conclusion contradicts the previous results as it indicates that foreign aid is negatively associated with HDI level. The author suggests this might be due to omitted variable bias, where explanatory variables are left out of the regression and the results can therefore be biased. Data used in the study is also only averaged across five time periods from 1980 to 2000. As for all econometric analysis lack of data or missing data can result in fallacious results. The results do suggest that government expenditures in social sectors can increase the welfare. They also, however, imply a crowding-out effect where more aid leads to decreased government expenditures. Lastly there is literature analyzing aid and HDI in a context of conflict. Noorbakhsh and McGillivray (2001) aim to examine whether foreign aid can offset the negative impact conflict has on HDI. This is made by studying 93 low- and middle-income countries, were 26 were affected by conflict. The main conclusion is that foreign aid does not have the capacity to offset the negative impact of conflict and the study indicates that both aid and conflict are negatively associated with HDI. Countries that had experienced conflict in the last three years had lower values of HDI than those who had not, which is in line with what one would expect. However, the result that aid is negatively associated with HDI the authors describe as perplexing. Important to add is that the conflict variable did not affect this result. The explanation presented by the authors is that their method does not capture the complex channels through which aid affects society, and thereby HDI.

Article	Author	Summary	Econometric procedure
Politics and the effectiveness of foreign aid (1996)	Peter Boone	**Main focus:** Aid effectiveness in context of political regimes. **Main results:** Aid does not improve HDI or increase investments but indicate an increase in size of government.	Panel data for 96 countries covering 1971-1990. The years are averaged for every 5 year period to remove influence of shocks.
The Impact of Foreign Aid on Development and Aggregate Welfare in Developing Countries (2007)	Todd Kumler	**Main focus:** Investigate whether aid is successful in increasing HDI **Main results:** Foreign aid is negatively correlated with HDI	Two-stage least squares estimation covering 87 countries from 1980 to 2000 while controlling for government expenditures.
Aid, Conflict and Human Development (2007)	Mark McGillivray and Farhad Noorbakhsh	**Main focus:** If aid can offset negative impact of conflict **Main results:** Aid does not offset the negative impact of conflict. Both aid and conflict are negatively correlated with HDI.	Two-stage least squares estimation covering the period 1975 to 1999 for 93 countries where 26 are described as conflict affected.

3.3 Aid effectiveness

To fully comprehend the ambiguous effects of foreign aid, further studies have been made to identify the factors promoting and impeding its influence. Collier and Dollar (2002) examined the importance of poverty-efficient allocation of aid. They base their research on previous results which has concluded that donors should take three aspects into account: The quality of policies, that the amount of aid does not affect policies and lastly that it is hard to target aid, due to fungibility. The marginal effect of aid comes with diminishing returns depending on the quality of policies and the amount of aid that a country receives. The effects of aid are largest where there is widespread poverty and good policies, as aid cannot be targeted at certain households. Countries with good policies will use the aid more effectively and thereby have a higher chance reducing poverty. When aid instead is allocated based on historical aspects, strategic or as an inducement to policy reform, it is not allocated properly. The authors deem

this as the main issue when there is a lack of effectiveness. Moreover, Kosack (2003) shows that aid effectiveness was contingent on the level of democratization in the recipient country. He specifies a model similar to a neoclassical, endogenous economic growth model where quality of life depends on aid/GDP, level of democracy and an interaction term with these two, as well as a range of control variables. He found that the positive correlation between aid and HDI could only be found via its interaction with different measures of democratization. Aid alone was negatively correlated with HDI. This indicate that the effectiveness is conditional on policy. Akramov (2006) continues the previous discussion on how effectiveness of aid in terms of economic growth is dependant on good governance. This is, however, considered in terms of sectoral aid allocation as it is not likely that aid into different sectors affect growth in a uniform way. The sectors considered are social infrastructure, economic infrastructure, production sector and the remaining sectors are compiled in one group. Interaction terms are created between governance and the sectors to see how different levels of governance affect the efficiency in the sectors in various ways. Measures of governance include democracy, political rights and liberty and institutional quality. The author concludes that aid to production and social sectors tend to be more effective when there is a low level of governance, while aid to economic infrastructure is more efficient in countries with higher levels of governance. This strengthens the hypothesis that it is important to look at aid disaggregated in order to understand its effects. Altogether, the articles emphasise the importance of how aid allocation can improve the effectiveness of aid.

Article	Authors	Summary	Econometric procedure
Aid allocation and poverty reduction (2002)	Paul Collier and David Dollar	**Main focus**: Compares a poverty-efficient allocation of aid with actual allocation of aid. **Main result**: Maximum effect of aid depends on level of poverty and quality of polices. Efficiency could double through proper allocation.	Panel data for 59 countries covering the period 1974 to 1997
Effective aid: How democracy allows development aid to improve quality of life (2003)	Stephen Kosack	**Main focus:** How and if aid can improve quality of life. **Main result:** Political environment determines whether aid increases quality of life or not.	Uses a variant of the neoclassical endogenous growth model but adjusted for quality of life rather than growth. OLS and two-stage least squares for 130 countries covering 1974 to 1995.
Governance and Foreign Aid Allocation (2006)	Kamiljon Akramov	**Main focus:** If governance have the same impact on aid effectiveness in all sectors **Main result:** Aid is more efficient in social and production sectors when there is a low level of governance, and otherwise more efficient when going to economic infrastructure.	A difference-in-difference estimator is applied on 140 countries covering 1973 to 2002. The disaggregated form of aid is investigated.

The inconclusive results derived from the various studies demonstrate the complexity in achieving the desired results from aid. The results do however imply that a greater understanding in this field of study is necessary in order to have aid improve living conditions in the recipient countries. With our study, we hope to add yet another brick in the work towards understanding through which channels aid will lead to greater human welfare.

4. Econometric Method

This section will outlay our empirical method. A description of our included variables will be presented, followed by an examination of the data and its sources. Further, descriptive statistics and an econometric specification will be provided and followed by an econometric discussion to ensure correct interpretation of the results.

The objective with this paper is to examine if and how the effects on HDI differ depending on the sectoral allocation of aid. This gives our key independent variables *social infrastructure*, *economic infrastructure* and *production*. To investigate this, a regression on panel data is performed. Panel data can be described as a combination of cross-sectional and time series data which allow us to follow and compare cross-sectional units (countries) over time. The study covers 84 countries during the period 1995-2015, with 1869 observations which we argue provide the study with enough observations to achieve meaningful results. In addition to our key independent variables, a number of control variables are included in the regression. The control variables are included as they are expected to have an impact on HDI and the choice of variables is based on previous research. The time interval and number of countries is set by available data as OECD only publish data on sector allocations from 1995.

4.1 Included variables

GDP

Empirics imply a strong correlation between GDP and HDI (Rosling 2012). This indicates that countries are successful in converting economic growth into higher life expectancy and increased education. The causality can however go both ways as it is probable that higher enrollment rates and better health have a positive impact on growth. Nevertheless, GDP is presumed to correlate positively with HDI.

Political instability

An index calculated from the Center for Systemic Peace where their Fragility State Index has been slightly readjusted to represent political instability. The original index is summarized from a number of indicators of stability. As it partly consists of the HDI and other variables included in our dependent variable, these variables were cut off, leading to a lower maximum sum. Research has suggested a negative relationship between political instability and economic

growth (Alesina et al. 1996; Collier and Dollar 2001). Further, Acemoglu and Robinson (2012) emphasise how stable and democratic political institutions to a higher extent invest in education. From this, political instability is believed to have a negative impact on HDI.

Government consumption

Government consumption, here measured as a share of GDP, can be both positively and negatively associated with HDI. In the well-cited study on determinants of growth, Barro (1996) suggests a negative relationship between government consumption and growth. The relationship is illustrated through the Barro curve where he illustrates that government spending will to a certain point be beneficial to society until the ratio of productive government expenditure to GDP peaks and thereafter declines (Barro 1990). Further, Landau finds a positive relationship between public spendings and growth among low-income countries which diminishes and turns negative at higher income levels. As countries eligible for aid are located at lower income levels the effects on growth are implied to be positive. In addition, results are anticipated to be different when examining effects on HDI. As government consumption is more closely connected to other variables within the HDI index than growth, the results on HDI are believed to be positive. That is, government consumption directed towards education and health may not increase growth but rather other welfare indicators.

Investments

Measured as gross capital formation as a share of GDP, investment here refers to accumulation of physical capital and is believed to have a positive effect on HDI through the income index. This is derived from economic growth theory where investments are positively associated with growth as it allows for a higher output and thereby higher GDP. Notable is that the causality is seen as twofold as a higher growth rate enables a higher investment ratio (Barro 1996).

Openness

As a measure of openness, we use what it often referred to as as the openness index. The index is calculated as the ratio of (export+imports)/GDP. In theory, openness is associated with higher levels of GDP as it allows for an exchange of ideas and technology. Empirics strengthens the thesis of the close correlation between growth in volumes and GDP (Jones and Vollrath 2013: 16, 148-150). Further studies suggest a positive relationship between trade and human welfare (Davies and Quinlivan 2006).

4.2 Data

The data used in the study is collected from several databases (see table 2 for details on the variables). The data for HDI is retrieved from the UNDP, United Nations Development Programme, which annually compile the HDI values. To collect data on GDP and openness, the World Bank database was used and data on savings and government consumption is obtained from Penn World Tables. As mentioned, data on political instability is retrieved from the Center for Systemic Peace. Data for the key independent variables comes from the credit reporting system at OECD which allows detailed information on where aid goes. The data provides numbers on ODA flow commitments from all donors, which includes multilateral organizations and donor countries which are not members of DAC. The three sectors included in the study are those receiving the largest amounts of aid and we argue that this makes them the most appropriate sectors to investigate. As the other sectors also had a higher frequency of missing data, this strengthens our argument to focus on the three largest sectors in order to obtain more reliable results.

Variable	Description	Source
loghdi	The logarithm of the human development index	HDR
loggdp	The logarithm of GDP in constant 2015 $US	World Bank
logsoc	The logarithm of aid going into the social infrastructure and service sector, as a share of GDP	OECD, Creditor Reporting System
logeco	The logarithm of aid going into the economic infrastructure and service sector, as a share of GDP	OECD, Creditor Reporting System
logprod	The logarithm of aid going into the production sector, as a share of GDP	OECD, Creditor Reporting System
logopen	The logarithm of openness, calculated as (import + export)/GDP	World Bank
logsavings	The logarithm of government investment, share of GDP	Penn World Tables
loggovconsump	The logarithm of government consumption, share of GDP	Penn World Tables
polity	Index over political instability	Center for Systemic Peace

Table 2. Variable description

It is of importance to address possible shortcomings in the collected data. For some years, data is not available. We have decided to run the regressions with some missing values as we consider it to be of more importance to have a larger number of observations, and since we cannot see a system in the missing values, which would indicate that it is somewhat endogenous in the model (Verbeek 2017: 51). To assure this, we did the same regressions after removing countries with several missing values and received the same results. Regarding the data, there is the question on quality as it can be challenging to collect data in developing countries. The databases used for this study do, however, have high standards on the data as they follow the principles of international statistics and take constant measures in increasing the quality. Conclusively, there is seldom perfect and fully comprehensive data but as we use data from high quality databases, we consider the data reliable enough to analyze.

4.3 Descriptive statistics

In table 3, statistics for mean, max and minimum value is displayed, as well as number of observations. The descriptives present the non-logarithmized values to make the numbers more understandable. As each of the panels in the data contain the same number of time points, Stata considers our panel strongly balanced. The table below does however exhibit some missing values as all variables should otherwise have an equal amount of observations.

Variable	Observations	Mean	Min	Max	Std. Dev.
HDI	1869	.5788	.23	.847	.1346
GDP	1869	163538.2	322.78	1.11e+07	674955.5
aid to social infrastructure (% of GDP)	1862	.0178	0	.219	.0234
aid to economic infrastructure (% of GDP)	1835	.0078	0	.1591	.0124
aid to production sector (% of GDP)	1850	.0042	0	.0637	.0067
political instability	1816	4.8871	0	12	2.924
openness	1812	74.78	.021	220.4	36.02
investment	1700	.1926	.0069	.5999	.0813
government spending	1700	.1712	.0355	.9544	.0852

Table 3. Descriptive statistics

4.4 Empirical method

To test how different foreign aid sectoral allocations affect HDI, a regression model with panel data has been conducted. The initial regression model is presented below.

$$loghdi = \beta_1 + \beta_2\ logsocial_{i,t-1} + \beta_3\ logeco_{i,t-1} + \beta_4\ logprod_{i,t-1} + \beta_5\ loggdp_{i,t} + \beta_6\ polity_{i,t} +$$
$$\beta_7\ logopen_{i,t} + \beta_8\ loginvest_{i,t} + \beta_9\ loggovconsump_{i,t} + \varepsilon_{i,t}$$
$$i = 1\ldots 84 \text{ and } t = 1996\ldots 2015$$

However, when doing comparisons between countries it is reasonable to believe that there are variations that are not explained by the model, i.e individual specific effects. If this is the case, the error term

$$\varepsilon_{i,t} = \alpha_i + u_{i,t}$$

consists of the individual specific effect α_i, which is constant over time but varies between countries, and the error term $u_{i,t}$. After reassuring this (see Hausman test in section 4.5), a correction of the regression was made and the problem addressed by including individual-specific intercepts, landing in the one-way fixed effects regression model

$$loghdi = \alpha_i + \beta_1\ logsocial_{i,t-1} + \beta_2\ logeco_{i,t-1} + \beta_3\ logprod_{i,t-1} + \beta_4\ loggdp_{i,t} + \beta_5\ polity_{i,t} +$$
$$\beta_6\ logopen_{i,t} + \beta_7\ loginvest_{i,t} + \beta_8\ loggovconsump_{i,t} + u_{i,t}$$
$$i = 1\ldots 84 \text{ and } t = 1996\ldots 2015$$

which is used in the regressions. As seen, the dependent variable is the HDI and key independent variables are aid in social infrastructure sector, aid in the economic infrastructure sector and aid in the production sector. This is followed by control variables which are included in the regression to reduce the risk of spurious regressions as they are believed to affect the dependent variable.

The natural logarithm is, in accordance with previous research, used for all variables except for political instability. The reason for using the logarithm is that it reduces skewness in data as well as it allows the the possibility to interpret the coefficients as elasticities. This means that the effect of a one percent change in an independent variable, can be interpreted directly as the coefficient represents the percentage change in the dependent variable. Further, the aid variables

logsocial, logeco and *logprod* have all been lagged one year. The time of the lag has its ground in previous research (Gomanee et al. 2005a; Gomanee et.al, 2005b; Kumler 2007), as the effect of aid is assumed to not have an immediate effect. It is possible to argue that aid takes even longer to have an effect, but as the index in large parts is constructed of "expected"-factors such as life expectancy and expected years of schooling which change faster, we argue that the one-year lag is enough. This also makes the study more consistent with previous research instead of the alternative of using another arbitrary time lag. Moreover, the aim of the lag is also to cope with an endogeneity problem as the allocation of aid reflects the level of development and income (Gomanee et al. 2005a). If more aid is given to countries which experience slower growth, the effects of aid on economic growth can be perceived as negative as high amounts of aid is associated with slow growth rates, and therefore also slower increase in HDI. By lagging the aid variables, the effect of previous aid is to have an effect on current HDI. Subsequently, the regression is performed on split samples. The countries are divided into groups after per capita level of income to see if the effective allocation of aid varies between the groups. It should be noted that this means a smaller number of observations in each group and the results can therefore be considered less reliable.

4.5 Econometric discussion

To ensure that we can correctly interpret and analyze our regressions, it is necessary to perform a series of tests. Firstly, the data needs to be stationary. This is generally true if the mean and the variance of the distribution, as well as the covariance between values, do not depend on time (Dougherty 2016: 481). To test the variables for stationarity, we used a Fisher type unit root test which is based on the Augmented Dickey-Fuller test but adjusted for unbalanced panels. The test resulted in high p-values for *loggdp* and *logopen*, indicating nonstationarity. However, the variables proved to be difference-stationary and as we argue that the change in GDP and openness are likely to have an impact on HDI, the first difference of the variables are included in the regressions.

Thereafter, tests for multicollinearity were made to investigate whether there is a linear relationship between the independent variables. Multicollinearity exists in nearly all regressions and it is rather a question concerning the degree of it than if it exists. When there is a high degree of multicollinearity, the standard errors will be larger, and coefficients suffer higher risk of being wrongly estimated (Dougherty 2016: 171). The multicollinearity was tested through a

Variance Inflation Factor (VIF) test where values above 10 indicate that the variables might be inappropriate to use as there can be misleading results (Baum 2006: 85). The highest value was 4.18, suggesting that multicollinearity is not a problem. However, the correlation matrix shows relatively high correlations between some of the explanatory variables. Although, solely high correlation does not mean the estimates will be imprecise (Dougherty 2016: 171) and as the VIF values are relatively low and the variables have been used in previous research we will keep the independent variables.

Further problems which can arise are those of autocorrelation and heteroscedasticity. Autocorrelation is common in time series data and therefore also in panel data. When there is autocorrelation in the data, the observations are dependent of each other as its error terms correlate. If this is the case, the variances are unnecessary large, and the standard errors tend to be biased (Dougherty 2016: 446-448). The Wooldridge test for autocorrelation in panel data rejected the null hypothesis that the data does not exhibit autocorrelation. Heteroscedasticity means that the error terms differ in variance between the observations, with similar consequences as when error terms are autocorrelated; the estimates of our parameters are inefficient and standard errors are likely to be biased (Dougherty 2016: 290-293). To test for heteroscedasticity, a number of tests were performed. White's test, Breusch-Pagan and the LR-test for panel data all rejected the null of homoscedasticity at p-value 0.000, implying that heteroscedasticity is present. Due to the heteroscedasticity and autocorrelation, robust standard errors are used in the regressions to adjust for the shortcomings.

To be able to determine whether a fixed effects model or a random effects model is more appropriate to use, the Hausman test for random effects was performed. Under the null, the random effects model is the most efficient. The observed p-value of 0.000 implies the fixed effect model will provide the most efficient results. This indicates that the individual specific effects in the error term are correlated with the independent variables, consequencing in misleading estimates (Dougherty 2016: 532). The fixed effects model controls for the individual specific effects by creating intercepts that vary for the countries included. From this, the possibility to interpret the intercepts coefficient diminishes (Verbeek 2017: 384). This is, however, not an issue as this is not the purpose of the thesis.

5. Results

In the following section, the results from our panel data regression are presented. First, the results from our three sectors will be brought forward. The results indicate a positive significant relationship between the social infrastructure and HDI. No significant result was found for the other key variables. Second, the results for our control variables are presented and briefly discussed.

In table 4 the regression results are presented. First, the aggregated result for HDI is shown while the remaining columns presents the results when performing a split regression based on the countries' level of income. For each variable, the coefficient is presented with robust standard errors in the parenthesis. Each regression also presents the number of countries and observations included, as well as adjusted R^2 which indicates to what degree the variation in the dependent variable can be explained by the model.

| | | HDI as dependent variable, with countries subcategorized after relative per capita income | | |
Variables	HDI	Bottom 25 %	Mid 25% - 75%	Top 75 %
_constant	-.1758*** (.0518)	-.9285*** (.2152)	-.0378*** (.0973)	-.6686** (.1944)
Δgdp	-.0044 (.0223)	-.0136 (.0158)	-.0378 (.1250)	-.0852 (.0733)
social infrastructure	.0256*** (.0040)	.0413*** (.0075)	.0319*** (.0017)	.0052 (.0056)
economic infrastructure	.0008 (.0015)	.0055* (.0029)	-.0001 (.0016)	.0020 (.0025)
production	-.0013 (.0026)	.0043* (.0021)	-.0042 (.0039)	-.0045 (.0045)
political instability	-.0186*** (.0038)	-.0116 (.0070)	-.0156*** (.0053)	-.0139** (.0056)
Δopenness	.0413* (.0226)	.0904** (.0416)	.0218 (.0149)	.07399* (.0377)
investment	.0862*** (.016)	.0812*** (.0245)	.0674*** (.0217)	.0142 (.0374)
government consumption	-.0005 (.0209)	-.0430 (.0358)	.0223 (.0244)	-.0405 (.0443)
Adjusted R^2	.3764	.5007	.3241	.2905
Countries	84	27	54	26
Observations	1513	337	759	416

Table 4. Results from regressions with HDI as dependent variable. ***, ** and * denote significance at 1 %, 5% respectively 10 % level. Robust standard errors are presented in the parentheses.

5.1 Results from the sectoral data

The first regression presents the thesis' main results. We find that aid allocated into the social infrastructure sector has a significant positive impact on HDI with a p-value of 0.000. The results imply that an increase of aid to the social sector will lead to a higher HDI the following year. As the coefficient can be interpreted as elasticities, it is implied that a one percent increase

in aid to the social sector will increase HDI with approximately 0.026 percent. Likewise, the coefficient for aid allocated to economic infrastructure is positive but is in contrast not significant. Further, a negative correlation between aid allocated in the production sector and HDI is suggested, but the result is not significant. The same result is found when using a time lag of three respectively five years, implying that a one-year lag is sufficient in capturing the effects of aid. Altogether, the main finding is that human welfare measured by HDI is affected in different ways depending on which sector aid is allocated to.

When examining the remaining three columns, we can see the effect on countries at varying levels of income. For countries in the bottom quantile, aid tends to have a significant positive effect on HDI independent of its allocation. Aid allocated into the social infrastructure sector does however exhibit a stronger degree of significance. For countries in the middle of the income distribution, only social infrastructure presents significant results which also here are positive. The other sectors display negative coefficients, although these are not significant. Lastly, there seems to be no significant relationship between aid and HDI for the countries in the top quantile. With the lack of significance in mind, the results indicate a positive effect of aid allocated to social and economic infrastructure while the coefficient for the production sector is negative.

5.2 Results from control variables

Further, the results of the control variables are examined. The coefficient for GDP is surprisingly negative for all regressions. As we use the derivative of the variable, this suggests that a higher economic growth would lead to a lower HDI. The results are however not significant. The coefficients for political instability show the expected negative sign for all regressions and is significant for all except for the lowest quantile. The results for openness also present the anticipated sign, though it is not significant for the countries in the middle of the income distribution. The effect seems to be largest for countries in the lower quantile which exhibits a two-star significance, while the aggregated significance is weaker with a p-value of 0.072. Investment also display the expected positive sign, with three-star significance in all regressions except for the top quantile which is insignificant. Government spending is insignificant for all regressions. This suggest that overall, the positive effect of spending in health and education does not outweigh the negative effect on economic growth.

In conclusion, results imply that aid operates in a non-uniform way amongst sectors. The main findings in this essay are the following: (i) the correlation between HDI and aid allocated to social infrastructure is significantly positive, (ii) aid allocated to economic infrastructure gives positive but insignificant results, (iii) the relationship between HDI and aid to production sector is negative but insignificant, (iv) countries with lower income tend to react positively to all aid.

6. Discussion

This thesis aims to investigate whether the effect of aid on human welfare is dependant on which sector foreign aid is allocated to. With emerged discussions regarding the effectiveness of aid together with ambiguous previous research, it is of importance to obtain a deeper understanding of aid in a disaggregated form. The Human Development Index serves as a proxy for human welfare and is believed to give a more cohesive overview of a country's development rather than the more classic method of measuring economic growth.

The results are in line with our hypothesis suggesting that effects of aid tend to differ between sectors. Our first finding (i) indicates that investments in social infrastructure, meaning education, health and other societal groundworks, will have a positive effect on HDI. It is therefore implied that the welfare and overall living conditions in recipient countries increases. This corresponds with the objective to investigate human development rather than economic growth as this sector is more closely related to the non-economic components in HDI. It is however plausible that aid allocated to the social sector enhance economic growth indirectly through increased human capital, and economic growth is in turn plausible to result in increased health and education in addition to the effect on the income component. The later is indicated through the high correlation between income and HDI. The effect of aid to this sector is therefore possible to operate in multiple ways, with a more direct effect from the start but also indirect through growth, although within a longer time frame.

Our second finding (ii) indicates that aid allocated to economic infrastructure have a positive but insignificant effect on HDI. As previously mentioned, the dimensions of this sector are associated with factors mainly meant to spur and facilitate economic growth. Its connection with HDI should therefore lie within the income component. Even though a stable economic infrastructure can facilitate mechanisms which could enhance growth and reduce poverty, the non-economic values within HDI are seemingly not captured through this sector as it does not provide any significant results. Without overlooking the importance of economic growth, the results imply that aid allocated to spur growth is insufficient in providing a significant effect on welfare measured in terms of HDI.

Further, our third finding (iii) shows a negative and insignificant relationship between the production sector and HDI. Similarly, to economic infrastructure, this sector might have a closer relationship with the more economic dimensions of the index. The insignificant result is quite surprising since individuals in developing countries tend to be more closely connected to the agricultural sector. A possible explanation could be the one provided by sceptics, where investments are made in more modern sectors and therefore leads to structural changes. This could be positive for the economy as the productivity may increase, although the average citizen may experience welfare losses due to unemployment and thereby diminishing opportunities.

Our fourth finding (iv) suggests that the effects of aid vary with a country's level of income. This result corresponds with previous research in which it is implied that the effects of aid are larger when welfare is lower (Mzee & Rashid, 2017; Gomanee et al. 2005b). This implies that the individuals with the lowest income will respond positively to foreign aid, independent of sectoral allocation. As a main objective of the Millennium Development Goals is to eradicate extreme poverty and hunger, this would to a great extent include countries within the lowest quantile. This indicates that foreign aid could serve as a mean to achieve a part of the MDGs. However, as countries eligible for aid are carefully chosen after income level, it is a bit puzzling that not all exhibit some significant effect of aid. Although, as mentioned, these results should be examined with caution as the number of observations decreases when the sample is split. Further, by investigating the regressions' values for adjusted R^2, it is implied that there are different factors explaining HDI. The value for the bottom quantile is the highest at approximately 50 percent, while the value of 29 percent for the countries with higher incomes indicates that relevant explanatory variables could be missing.

Moreover, findings concerning our control variables are worth discussing. In line with studies implying a negative relationship between political instability and growth (Collier and Dollar, 2001; Alesina et al. 2000), our regression generates a negative relationship between political instability and HDI. Likewise, the results for the openness variable are in line with previous research (Davies and Quinlivan 2006) as it is significantly positive. As predicted, investment reveals a significant and positive relationship with HDI. The results on government spendings show no significant effect on HDI, corresponding with results by Mohamed and Mzee (2017) and Gomanee et al. (2005a). Unexpectedly, an increase in GDP indicate a negative, yet insignificant relationship with HDI. Given the close connection to the HDI index, this result is

rather perplexing. Even though this result contradicts reasonable assumptions, the result is insignificant and therefore no inference can be drawn.

Altogether, the results from our study imply that the effects of foreign aid are non-uniform and depends on which sector the aid is allocated to. The choice to measure welfare in terms of the Human Development Index rather than economic growth is reflected in the result as aid targeted towards the health and education give the seemingly largest effects. Thus, it is of important to emphasise the complexity in measuring welfare. The results in this study merely suggest how aid allocation can affect HDI, and as the concept of human welfare includes many dimensions we do not claim the study to cover all components of well-being or the quality of these. It is possible that another composition of the weights, as well as more included components would lead to different results. After emphasising the importance of being aware of limitations, we still suggest that HDI is a suitable proxy for human welfare and that our study therefore contributes to an increased understanding of the effectiveness of aid.

7. Concluding remarks

The objective of foreign aid is to increase economic growth as well as other human welfare indicators in developing countries. It has been used for decades to uphold political relationships, promote development as well as an emergency response. Research on the welfare effects begun with focusing mainly on economic indicators, yet this has changed the last two decades after the introduction of the Human Development Index, a more inclusive measurement. This study has aimed to contribute to the research on foreign aid and HDI by examining the effects sectoral allocation of aid on the index. Our results indicate that allocation in the social infrastructure sector will have a positive effect on HDI, and thereby hopefully overall welfare in recipient countries. The contribution of this study is then as follows; if the aim of foreign aid is to increase welfare in excess of economic measures, aid allocated to social infrastructure tend to be the most efficient. Further, this could facilitate the efficiency of foreign aid allocation if donors know where to target their aid, and recipients which sector to prioritize.

Further knowledge and understanding of the area is necessary to enhance the effectiveness of aid and through that improve global welfare. If it is known in which sectors aid should be allocated in to stimulate development and potentially increase welfare, better allocation of aid is possible. We advise further research on disaggregated aid, together with a closer look at the weighted variables within the HDI and how each would be affected by the sectoral allocation of aid.

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Appendix

List of included countries

Albania	Chile	Guatemala	Lesotho	Nicaragua	Tajikistan
Algeria	China	Guinea	Malawi	Pakistan	Tanzania
Argentina	Colombia	Haiti	Malaysia	Panama	Thailand
Armenia	Congo	Honduras	Mali	Paraguay	Togo
Azerbaijan	Costa Rica	India	Mauritania	Peru	Trinidad and Tobago
Bangladesh	Côte d'Ivoire	Indonesia	Mauritius	Philippines	Tunisia
Benin	Dem.Rep. of Congo	Iran	Mexico	Rwanda	Turkey
Bolivia	Djibouti	Irak	Moldova	Senegal	Uganda
Botswana	Dominican Republic	Jamaica	Mongolia	Serbia	Uruguay
Brazil	Ecuador	Jordan	Morocco	Sierra Leone	Venezuela
Burundi	Egypt	Kazakhstan	Mozambique	South Africa	Vietnam
Cambodia	El Salvador	Kenya	Myanmar	Sri Lanka	Jemen
Cameroon	Gabon	Kyrgyzstan	Namibia	Sudan	Zambia
Central African Republic	Gambia	Laos	Nepal	Swaziland	Zimbabwe

Correlation matrix

	dloggdp	logHDI	logsoc~l	logeco~l	logpro~l	polity	logopen	loginv~t	loggov~d
dloggdp	1.0000								
logHDI	0.0744	1.0000							
logsocial_Ll	0.0590	-0.6214	1.0000						
logecoinfr~l	0.1024	-0.4470	0.7525	1.0000					
logprod_Ll	0.0957	-0.5232	0.8433	0.7723	1.0000				
polity	-0.0449	-0.3687	0.0628	0.0320	-0.0081	1.0000			
logopen	-0.0032	0.2161	0.0965	0.1542	0.1262	-0.3584	1.0000		
loginvest	0.1143	0.4594	-0.2468	-0.1569	-0.2172	-0.3237	0.1458	1.0000	
loggovspend	0.0410	0.1350	0.0032	0.0525	0.0040	-0.0472	0.1270	-0.0379	1.0000

Variance Inflation Factor

. vif

Variable	VIF	1/VIF
logprod_Ll	4.18	0.239152
logsoc_Ll	3.89	0.256770
logecoinfr~l	2.79	0.358521
polity	1.28	0.781754
loginvestm~t	1.23	0.815345
logopen	1.21	0.827353
dlogGDP	1.04	0.963903
loggovspend	1.03	0.971800
Mean VIF	2.08	