Bachelor's thesis

NTNU
Norwegian University of Science and Technology
Faculty of Economics and Management
Department of Economics

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Allocation of Aid

What are the desicive factors for developing countries to receive aid

Bachelor's thesis in Economics
Supervisor: Hildegunn Ekroll Stokke
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Forewords

This thesis marks the end of a bachelor's degree in Economics at the Department of Economics by the Faculty of Economics and Management at the Norwegian University of Science and Technology.

We would like to thank our academic supervisor, Hildegunn Ekroll Stokke, for constructive feedback, excellent guidance and for being available.

Astrid Sofie Festøy, Herman Grimstad Amundsgård, Jasmeen Barmen
Trondheim, May 16th, 2022.

Abstract

This thesis seeks to assay the decisive factors of reception of official development assistance and official development aid among 82 countries with a gross national income below $755 in 2000 and $1045 in 2014. Factors such as development, internal stability, government efficiency and economic stability, and if the country is a former colony. By utilizing datasets obtained from the World Bank, appliance of multiple regression models and satisfying assumptions of the ordinary least square method, it is found that these factors have a significant impact on a country's received aid.

Sammendrag

Denne oppgaven undersøker avgjørende faktorer for mottakelse av bistand hos 82 land med en brutto nasjonalinntekt på under $755 i 2000 og $1045 i 2014. Faktorer som utvikling, intern stabilitet, statlig effektivitet og økonomisk stabilitet, og om et land er en tidligere koloni. Ved å ta i bruk data hentet fra Verdensbanken, anvendelse av multiple regresjonsmodeller og å tilfredsstille forutsetninger ved minste kvadraters metode, er det funnet at disse faktorene spiller en signifikant rolle i et lands mottak av bistand.

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1. Introduction

Economic aid is given to developing countries with the intention to increase growth and stability (Veiderpass & Andersson, 2007). We want to research the decisive factors behind donor nations' decisions to give aid to recipient countries. This is done by looking at data from low- and lower-middle income countries in two different years, 2000 and 2014.

In the year 2000 the world community changed its policies on giving aid. It gave larger amounts to developing countries which had good governmental institutions and more rational politics (Todaro & Smith, 2011). 2014 is significant for several reasons. It is six years after the 2008 financial crisis, meaning most industrial countries had restored economic stability. It is also the year prior to the oil-crisis, another global economic transition. Furthermore, at the summit in Busan in 2011 regarding aid efficiency, donor countries agreed on common principles for development cooperation. The principles emphasize on strategic donations to improve national capacity and development (OECD, 2011).

By comparing these two years, we want to see which factors are important to receive aid and if they have changed over time. Therefore, our thesis question is as follows:

"Which factors determines the reception of official development assistance and official development aid among low- and lower-middle income countries?"

We will present earlier research regarding the topic, elaborate relevant econometric methods, and present the results. Further, we will discuss our main findings and present our conclusion.

2. Theory & Literature

The international financial situation of a country is reflected by its balance of payments and the level of monetary reserves. Developing nations with incurred deficits are dependent of foreign financial resources for their long-run development and poverty reduction strategies. (Todaro & Smith, 2011, p. 684). Aid means to help; however, economists have tried to understand whether foreign investments make a difference, and under what circumstances it has the greatest effect. There are several forms of international flow of financial resources that contribute to an economy. When referring to foreign aid, it regards public and private development assistance (Todaro & Smith, 2011, p. 684).

2.1 Foreign Aid

Foreign aid is international transfer of public funds either as bilateral assistance from one government to another, or through multilateral assistance agencies, for example the World Bank. Foreign aid statistics do not include assistance from private sources, foreign direct and portfolio investments (FDI). It only refers to official development assistance (ODA). These include bilateral grants, concessional loans, and technical assistance as well as multilateral flows. In the first decade of 2000, Denmark, Sweden and the Netherlands gave the highest percentages of their gross national income (GNI). The Middle East and Africa were the areas receiving the most ODA in 2008 (Todaro & Smith, 2011, p. 698).

Aid should be given as a resource for potential economic growth. Common for many developing countries' absence of economic growth is economical gaps. Such as lack of domestic savings, access to foreign currency, government revenue and access to human capital; management gaps. By fulfilling these gaps foreign aid can generate growth. The foreign exchange gap can be covered by aid if imports of capital and intermediate goods are financed by export earnings, and if foreign exchange requirements are larger than export earnings. The budgetary gap is filled if foreign aid covers the deficits, while the management gap is possibly filled with aid as technical assistance (Todaro & Smith, 2011).

The Harrod-Domar Growth Model

The Harrod-Domar growth model can calculate the necessary investment rate to achieve a target growth rate. To invest, an economy must have net savings. If domestic savings is less than required investments, the savings gap can be financed through foreign aid. (Todaro & Smith, 2011, p. 3). The model uses the capital-output ratio, net savings ratio, investments, and depreciation to express the GNI per capita growth rate (Todaro & Smith, 2011, p. 113-114)

$$g^* = \frac{s}{c} - \delta - n$$

Were,

- g* = GNI per capita growth rate,
- s = net savings ratio,
- c = capital-output ratio,
- d = rate of capital depreciation,
- n = population growth

The model says economies must save and invest an amount of their GNI to grow. The economy's growth pace depends on the amount saved and invested. By looking at the actual growth rate for any level of saving and investment, we can measure the inverse of the capital-output ratio, *c*. In inverse, 1/*c*, is the output-investment ratio (Todaro & Smith, 2011, p. 113-114). Foreign aid only fills the savings gap if the aid goes into investments, and the investments generates growth (Todaro & Smith, 2011, p. 684).

2.2 Does Aid Work?

Foreign aid can be given to specific causes, such as famine, general health, or education. (NORAD, 2021). To consider if aid works, the focus will be on whether investments, as an income transfer, in an economy generates growth in total within the country. According to research from the 1990's, foreign aid does not generate much growth. How the income is spent affects the outcome. In the later 1990's and in early 2000, economists tried to understand how, rather than if, aid generates economic growth. The later research still shows that aid has little effect on growth, however it has a greater impact if the country has good policies with little distortions (Todaro & Smith, 2011, p. 14-16).

In attempts to measure aid and growth, there are econometric difficulties. Error terms estimating the different factors are likely to be correlated and do not fulfill the conditions of regression. Different ways of estimating and use of variables give diverse results. Nevertheless, most results indicate weak relations between aid and economic growth. An article by Boone (1995) concludes aid have no significant positive impact on growth.

2.2.1 Allocation of Aid

Knowing that foreign aid alone does not generate growth, it is interesting to research if the knowledge affects how aid is allocated. Is allocation of aid decided by economic and political measurements, or national interests? During the Ebola-epidemic in 2015, UK donated aid to Sierra Leone, an earlier colony, while the US helped Liberia, due to their common history. (BBC, 2014). Aid shall not be profit motivated, however it can be affected by relations between countries and states. Research done by Burnside and Dollar (2000) indicates strategic interests has a bigger factor for allocation to lower middle-income countries, while it has a low explanatory factor of aid to low-income countries. The same research shows aid received is negatively correlated with size and income. This means smaller and poorer countries receive more aid. Looking at the policies, there is no significant tendency for the allocation of aid

bilaterally, though it is a significant positive coefficient when considering multilateral aid (Burnside & Dollar, 2000).

2.2.2 Why Foreign Aid Might Not Work

Burnside and Dollar (2000) discovered a strong positive relation between government consumption and aid received when looking at bilateral aid. Especially aid given with donor interests, seem to increase government consumption. However, this increase has no significant effect on growth. When considering multilateral aid, there are no significant relation between government consumption and aid. While there seems to be no significant tendency for bilateral aid to favor good policy, multilateral aid is allocated in favor of better policies (Burnside & Dollar, 2000). General fear of conflict might cause economic harm. The population might rather save their earnings instead of taking the risk of investing or inventing. The reason being the country is in conflict, or because the people are in fear of one arousing in close time (Todaro & Smith, 2011, p. 708).

Two attempts to explain why foreign aid does not achieve economic growth is the micro-macro paradox and the Samaritan's dilemma. The micro-macro paradox describes how measurements of individual investment projects at micro levels does not show in economic measurements at macro levels. Because the effect of aid is measured at the total change of a country, the smaller changes do not appear. Still, over time many micro changes should be reflected in the bigger picture, however, overall growth effect of aid is still poor. In addition, when donating, it can be difficult to earmark funds. If a project receives aid but was already planned to be financed, the aid might be spent differently. Often the aid is spent on prestigious projects with low returns, or other government consumptions (UNU-WIDER, 2012). The Samaritan's dilemma explains why an aid receiver might not want to make effect of the funds. If a country were to fulfill the purpose of the aid, it will lose further support. If the receiver fails to improve, the transfers will continue. In the short run it seems better to continue receiving aid, rather than investing and aim for independent growth in the future (Raschky & Schwindt, 2009).

Research done by Alesina & Dollar (2000) focuses on various aid donors' allocation pattern of foreign aid to recipient countries. The article discovers that, for a developing country to receive aid is equally decided by political and strategic consideration as well as economic need and policy accomplishment of the beneficiary. Political alliances and colonial history also affect aid received. A further important aspect is that the democratized countries receive more aid.

Alesina & Dollar (2000) paper emphasized that Foreign Direct Investments (FDI) are more sensitive to economic incentives, especially property right protection and countries efficient policies. Considering why aid does not seem to create growth, they mention: poor performance of bureaucracies of the receiving countries, pattern of flows of given aid and inefficient allocation of funds bilaterally (Alesina & Dollar, 2000).

3. Method and Data

To assay the relation between aid received and a country's circumstances we build a multiple regression model. It is used to give empirical intimation about factors affecting the amount of aid received. In this chapter, we make clear of how the regression model is built up, and how we approach the research question. We account for the choice of variables, and what premises must be in place to trust the results of the analysis.

3.1 Method of Least Squares (OLS)

The study assays if there is an empirical connection between the dependent variable, *assAidRec*, and a collection of control variables. To solve this, we will use ordinary least squares (OLS). By using OLS, we can explicit control several variables which simultaneously affect the dependent variable. Further, the OLS presumes it has one control variable, *Y*, and one or more independent variables, x_i, as well as a residual, u:

$$Y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_i x_i + u$$

The coefficient β_x equals the intercept and x_i is the name of the slope of β_i. The slope coefficient is the model's estimate for change in *Y* by one unit increase in *x*, given all other variables are constant. The error term u equals the missent and catches interferences. It implies the effect of variables which is not included in the analysis or cannot be measured. The missent is interpreted as the difference between the expected value, *Y*, and the actual variable *Y*.

Firstly, for the estimated results to be applicable, the number of observations must be big enough. Secondly, the missent is homoscedasticity, normal distribution and independent. Lastly, there is no perfect multicollinearity between the independent variable. These conditions, as well as other necessary rules of regression, will be further elaborated later in the paper.

The objective is to estimate a value for the parameters β_i and u. However, it says little of the quality of the model. To measure quality, we will use another variable to compute the validity.

Id Est, R^2 which explains how large of a variation *Y* has in our model. Total variation (*SST*) is the sum of the explained variation (*SSE*) and unexplained variation (*SST*). How much of the total variation that is unexplained, is reflected in R^2:

$$R^2 = \frac{SSE}{SST} = 1 - \frac{SSR}{SST}, 0 < R^2 < 1$$

R^2 will increase as more relevant variables are added to the model.

3.2 Hypotheses Testing

The effects of each variable can be interpreted by observing the estimated coefficients' *t*- and *p*-value. By running a *t*-test using the *t*-value, we can evaluate a hypothesis from the significance degree of the variables' coefficients.

First, two mutually exclusive hypothesis are formulated, a null- and an alternative hypothesis. The objective is to discover whether there are grounds to reject the null hypothesis (Woolridge, 2015, p.124). Mathematically approached it is expressed by the difference between the estimated- and hypothetical coefficient divided by the standard error (Woolridge, 2015, p.124):

$$t_{\beta_j} = \frac{\hat{\beta}_j - \beta_j}{se(\hat{\beta}_j)}$$

Another approach is to run a regression using the data tool STATA. Further, through a selected significance level and computed number of degrees of freedom, a critical value is to be found. In the OLS regression method, the degrees of freedom are observations subtracted by independent variables:

$$df = n - k - 1$$

Whether the hypothesis requires a one- or two-tailed test needs to be assessed to properly read the current critical value. Because we want to discover if there is an attainable effect and not whether the effect is positive or negative, a two-tailed test is applicable in our analysis. The critical value is then compared to the *t*-value to determine if the null hypothesis can be rejected. If the critical value is lower than the *t*-value, and we have used a 5% significance level, the null hypothesis can be rejected with a confidence of 95%.

The *p*-value can also be considered when interpreting a coefficient's significance level. This value indicates the lowest significance level of which the null hypothesis is to be rejected (Woolridge, 2015, p.765). With a 5% significance level, a coefficient with a *p*-value greater

than 0,05 is not considered significant. The relation can be interpreted as an accidental correlation in the sample.

Statistical hypotheses

We want to examine how certain factors collectively affect low- and lower-middle income countries' reception of development assistance and official development aid. The factors being development, institutional stability, government efficiency, and economic stability.

Null hypothesis: *There is no correlation between aid received and internal factors in developing countries.*

Alternative hypothesis: *There is a correlation between aid received and internal factors in developing countries.*

$$H_0: \beta_2 = 0, \beta_3 = 0, \beta_4 = 0, \beta_5 = 0$$

$$H_A: not\ H_0$$

3.3 Theoretical Regression Model

The regression model used in this paper is formulated:

$$Development\ assistace\ and\ \ aid\ received =$$

$$\beta_0 + \beta_1 GDP + \beta_2 GDPgrowth + \beta_3 RuleofLaw + \beta_4 Governmenteffeciency + \beta_5 \inf l\ ation + \beta_6 government\ \exp e\ ntiture + \beta_7 totalpopulation + \beta_8 colony$$

The following subchapters will explain our variables in detail and sum them up with a summary table with a short description.

3.3.1 Variables

i) Dependent Variable

Development Assistance and Aid Received (assAidRec)

Net official development assistance and aid received is the distribution of flows from the Development Assistance Committee (DAC) member countries to aid recipients. Net official aid refers to aid from official donors to countries and territories included in the DAC list. Official aid is provided under terms and conditions from ODA. Through the World Development Indicators (WDI) we have selected low- and lower-middle income countries giving us 82 recipients. The variable is measured in U.S. dollars.

ii) Dummy Variable

Colony (colony)

The dummy-variable *colony* was created to determine if the recipient country is a former colony or not. A dummy-variable is a binary variable used to indicate the presence of a specific trait (Wooldridge, 2015, s.759). The dummy *frColony* demonstrates if it was a former French colony by the same system of 1 and 0 as the main dummy variable *colony*. A dummy variable has the code 1 if the trait is present, and 0 if it is not.

iii) Control Variables

Gross Domestic Product (gdp)

The variable *gdp* measures the sum of value added by all producers as well as tax income in U.S. dollars. GDP works as an indicator of standard of living – all elements that affects people's well-being in a country.

GDP Growth (gdpGrowth)

The annual growth rate of the GDP, *gdpGrowth*, is measured by the change in volume of outputs or real income of the population. To calculate the growth three indicators must be in place: volume of GDP, real gross domestic- and national income.

Inflation (inflation)

The variable *inflation* is the annual growth rate of the GDP implicit deflator. It shows the rate of price change in the economy.

Rule of Law (ruleLaw)

The factor of internal stability is represented through the variable *ruleLaw*. It captures the quality of contract enforcement, property rights, policing, justice system as well as the likelihood of crime and violence. This variable is measured by percentage rank amongst countries, with 0 being the lowest and 100 to the highest rank.

Government Efficiency (govEff)

The variable measured in percentage captures the quality of public- and civil- services, together with the credibility of the government's commitment to similar policies.

Primary Government Expenditure (primGovExp)

Primary government expenditure is a proportion of original approved budget expenditure outturn. The *primGovExp* variable is a measurement on the governments intended spending and collection on the planned budget. This factor measures the government's ability to deliver public service and achieve development objectives.

Table 3.3.1 - *Overview of Variables*

assAidRec	Total amount of development assistance and aid received
gdp	Gross domestic product
gdpGrowth	Annual percentage growth rate of GDP
ruleLaw	Primary government expenditures as a proportion of original approved budget
govEff	Government effectiveness
inflation	Inflation measured by the annual growth rate of the GDP
primGovExp	Primary government expenditures as a proportion of original approved budget
colony	Former colony
frColony	Former colony of France

3.5 Collecting, Consideration & Delimitation of Data

The dataset is collected from the databank of the World Bank, through the databases for World Development Indicators (WDI) and Worldwide Governance Indicators (WGI). The observations are limited to low- and lower middle-income countries for the years 2000 and 2014. Low-income countries were in 2000 defined as those with a GNI per capita of $755 or less, while in 2014 it was defined at $1045 or less. Lower middle-income economies were those with a GNI per capita of $756 - $2995 in 2000, and between $1046 - $2125 in 2014 (The World Bank, 2021). The year 2000 is chosen because in the beginning of the century there was research

regarding the effect of aid. The results led to changes in aid allocations in the following years. (Todaro & Smith, 2011) To compare and investigate possible changes in aid allocations, we chose the year 2014. It is in reasonable time from the first observations, in distance from the finance crisis of 2008, and prior to the oil crisis. Also, there was an international gathering in 2011 in Busan where principles of aid allocation were reevaluated. (OECD, 2011) The year 2014 is relevant to consider if these changes had any effect on aid giving.

The dataset is missing reported observations for the variable *PrimGovExp* from 2000. It is still considered for 2014 because it reflects if governments spend, and collect, what they intend to (the World Bank, 2022). Some countries are missing several observations, for example Somalia and Afghanistan, due to conflict and lack of statistical capacity (the World Bank, 2022). Because the data is collected from developing countries, it might be older observations or outdated collection methods as of less resources for measuring (the World Bank, 2022). Different countries use different methods to measure certain data. Time of measurement and use of methods will change numbers from industrial countries as well (The World Bank, 2018). It is relevant to emphasize that the variables GDP and GDP-growth are difficult to estimate in developing countries. Families produce their own consumption and prices are not set, affecting measuring methods. (The World Bank, 2022).

The variables are chosen based on relevance and representation, but also numbers of observations. More relevant variables were missing numbers of observations, for example regarding economic politics. It would have been interesting to use the preferred variables to see if it changed the outcome. Also, it was intended to include a variable for total population. However, the total population was too correlated with the variable for GDP to satisfy one of the conditions for regression.

Dummy-variables for the colony states are self-made. For example, Egypt was a protectorate of the UK, and Morocco of France. Such countries are not included as colony states, but their relation might affect the allocation of aid from the colonial powers. If a country has been occupied by several states, the last occupier is considered for the variable *frColony*.

In the end, the dataset consists of 82 countries and 11 variables. The dependent variable, *assAidRec*, represents received development assistance and aid to all 82 low- and lower middle-income countries.

3.6 Descriptive Statistics

Table 3.6.1 – *Descriptive statistics for assAidRec*

	2000	*2014*
Observations	81	82
Mean	3.29e+08	1.03e+09
Standard deviation	3.53e+08	1.13e+09
Minimum	1.31e+07	-3.82e+08
Maximum	1.65e+09	4.94e+09
Median	2.00e+08	6.51e+08

The descriptive statistics shows the differences in net official development assistance and official aid received (aid received for simplicity) for low- and lower middle-income countries in the year 2000 and 2014. The average aid received is $701 000 000 more in 2014 compared to 2000. Even though there is less difference between the highest and lowest aid in 2014, we see that the average distribution of aid received, from the standard deviation, is lower for 2000. This indicates less fluctuation of aid received across the low- and lower-middle income countries in 2000. In addition, we can look at the median seeing it gives a more accurate representation of the distribution than the mean. The mean is affected by extreme values and can therefore give a misrepresentation of the distribution. The median and mean differs from each other both in 2000 and 2014. Note, the difference in 2014 is significantly greater. This indicates more fluctuation of aid received across the low- and lower-middle income countries in 2014. According to Todaro and Smith (2011) it can be explained by the incentives and motivation of a donor country in their allocation of aid. The decision is not entirely based on the needs of the receiving country, but also the donor country's political-, strategic-, or economic self-interest (Todaro & Smith, 2011, p. 700-701).

Table 3.6.2 – *Descriptive statistics for 2000 and 2014*

2000	*2014*

Variables	*Mean*	*Standard deviation*	*Mean*	*Standard deviation*
gdp	2.18e+10	5.96e+10	8.75e+10	2.59e+11
gdpGrowth	3.474721	4.596254	4.206733	3.646982
ruleLaw	29.73964	20.08092	27.89048	18.79226
govEff	28.94872	19.09528	25.41041	17.03702
primGovExp	–	–	94.01805	10.17937
inflation	54.06268	307.6613	4.850447	7.970119
colony	0.8170732	0.3889857	0.8170732	0.3889857
frColony	0.2560976	0.4391624	0.2560976	0.4391624

The data reveals that the average GDP was $21.8 billion in 2000 and $87.5 billion in 2014. Average annual percentage growth rate of GDP (*gdpGrowth)* increased by 0.73 percentage points from 2000 to 2014. Looking at the standard deviation, it reveals the fluctuation in annual percentage growth rate of GDP decreases by almost a whole percentage point from 2000 to 2014.

It is also interesting to point out the difference in the average of inflation, seeing that it has decreased by almost 50%. Here, the standard deviation reveals that the variation of inflation across the low- and lower-middle income countries have decreased by nearly 300% in a period of 14 years. This is likely related to international monetary fund's (IMF) funding and stabilizing packages following the global financial crisis. It required the recipient countries to adapt some, if not all, of the stabilization policies (Todaro & Smith, 2011, p. 681).

3.7 Assumptions

If the regression analysis is to be valid, using the OLS-method, there are significant assumptions that need to be reviewed. Fulfilling these conditions is necessary to receive a reliable result, and the ability to draw statistical presumptions.

MLR. 1 – Linearity

If the parameters in the model is linear, the first assumption is satisfied, and one can use the OLS-method. In addition, the error term u needs to be added. The linear regressions will then take the following forms:

2000:

$$\widehat{assAidRec} = \beta_0 + \beta_1 gdp + \beta_2 gdpGrowth + \beta_3 ruleLaw + \beta_4 govEff + \beta_5 inflation + \beta_6 colony + \beta_7 frColony + u$$

2014:

$$\widehat{assAidRec} = \beta_0 + \beta_1 gdp + \beta_2 gdpGrowth + \beta_3 ruleLaw + \beta_4 govEff + \beta_5 primGovExp + \beta_6 inflation + \beta_7 colony + \beta_8 frColony + u$$

We can discover the linearity of the model by plotting the residuals against the predicted values. The results are illustrated in the figures below:

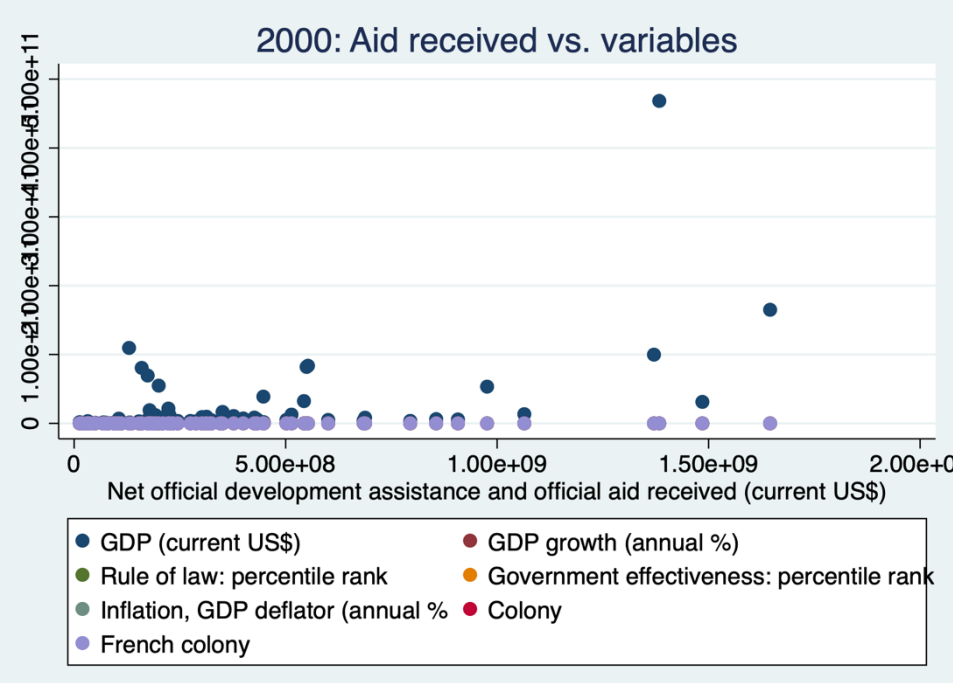

Figure 3.7.1: residuals against predicated values 2000

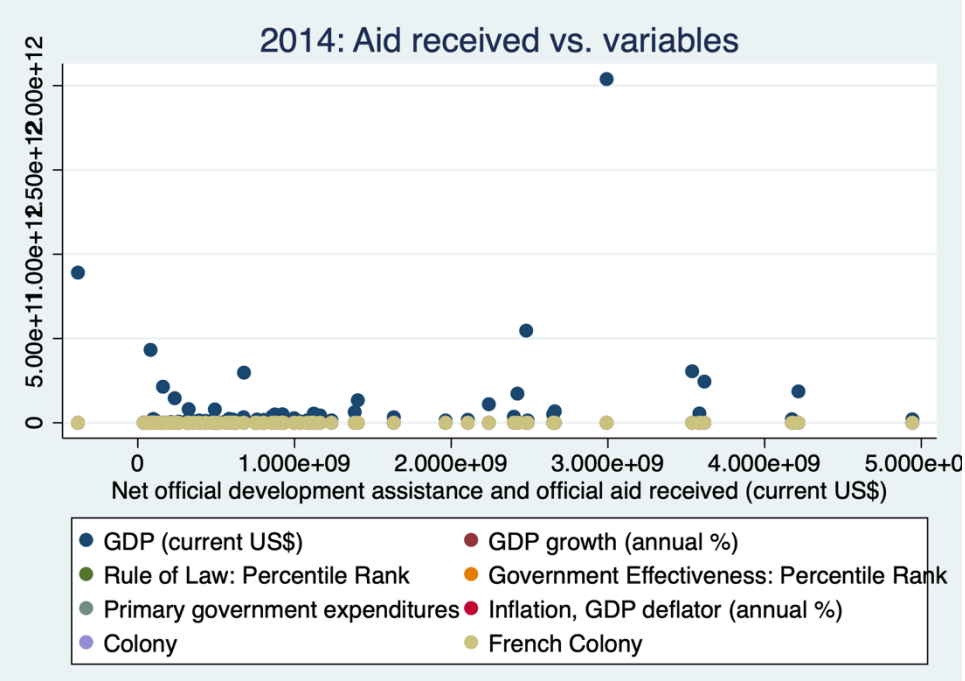

Figure 3.7.2: residuals against predicated values 2014

The figures above reveal the challenges of achieving complete linearity. However, there are numerous instances of economic circumstances that do not have a completely rigid linearity as one theoretically desire (Woolridge, 2015, p. 63). Despite the asymmetries, we decided to move forward with the model. Thus, we can assume linearity.

MLR. 2 – Random Sampling

The second assumption requires random sampling. We do not have a sample drawn from a population, because we consider all low- and lower-middle income countries. Our main concern is that the missing observations of some variables are systematically missing for countries in conflict. Such countries will therefore have a smaller representation in the results.

MLR. 3 – No Perfect Collinearity

A precondition of the analysis being completely robust, is no perfect collinearity observed. This will be observed if several variables in a multiple regression model correlate on a high enough level. Collinearity describes how much correlation there is between the variables in an analysis. It is impossible to get unique estimates on the regression coefficients with perfect linearity since all combinations preform equally (Woolridge, 2015, p.74-76). Further, too high collinearity will lead to challenges with the estimates. It is also notable that with no perfect collinearity, the model's explanation percent (in this analysis noted by R^2) can be challenged. In total, perfect

collinearity in a regression analysis obstructs the ability to generalize the data, which is why it is something one prefers to avoid.

By examining a correlation matrix, it is possible to discover if an obstacle is linked to perfect collinearity that might have occurred in the regression analysis. Values over 0,80 and 0,090 are considered too high (Woolridge, 2015).

Table 3.7.1 – *Correlation Matrix 2000*

Variables	(1)	(2)	(3)	(4)	(5)	(7)	(8)	
(1) *assAidRec*	1.000							
(2) *gdp*	0.5335	1.0000						
(3) *gdpGrowth*	0.0401	0.0502	1.0000					
(4) *ruleLaw*	0.1257	0.1637	0.0968	1.0000				
(5) *govEff*	0.2159	0.1679	0.2472	0.7855	1.000			
(7) *inflation*	-0.0619	-0.0121	-0.2681	-0.2228	-0.2273	1.0000		
(8) *colony*	0.0526	0.0018	0.0641	-0.0922	-0.1364	0.0622	1.0000	
(9) frColony	-0.1414	-0.1141	-0.1054	-0.0787	-0.2055	-0.875	0.3069	1.0000

Table 3.7.2 – *Correlation Matrix 2014*

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) *assAidRec*	1.0000								
(2) *gdp*	0.2570	1.0000							
(3) *gdpGro*wth	0.0682	0.1115	1.0000						
(4) *ruleLaw*	-0.0130	0.1721	-0.0778	1.0000					
(5) *govEff*	-0.0015	0.2200	-.0.0672	0.8442	1.0000				
(6) *primGovExp*	0.0044	0.0009	-0.0264	0.0962	0.1169	1.0000			
(7) *inflation*	0.0643	0.0362	-0.0264	0.1709	0.1307	0.1774	1.0000		
(8) *colony*	-0.0763	0.0446	0.0681	-0.1151	-0.1967	-0.1506	-0.2496	1.0000	
(9) frColony	-0.1454	-0.1292	0.0934	-0.1101	-0.2360	-0.2244	-0.2546	0.2630	1.0000

The tables reveal that none of the variables are crossing the upper limit, a good indication of no perfect collinearity in the dataset. However, it is noticeable that $govEff$ and $ruleLaw$ correlates on a relatively high level, in both 2000 and 2014. To consider the model valid, the

importance of no perfect collinearity between variables is prevailing and therefore should be investigated further.

A variance inflation factor (VIF) will reveal if a variable has a strong linear correlation with other variables. Using STATA, we examine if there is no perfect collinearity as illustrated in the tables below.

Table 3.7.3 – *Variance Inflation Factor 2000*

Variables	VIF
govEff	2.99
ruleLaw	2.77
frColony	1.21
gdpGrowth	1.19
inflation	1.16
colony	1.14
gdp	1.04
Mean VIF	1.64

Table 3.7.4 – *Variance Inflation Factor 2014*

Variables	VIF
govEff	3.94
ruleLaw	3.73
frColony	1.25
colony	1.17
inflation	1.16
gdp	1.09
primGovExp	1.08
gdpGrowth	1.03
Mean VIF	1.81

There are no values over 10 in the VIFs, which is the upper limit for perfect linearity (Woolridge, 2015). It is therefore reasonable to conclude that there are no challenges with perfect collinearity in the dataset, meaning that the assumption is satisfied.

MLR. 4 – Zero Conditional Mean

The assumption regarding the zero conditional mean explains that there should not be a correlation between the error term and the independent variables in the analysis. This is often violated. The violation of the assumption should be mitigated as much as possible. The expected value of the error term should be zero by all given values of the independent variables. It is expressed in the following form:

$$E(u_i|x_i, \dots, x_k) = 0$$

This requirement is most frequently violated by a variable not being included in a correct way or that an important explanatory variable is not included in the analysis. This will then result in distortion due to the excluded variable, also known as omitted variable bias (Wooldridge, 2015,

p. 84). The zero conditional mean is accounted for in the analysis and is therefore assumed to be satisfied.

MLR. 5 – Homoscedasticity

This condition requires the variance in the error term, u, to be equal in all observations, known as homoscedasticity:

$$V(u_i|x_i) = \sigma^2$$

If this is not the case, meaning the variation in the error term is not consistent, the OLS method will imprecisely estimate the standard deviations of the coefficients. This increases the risk of type 1 errors, wrongly rejecting the null hypothesis (Woolridge, 2015, p. 82-83). The figures 3.8.1 and 3.8.2 with scatter plots for the residuals and predicted values show quite a variation between the lowest and highest point. It is still an obvious trend in variation with only a few cases of deviating values. It is fair to assume our model is indeed homoscedastic, but to be safe we can perform a Breusch-Pagan test. Using hypotheses, the tests examines if constant variance in the error term for all holds (Woolridge, 2015, p. 251). We test the models for each year (2000 and 2014) to see if our assumptions are correct. Our null hypotheses being that there is no constant variance, and with an f-statistic we get the following results:

2000	2014
$F(7, 66) = 0.86$ $prob > F = 0.5391$	$F(8, 55) = 0.36$ $prob > F = 0.9369$

Considering the p values of 0.54 and 0.94, we do not have sufficient evidence to reject the null hypothesis to a significance level of 5%. We can therefore conclude that the variance is constant, meaning that there is indeed homoscedasticity in both models.

MLR. 6 – Normality

This is the most restrictive assumption because it expresses how the error term is independent from all variables, both predicted values and the variance (which is both MLR. 4 and -5). It also expresses that the error term, u, needs to be normally distributed:

$$u \sim N(0, \sigma^2)$$

MLR. 6 is often violated, which is why the central limit theorem is an important indicator; expressing that the error term needs to be normally distributed in the selections. This is due to the error term consisting of many different additive variables, which again affects the dependent

variable in different ways but also additively. Such variables will, in accordance with the central limit theorem, result in normality.

There are multiple factors that we have not accounted for in our analysis, and these might influence the dependent variable, $assAidRec$. We assume that those factors fall within the central limit theorem. Therefore, it affects the dependent variable additively and separately – and accordingly MLR. 6 will be satisfied. The distribution of the error terms is distributed in the figures below.

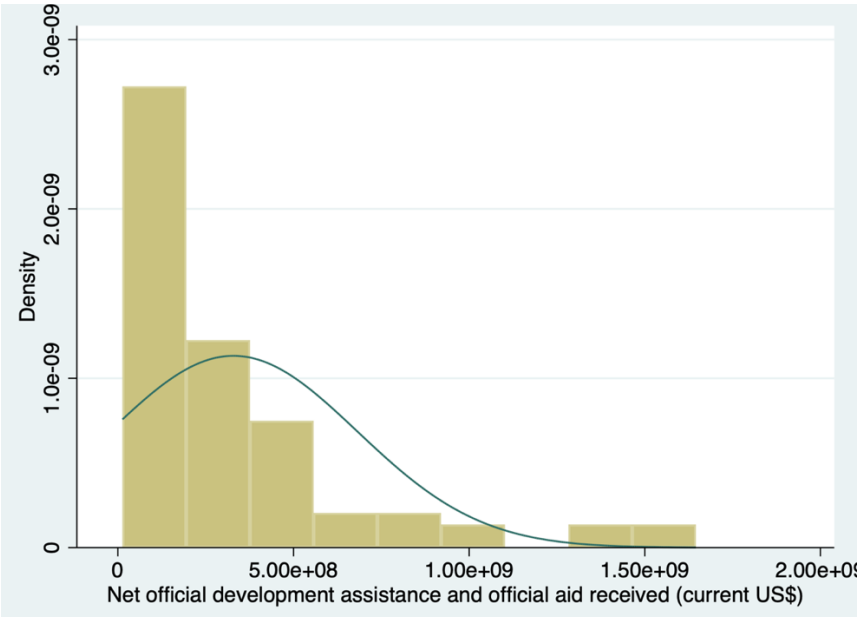

Figure 3.7.3: Distribution of error term 2000

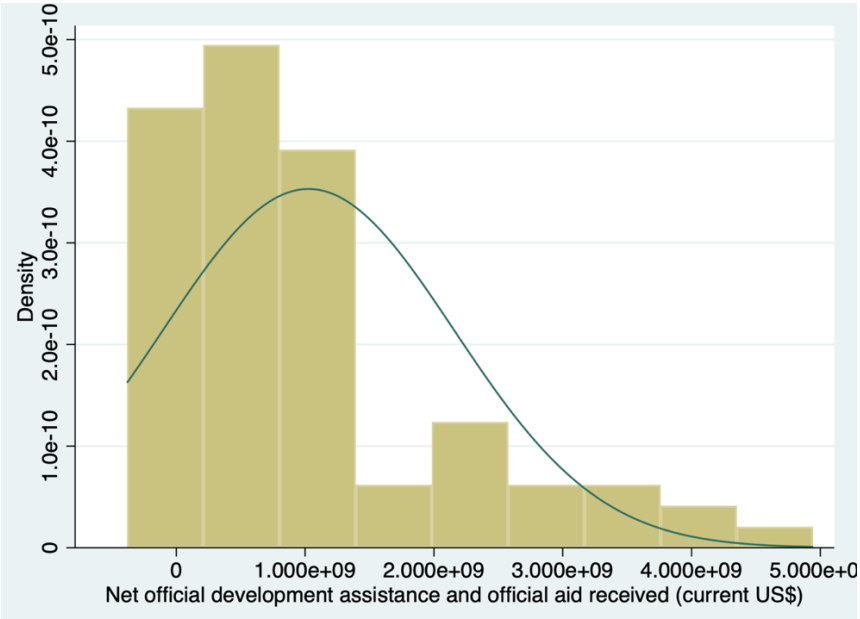

Figure 3.7.4: Distribution of error term 2014

4. Results

In this chapter we will carry out our linear regression. Through the method we aim to retrieve results implying which factors determines the reception of foreign aid.

4.1 Linear regression

We begin with a regression analysis of assistance development and aid received and GDP.

Table 4.1.1 – *Regression Model 2000*

assAidRec	Coefficient	Std. Err.	*t*-value	*p*-value	95% confidence interval	
					Min.	Max.
gdp	0.0032131	0.0005837	5.50	0.000	0. 0020503	0.0043758
Constant	2.72e+08	3.68e+07	7.38	0.000	1.98e+08	3.45e+08

Observations = 77, R^2= 0.2878

Table 4.1.2 – *Regression Model 2014*

assAidRec	Coefficient	Std. Err.	*t*-value	*p*-value	95% confidence interval	
					Min.	Max.
gdp	0.001012	0.0004837	2.09	0.040	0.0000491	0. 0019749
Constant	9.61e+08	1.31e+08	7.32	0.000	6.99e+08	1.22e+09

Observations = 80, R^2= 0.0531

From our first regression model we observe that the GDP is 0.001012 in 2014 and 0.0032131 in 2000, meaning *assAidRec* will increase by small margins if the GDP rise with one percentage point. Our hypotheses questions *if GDP change, so does assAidRec:*

$$H_0^t: \beta_1 = 0$$

$$H_A^t: \beta_1 \neq 0$$

In STATA we conduct a two-tailed test with a significance level at 5%. We will reject the null hypothesis if *p*-value > 0.05. We receive the results shown in table 4.1.1 and 4.1.2 and read off the p-value at 0.040 in 2014 and 0.000 in 2000. Because the values are lower than our

significance level, we reject the null hypothesis. From our two-tailed test we can conclude that a change in GDP will result in a change in aid received.

Table 4.1.3 – *Regression Model 2000*

assAidRec	Coefficient	Std. Err.	*t*-value	*p*-value	95% confidence interval	
					Min.	Max.
gdp	.0030334	0.0006144	4.94	0.000	0. 0018067	0. 00426
gdpGrowth	-5 308 384	8 662 610	-0.61	0.542	-2.26e+07	1.20e+07
ruleLaw	-3 069 895	3 091 057	-0.99	0.324	-9 241 390	3 101 600
govEff	504 417	3 396 487	1.49	0.142	-1 737 127	1.18e+07
primGovExp	-	-	-	-	-	-
inflation	-78 110.6	127 857.5	-0.61	0.543	-33 3386.3	177 165.1
colony	9.59e+07	9.64e+07	0.99	0.324	-9.66e+07	2.88e+08
frColony	-7.18e+07	8.98e+07	-0.80	0.426	-2.51e+08	1.07e+08
Constant	1.87e+08	1.11e+08	1.68	0.097	-3.49e+07	4.09e+08

Observations = 74, R^2 = 0.3265

Table 4.1.4 – *Regression Model for 2014*

assAidRec	Coefficient	Std. Err.	*t*-value	*p*-value	95% confidence interval	
					Min.	Max.
gdp	0. 001048	0. 0005391	1.94	0.057	-0.0000324	0.0021283
gdpGrowth	1.83e+07	4.81e+07	0.38	0.705	-7.82e+07	1.15e+08
ruleLaw	1 343 976	1.51e+07	0.09	0.929	-2.89e+07	3.16e+07
govEff	-7 694 950	1.66e+07	-0.46	0.645	-4.10e+07	2.56e+07

primGovExp	-2 920 541	1.49e+07	-0.20	0.846	-3.28e+07	2.70e+07
inflation	3 242 231	2.04e+07	0.16	0.874	-3.76e+07	4.41e+07
colony	-2.35e+08	4.16e+08	-0.57	0.574	-1.07e+09	5.98e+08
frColony	-3.17e+08	3.75e+08	-0.84	0.402	-1.07e+09	4.35e+08
Constant	1.63e+09	1.51e+09	1.08	0.287	-1.41e+09	4.66e+09

Observations = 64, R^2 = 0.0952

Based on the data from 2000, aid received is expected to decrease by –$3 069 895 if the rule of law-variable were to increase by one percentage point. However, from the data of 2014 we see that the same variable will cause an increase in aid received by $1 343 976. To test if this is a significant correlation, we form our hypotheses: *if stability through ruleLaw in a country change, it will result in a change in received aid.*

$$H_0^t: \beta_3 = 0$$
$$H_A^t: \beta_3 \neq 0$$

From our two tables we read off the numbers for the p-values to be 0.929 in 2014, and 0.324 in 2000. We run a two tailed test with the significance level of 5%. Because the p-values > 0.05 for both years, we do not reject the null hypothesis and we cannot with 95% confidence state there is a correlation.

The results from the regressions imply that aid is expected to increase if there is a one percentage point increase in government efficiency for both years. In 2014, a country with colonial past is expected to receive far less aid compared to the same countries in 2000. The coefficients indicate correlation; however, the statistical values, imply if the relations are in fact significant or not. We notice all the variables has quite high p-values which will fail to reject null hypothesis with an acceptable level of significance.

With an f-test we can exclude multiple variables. Testing if factors such as development, internal stability, government efficiency and economic stability influence aid received we will create a restricted model and assume the variables have no effect. We create the same null hypothesis for both 2000 and 2014. The following test needs to be performed: *If development,*

internal stability, government efficiency and economic stability where to change, it will result in a change in aid received.

$$H_0: \beta_2 = 0,\ \beta_3 = 0,\ \beta_4 = 0, \beta_5 = 0$$

$$H_A: \ not\ H_0$$

In STATA we conduct two F-tests for each year. Our F-statistic for 2000 is 6.7020509. With a 1% significance level we receive a critical value of 5.2193412. Thus, we can confidently reject our null hypothesis for 2000 with a 99% confidence level. We conclude that the factors indeed collectively are expected to affect received development aid, ceteris paribus.

The data from 2014 reveals an F-statistic of 3.3639933. We are not able to reject the null hypothesis at a 1% significance level, seeing that the critical value exceeds the f-statistic. However, at a 2% significance level we can reject with a critical value of 3.1868381. Thus, we can reject our null hypothesis for 2014. Ceteris paribus, we conclude with 98% certainty the factors collectively are expected to have an impact on aid received.

Our findings show that the factors for development growth, internal stability, efficiency, and economic stability collectively are expected to have an impact on whether low- and lower-middle income countries receive ODA. We also conduct F-statistics on former colonies and French colonies to see if these are relevant factors to receive aid. Our null hypothesis being

$$H_0^t: \beta_7 = 0$$

$$H_A^t: \beta_7 \neq 0$$

From STATA we retrieve an F-statistic of 1 in 2014. The null hypothesis can only be rejected with 60% confidence, consequently with a 40% significance level and critical value of 0.93172695. Because the null hypothesis is not rejected with an acceptable level of confidence, we do not conclude the correlation to be of significance.

For 2000 we had the same hypotheses, with the F-statistic at 1 for this year as well. Again, the null hypothesis can only be rejected with a 60% confidence level and with a critical value of 0.92913033. Hence, we do not conclude with certainty that our dummy variables have a significant role in aid allocation.

5. Discussion

The descriptive statistic for aid received shows that the average has increased from approximately $329 million to $1.03 billion from the year 2000 to 2014. This finding is not surprising because of general economic growth. The results from both the restricted- and unrestricted regression models for both year shows a very low coefficient for GDP, > $0.001, with low standard deviations. The standard deviations imply a small variation in poverty levels between the countries. Understandably since the sample only contains low- and lower-middle income countries (Burnside & Dollar, 2000). The level of GDP has a relevance of receiving aid considering all countries. However, because the level is commonly low in our sample, it does not seem to have a great impact on aid allocation.

Results from year 2000 indicates that aid received is expected to decrease by around $5 million if the variable for GDP growth increases by one percentage point. If the variable for internal stability increases by one percentage point, aid received is expected to reduce by $3 million. Ceteris paribus, the standard deviations are respectively $8.7 million and $3 million.
Considering the variation of the variable, the coefficient indicates that the affect tends to fluctuate, and the factor was not a determining element at the time. This is conclusive with results from economists who describe how poverty level, rather than a foundation for improvement, had greater significance the previous century and the beginning of the 2000s (Burnside & Dollar, 2000).

The variables for government efficiency and inflation have low coefficient values by respectively $500 000 and -$78 000 and high standard deviations compared to the coefficients. This implies that the government's efficiency and the economy had little effect on aid received in the year 2000. If a low- or lower-middle income country is a previous colony, aid received is expected to increase by $187 million, ceteris paribus. Alesina and Dollar (2000) write the relations have a great significance in accordance to aid allocation, especially to former colonies. Their analysis concludes that especially France donates more to its former colonies, which is not conclusive with our observations. The result from our regressions expresses that aid received is reduces by $71.8 million if the country is a former French colony, all else equals. We are unsure as to whether Alesina and Dollar's (2000) assessment of former French colonies and the numbers may have been different if we included protectorates. In total, some of our

findings coherent with earlier research by other economists and the variation of each variable implies inconsistent reasons for aid allocation.

New common principles for aid allocation were agreed upon at the summit in Busan. The objective changed its focus towards the countries' political and governmental factors, rather than the poverty level. In contradiction to GDP growth for the year 2000, the variable has a positive coefficient for 2014. Ceteris paribus, if *gdpGrowth* increases by one percentage point, *aidAssRec* is expected to increase by $18.3 million. The positive correlation implies economic growth and progress to be more important for the DAC members in 2014.

We also notice the change in coefficients for *ruleLaw* and *inflation* to now be a positive correlation with aid received. If *ruleLaw* were to increase by one percentage point, the aid received is expected to increase with $1.3 million, all else equal. For one percentage point increase in inflation, the *aidAssRec* is expected to increase by $3.2 million, all else equal.

For 2014, the colonial variable is now in negative correlation with aid received. The variable for France has a reduced effect in 2014 compared to 2000. It now implies relation and strategic allocations to partners has a reduced importance. *GovEff* has also changed to be in negative correlation with the independent variable. In 2000 there were a low effect with a high standard deviation, while it has a greater impact for 2014 it still has a quite high variation. The high level of variance indicates low consistency of aid allocation, however a greater importance of the variable in 2014. *PrimGovExp* was not observed in 2000. The variable is in negative correlation with foreign aid received; if *primGovExp* increases by one percentage point, *aidAssRec* in expected to decrease by $2.9 million. The variance is quite high compared to the coefficient and we imply the same tendencies of missing consistency of aid allocation.

In general, there are clearer tendencies of stability and growth being more essential regarding allocation of aid in 2014. One explanation could be the findings of Burnside and Dollar (2000), and the Busan summit. Even though thoroughly testing implies the data is trustworthy, the great variation of each variable is worth emphasizing. With this in mind, and considering the chances of interactions between variables, we find it difficult to draw general assumptions with a high degree of certainty.

6. Conclusion

From our analysis we observe a model indicating the importance of different factors deciding the allocation of aid. The result of the tests and methods implies there is a significant correlation between the chosen variables and the aid received. When we compare the observed years against each other, we see the factors are weighted differently for the different times. In comparison to 2000, we find significant evidence that other factors than poverty level has a greater impact on aid reception. This adds to other researchers' interpretation of the shift following Burnside and Dollar's (2000) findings and the summit in Busan. Especially, the importance of the ability to develop economically using the aid, has gained more respect as a factor. In addition, the variables representing internal stability and government efficiency seems to play a more important role in 2014 compared to 2000. From the results of 2000 we can interpret the same results as others; other factors than poverty had little decisive impact for allocation of aid. We conclude other factors than level of poverty does affect allocation of aid in later years.

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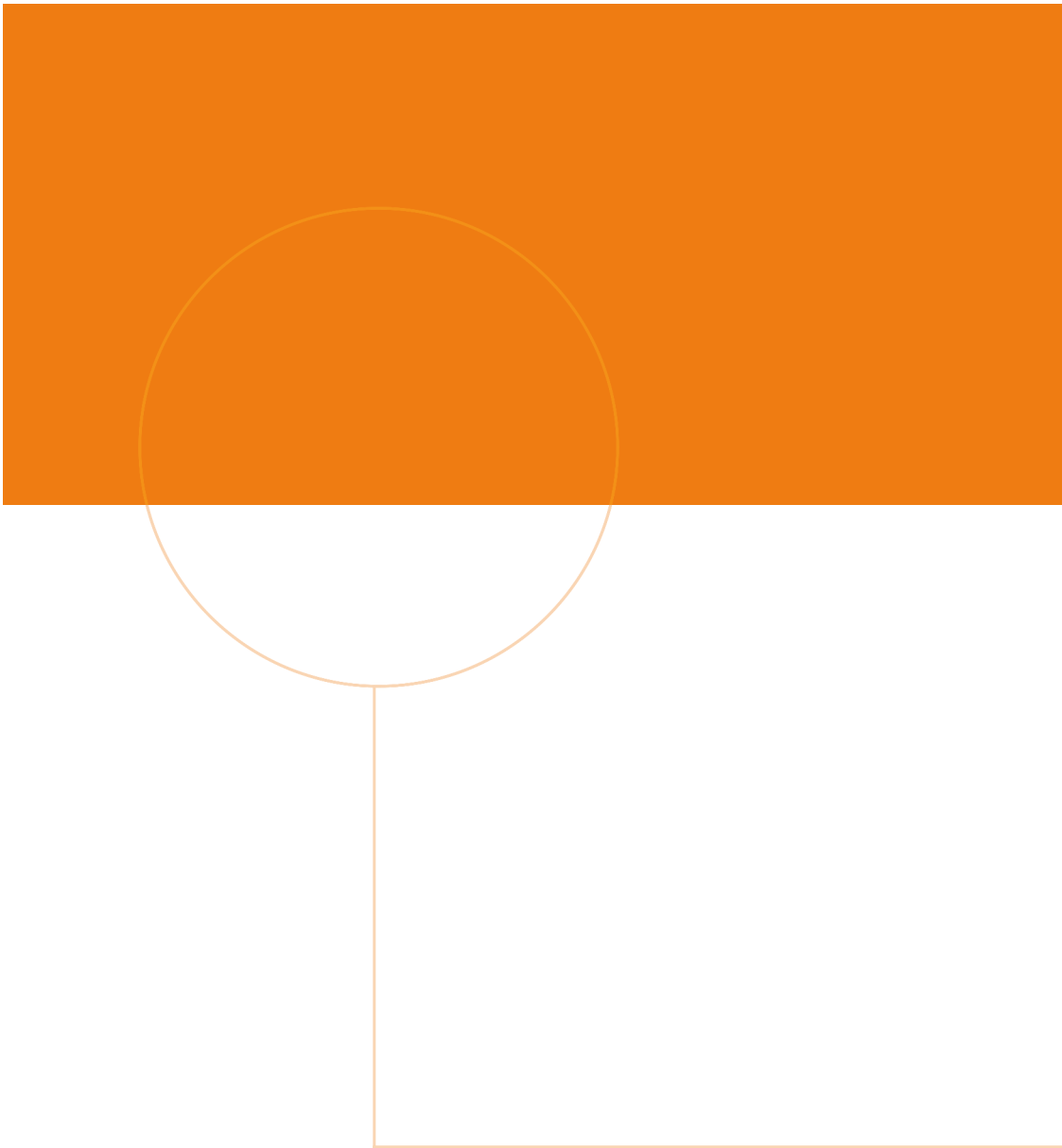

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