Wageningen University and Research Centre
Department of Social Sciences
Development Economics Chair Group

MSc Thesis

Impact of Development and Humanitarian Aid on Economic Growth of Developing Countries

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Preface

I did my thesis on impacts of foreign aid on economic growth of developing countries. Most of the time foreign is seen as a source of income for most of developing countries and believed it has significant impact on economic growth. However, most of countries which received aid for longer period still undergoing low economic growth. This situation provokes many researchers and policy makers to ask why aid is in effective though its effectiveness depends on how it allocated or used by nation.

So I am motivated to do my thesis to clear such confusion and come up with clear answers. My study focused on identifying impacts of humanitarian and development aid on countries economic growth in the short and long run. It was demanding, but made possible by different reference materials and with the help of several people. First and for most I would like to thank my advisor Dr. Jeroen Klomp. Thank you so much for all, for provide me the information I was seeking and the assistances you all made for me.

My special thanks goes for my mother W/ro Abebech Sahela(Aba) and my father Ato Debebe Dagne(Abaye) last but very importantly, my thanks go to my brothers and sisters for their true love, encouragement and moral support during my study from that long distance and also for my friends and classmates;Tigist, Abebayehu, Seble , Banchi, Hana ,Mikinay and Zewudena, Agazi, Shambi and Habtish for their unforgettable encouragement and support in the course of the study.

Almighty God, thank you so much! You make everything I want possible.

Summary

Official Development Assistance (ODA), commonly known as foreign aid comprises resource transfers from developed to developing countries in the form of grants and loans at concessional financial terms. Even though the primary objective of foreign aid is to promote economic development and welfare in aid recipient countries, after decades of capital transfer several studies on the relationship between foreign aid and economic growth find contradicting results. The aim of this thesis is to test the hypothesis that the impact of foreign aid on economic growth per capita may differ between humanitarian and development aid in the short and long run for aid recipient countries. To test this hypothesis, we employ panel and cross sectional regressions and used Ordinary Least Squared (OLS) as well as Two Stage Least Squared (2SLS) estimation methods for 81 aid recipient countries between the time period of 1990 and 2010. The study uses a fixed effect model and regresses humanitarian and development aid on GDP per capita growth separately to observe short and long run impacts. Under the panel OLS estimation method we find that a one percent increase in development aid increases GDP per capita growth by 1.19 percentage-points where as it reduces GDP per capita growth by 6.8 percentage-points under 2SLS estimations. However, in the long run (cross sectional regression), we find this type of aid reduces GDP per capita growth by 0.53 percentage-points under OLS and by 1.13 percent under 2SLS estimation methods. Moreover, a one percent increase in humanitarian aid increases GDP per capita growth by 0.68 percentage-points under OLS estimations in the short (panel) and 0.62 in the long run (cross sectional) regression. The major causes of the difference with other studies are discussed in terms of specification, sample size and instrument used. Given these limitations, this study may contribute to the important debate which continues to surround the aid effectiveness argument. Further research is needed in this field to provide donors and recipients in order to improve development policy.

Acronyms

Development Aid (DA)

Development Assistance Committee (DAC)

Generalized Method of Moments (GMM)

Gross Domestic Product (GDP)

Gross National Income (GNI)

Gross National Product (GNP)

Humanitarian Aid (HA)

Instrumental Variable(IV)

International Financial Institutions (IFIs)

International money Fund (IMF)

Least Developed Countries (LDC)

Millennium Development Goals (MDGs)

Multilateral Aid (MA)

Non Development Aid (NDA)

Non -Government Organizations (NGOs)

Official Development Assistance (ODA)

Official Humanitarian Assistance(OHA)

Ordinary Least Squares (OLS)

Organization for Economic Co-operation and Development (OECD)

Two Stage Least Square (2SLS)

World Bank (WB)

Chapter 1. Introduction

1.1. Background of the Study

Tradition of giving foreign aid to developing or aid-needing country began after World War II. Official Development Assistance (ODA), commonly known as foreign aid comprises resource transfers from developed to developing countries in the form of grants and loans at concessional financial terms (Moreira, 2005). In 2009, the total amount of Official Development Assistance (ODA) which is given by all type of donors reached $165.4 billion. Out of this 25.5 %, 24.15% and 23.1% was allocated to Sub-Saharan Africa, Least Developed Countries (LDC) and Asian countries, respectively and the rest[1] received less than 4 percent (UNDP, 2011). Currently, more aid is channelled through the International Financial Institutions (IFIs) such as the International Monetary Fund (IMF), World Bank (WB) and the Organization for Economic Co-operation and Development (OECD). Even though the primary objective of foreign aid to aid recipient countries is to promote economic development and welfare, after decades of capital transfer for these countries, several studies on the relationship between aid and economic growth find contradict results. These findings raise question on the effectiveness of foreign aid (Durbarry et al., 1998).
All types of aid are not the same, their effectiveness depends on the purpose of aid (UNDP, 2011). According to Akramov (2012) Official Development Aid (ODA) falls into three different categories. The first category is economic aid, which mainly focuses on raising capital accumulation by increasing a recipient nation's stock of physical capital such as machinery, buildings and equipment. Economic aid is divided into two, those allocated for production sectors which includes agriculture, manufacturing, mining, construction, trade and tourism sectors and the others allocated for developing economic infrastructures, which include equipment for communication and electronic networks, road and railroad construction, financial infrastructure and energy distribution. The second category of ODA is social aid which is intended to build additional physical and human capital in recipient countries to promote economic growth, which includes education, healthcare, and sanitation and drinking water supplies. The third category is humanitarian aid which is intended for consumption during emergency situations which includes medicine and food.

Despite aid channeled through capital flows, technical and relief assistance, most people who live in the developing countries live in conditions of absolute poverty and deprivation. According to Millennium Development Goals (MDGs) report currently about 870 million people, or one in eight worldwide, did not consume enough food on a regular basis to cover their minimum dietary energy requirements over the period 2010 to 2012, out of this around 852 million people reside in developing countries (UN, 2013).

Various studies have been conducted to cross check impact of humanitarian and productive aid in the short and long run. According to Clemens et al. (2004) previous researches on aid and growth were weak because researchers usually are examining the impacts of aggregate

[1] Which includes; Europe (3.5%), Central-America (2.6%), South-America (2.2%), North-Africa (1.7%) and Oceania (1%)

aid on growth over a short period of time commonly four years, though significant portions of aid are unlikely to affect growth in such brief time. So, they categorize types of aid in to three based on time period needed to bring impacts on growth. The first one is short-term aid which is expected to raise GDP per capita within roughly four years to a permanently higher level. For example, aid that allocated to budget and balance of payments support, investments in infrastructure, agriculture and industry sectors bring impact on growth in the short run. The second classification is a long-term aid which might permanently raise GDP per capita, but is unlikely to do so within roughly four years of the disbursement. For example, aid allocated to education, health and environment, bring impact in the long run. The third one is humanitarian aid which is intended to fill consumption gaps during emergency situations.

1.2. Problem Statement

Andrews (2009) reported that the economic gap between developed and developing countries is increasing through time due to many reasons. Some of the reasons are unequal accessibility of economic opportunities, political freedom and transparency by all people because of dictatorship and corruption. In addition sudden natural disasters cause crop failure, death of cattle and damage to the infrastructure, for instance by flooding. In response to this, both productive and humanitarian aid has been allocated to these nations.

The concept of foreign aid is widely accepted as a flow of financial resources from developed to developing countries to accelerate their economic development till they reached to satisfactory rate of growth on a self-sustained basis **(**EROĞLU and YAVUZ, 2008). However, several studies on the link between foreign aid and economic growth generate mixed results (Ekanayake and Chatrna,2010**).**This may be due to econometric, theoretical or methodological problems. The contributions of foreign aid to economic growth of developing countries may be positive, negative, or even non-existent, in statistical terms (Moreira, 2005). For example, Burnside and Dollar (2000) show that aid has a positive impact on growth but this positive result is conditional on the quality of countries macroeconomic policies. Furthermore, Hansen and Tarp (2001) examined the relationship between aid and growth in a panel framework and concluded that aid increases growth rate of developing countries via investment. The findings of Dalgaard et al. (2004) indicated that aid increases productivity but it is conditional on the country's location (geography),being located in tropical area matter on agricultural production since most developing countries economy is depend on it.While Rajan and Subramanian,(2011) argued that aid inflow only increases consumptions of domestic goods whereas it adversely affect countries competitiveness by lowering growth rate of exportable industries.

Neanidis (2012) examined the effect of humanitarian aid on the rates of fertility and economic growth in aid recipient countries. His result shows that humanitarian aid has unclear effect on economic growth. For example in kind aid like food and vaccination has a positive impact on growth by enhancing the health status of children and their productivity during adulthood. Whereas aid per adult (monetary) reduces the child-rearing time that adults allocate to their children. This in turn reduces health status in adulthood and thus the rate of economic growth.

In this thesis I shall focus on testing the hypotheses that there is a positive relationship between aid and economic growth per capita. Specifically the impact of aid on economic growth per capita may differ between humanitarian and development aid in the short and long run in aid recipient countries. Since most of the time these countries are affected by man-made and natural disaster, they received relief assistance for short term as well as development aid to bring sustainable long term growth.

General hypothesis: There is a positive relationship between foreign aid and economic growth.

Specific hypothesis: The impact of aid on economic growth per capita may differ between humanitarian and development aid in the short and long run.

1.3. Objectives of the Study

The general objective of this study is to identify the relationship between development and humanitarian aid, and economic growth in developing countries by using the so-called Barro regression-analysis. Specifically

- Identifying short and long run effects of humanitarian aid on economic growth of developing countries
- Identifying short and long run effects of productive aid on economic growth of developing countries

  In addition

  - Testing the hypothesis that too much aid is detrimental for aid recipient countries
  - Testing conditionality of aid on macroeconomic policies, institutions and region specific characteristics

Chapter 2.Literature Review

The relationship between aid and economic growth has always been a controversial issue. Some scholars argue that aid has positive effects on economic growth, whereas others claim that it resulted in the opposite. Below we review on studies about foreign aid and economic growth by dividing into three different parts such as: relationship between aid and economic growth, short and long run impacts of foreign aid and different types of foreign aid.

2.1. Relationship between Aid and Economic Growth

Official Development Assistance (ODA), commonly known as foreign aid comprises resource transfer from developed to developing countries in the form of grants and loans at concessional financial terms (Moreira, 2005).Several studies in the empirical literature on the effectiveness of aid have tried to assess if aid reaches its main objectives, which is the promotion of economic development and welfare in developing countries. Usually, lack of saving, which is crucial for investment, is considered as a major limitation for economic growth in those countries. Indeed, one characteristics of these countries are limited capacity to generate savings due to low per capita income (Moreira, 2005). Neanidis (2012) noted that the aid growth literature largely divided in to two strands, unconditional and conditional. The first, supports that aggregate aid has on average a positive growth effect either with or without diminishing returns (Dalgaard et al., 2004; Hansen and Tarp, 2001; Lensink and Morrissey, 2000; Lensink and White, 2001). Whereas, the second advocates that aid has positive impacts only if certain conditions are place (Burnside and Dollar, 2000).

Hansen and Tarp (2001) consider three generations of cross-country studies. The first generation studies offer an empirical assessment of how aid influences domestic savings. According to the Harrod-Domar equation, growth depends on investment, which is financed by savings (domestic plus foreign). If the effect of aid on domestic savings is positive, more saving leads to increase investment then one may say that aid will incentive growth. If not, aid will be harmful or no impacts on the economic growth of developing countries. The second generation studies considered the relationship between aid and growth through investment (investment regressions). The third generation studies, classified as a new generation of aid effectiveness studies, considering direct relationship between aid and growth through capital accumulation, growth regression (Hansen and Tarp, 2001).

According to Moreira (2005) the first and the second generation studies were important in shaping the empirical research of current generation, however, the third generation studies represent a distinct step forward in empirical cross-country work on aid effectiveness. The reason is that, these studies examine the growth rate variation between countries within specified time periods, include initial level of per capita income to capture conditional convergence effect and consider endogeneity of explanatory variables.

An analysis of the main characteristics of those studies provides a general understanding of methodological and econometric procedures which is principal in the literature. Some of them are listed below: Single-equation regressions for the total sample, sub-samples selected

according to geographical region to take into account regional specificities; Cross-section data with period averages; Non-specification of time lags in the aid-growth relationship, in spite of the perception that the effect of aid on growth does not end in a single time period; ODA as an exogenous variable, even though there are reasons for suspecting correlation between aid and the error term in a given model; Aid flows not identified separately from other foreign capital flows; Control variables, even though some of them are not fully documented; Little mention of diagnostic tests, which are important when evaluating the quality of model specification and the Ordinary Least Squares (OLS) estimation method.

Until now, the aid-growth literature has been dominated by cross-section studies using single-equation estimation techniques, produce mixed results. The reason behind these results probably arises from sample size and composition, data quality, econometric technique and specification and also most studies are looking at the long run impact rather than short run. Many studies have tried to assess the effectiveness of aid at the micro and macro level. While micro evaluations have found that in most cases aid 'works', those at the macro-level are ambiguous (Durbarry et al., 1998).

In general, the new generation of aid-growth econometric studies share common characteristics from first and second generation. First, they examine the growth rate variation between countries within specified time periods by using a panel data with sub-period averages to estimate short term impacts of aid. Second the majority of studies introduce time dummies in regression. Many other researchers also use regional dummies, though some of them prefer to take individual heterogeneity in to account by including country specific effects. The third characteristics is standard in the empirical "new-growth" literature, it include initial level of per capita income to capture conditional convergence effect and a number of political, institutional and economic factors in the growth regressions. Fourth, non-linear relationship between aid and growth is taken into account by using quadratic terms, which allows for diminishing returns to aid and inserting the interaction term between aid and a given variable to show that effectiveness of aid is conditional on that variable. Finally, most studies assumed that foreign aid is an endogenous variable and only a few consider the possible endogeneity of other explanatory variables (Moreira, 2005).

Several recent studies argue that aid is ineffective or does not have a significant impact on growth at all. One aspect which contributes for this ineffectiveness is that governments treated aid as fungible or diverted to less productive consumption uses rather than investment (Boone, 1996). Another argument is that aid is only effective if appropriate economic policies are in place in recipient government (Burnside and Dollar, 2000).However, Easterly et al. 2003and Hansen & Tarp, 2001 contradicts the conditionality of aid on good policies. Because Easterly et al. 2003and Hansen & Tarp, 2001 used same database and specification that Burnside and Dollar, (2000) used and obtained insignificant results on aid and policy interaction term. Moreover,Easterly et al. 2003and Hansen & Tarp, 2001 show that aid increases the growth rate via investment, and this result is not conditional on good policies.

2.1.1. Foreign Aid Increases Economic Growth

Durbarry et al. (1998) examines the impacts of foreign aid on growth of 68 developing countries for a period of 1970-93.They are using endogenous growth models, namely: Fischer-Easterly model' and Barro model' and estimate the impacts by using both cross-sectional and panel data techniques. Endogenous growth model explains primarily growth in the economy depends on internal factors such as a policy measure and investment in human capital, innovation and knowledge which drive growth in the long run. Whereas exogenous growth model explains long run growth in the economic achieved through external factors such as the level of technological progress and population growth.

Fischer-Easterly type model emphasises on macroeconomic policies such as monetary, fiscal and exchange rate policies that determine inflation, budget deficit and balance of payments, thus countries that permit high inflation rates and large budget deficit grow more slowly. Whereas, Barro model demonstrates that foreign aid causes faster growth for those who has a problem of capital shortage and initial per capita GDPs are at a lower level, by speeding up their way to reach on steady state growth. In addition it draws transitional dynamics that include speed of convergence and steady state aspects and includes initial per capita GDP and human capital per person in its basis specification to measure countries economic growth rate.Durbarry et al. (1998) are using cross-sectional methods to investigate the effects of aid on economic growth and use data averaging over the 1970-93. And also panel data techniques to allow the equation intercept to vary as a way of representing country and/or time effects.

The major finding from the augmented Fischer-Easterly Cross sectional regression is that the macroeconomic and policy control variables are typically correctly signed and statistically significant. They find a positive coefficient on Official Development Assistance, which is significant at the 10 % confidence level and a negative sign for the quadratic aid term; however, it is not significant. From augmented fishery panel data, again foreign aid coefficient is positive as predicted and significant at the 5 % level; the quadratic aid term is now also significant with a negative sign; indicate too much foreign aid hurts developing countries beyond a certain threshold level.

The major findings from the Barro-regression show that from all of the Barro variables (GDP per capita, primary and secondary school enrollment rates (all in 1970), and fertility rate) only secondary enrollment and fertility appear to be significant. More importantly, impacts of aid appear to be large and significant only when policy variables are omitted. This result strengthened the argument that equations is mis-specified when policy variables are omitted.

In general Durbarry et al. (1998) finding strongly support the view point that foreign aid does have some positive impact on growth. Especially huge amount of foreign aid inflows have a beneficial effect on LDC growth, conditional on a stable macroeconomic policy environment in those countries. This explanation is consistent with the evidence of Burnside and Dollar (2000) who generally find that foreign aid to be a significant determinant of growth only in combination with an index of good macroeconomic policy/stability. Further, they also level amount of aid which has an impact on growth. Accordingly low amounts of aid which is less than about 13% of their GDP do not appear to generate faster growth and also very high

aid/GDP ratios (around 40-45%) are also associated with slower growth, which support too much foreign aid is detrimental. Moreover, they find negligible growth effects of foreign aid in low income countries especially for those who receiving less than 13% of their GDP.

Easterly et al. (2003) reassess the association between aid, policy and growth by using OLS and IV estimation methods for 62 countries for a period of 1970-1997. They reconstruct the Burnside and Dollar (2000) database from original sources and add additional countries and observations and used non-linear specifications.

They increased the sample size from their original Burnside and Dollar (2000) from 275 observations in 56 countries to 356 observations in 62 countries. Even though they are using the same specification the aid*policy interaction term enters insignificantly when using data from 1970–1997.However, Burnside and Dollar (2000) used (1970-1993) data set and get significant results on the interaction term.

Burnside and Dollar (2000) found the aid*policy term to be significant and positive when they did not exclude outliers but added another term aid^2*policy, which was significant and negative. The reason behind this result may be too much aid is harmful for recipient countries, and inclusion of outlier may be contributed on their positive results. Their result is significant in OLS for the whole sample and the low income sample, but not in 2SLS. However,Easterly et al. (2003) used full sample and found the coefficients on the aid*policy and aid^2*policy reverse sign from the Burnside and Dollar (2000) results. Adding new data creates new doubts about the Burnside and Dollar (2000) conclusion. Easterly et al. (2003) extend the sample from 1993 to 1997 and no longer find that aid promotes growth in good policy environments. Their findings regarding the fragility of the aid-policy-growth link is unaffected by excluding or including outliers.

Lensink and Morrissey (2000) investigate whether uncertainty regarding the level of aid inflows affects the impact of aid on growth. In their paper Uncertainty is proxied by unanticipated aid to capture the volatility that is assumed to have an adverse impact on investment, and hence on growth. Their hypothesis is that although all measures may be negatively related to growth, uncertainty will be a more significant determinant of aid ineffectiveness than total instability.
They used the OLS estimation method to observe the impacts of aid on growth for 75 developing countries and sub sample of 36 low income African countries for a period of 25 years (1970-95). There are a variety of reasons why aid flows will vary from year to year. For example, if a country sustains strong performance for a relatively long period its need for aid should decline. On the other hand, some changes in aid may be quite sudden and unexpected. For example, severs famines may increase the amount of aid in recipient countries. Their result showed that aid uncertainty is consistently and significantly negatively related to growth, and this result is robust. Investment appeared to be the principal determinant of growth and, when included with investment, foreign aid does not have a robust effect on growth. Their results suggest that aid has a robust effect on economic growth via the level of investment when controlling for uncertainty. This suggests that stability in donor recipient

relationships could enhance the effectiveness of aid by making it easier for recipients to predict future aid inflows that may in turn permit more investment and better fiscal planning.

Dalgaard et al. (2004) paper has a look at two issues in aid effectiveness debate. First when aid is modelled as an exogenous transfer of income or capital in a standard OLG model, aid will in general impact on productivity. Second the "returns to aid" may depend on both policy and structural characteristics. They find that aid appears as to be less effective in the geographic tropics. These may be due to the effects of climate condition on productivity of many countries since most developing countries depend mainly on agricultural production.

They noted that aid should not be recognized as a remedy for poverty reduction. Their regression results indicate that there are diminishing returns to aid, as the variable 'aid squared' enters with a significant, negative parameter. Importantly, the study by Dalgaard et al. (2004) and Hansen and Tarp (2001) performs a general-to-specific test which ultimately advance unique support to the "diminishing returns" specification.

The paper of Ekanayake and Chatrna (2010) contributes to the existing empirical literature by using 83 aid-receiving developing countries for long time period (1980-2007). Their model estimates for different regions, namely, Asia, Africa, and Latin America and the Caribbean. In addition, they estimate different income levels: low income, low middle income, upper middle income and all income levels. When the model was estimated for different regions their result shows foreign aid variable has a negative sign in three regions (Asia, Latin America and the Caribbean) out of four regions, indicating that foreign aid appears to have an adverse effect on economic growth in developing countries. However, this variable is positive for African region indicating that foreign aid has a positive effect on economic growth in African countries. This is not surprising given that Africa is the largest recipient of foreign aid than any other region. Finally, when the model was estimated for different income levels, the foreign aid variable has a positive sign in three (low income, upper middle income and all income levels) countries, indicating that foreign aid appears to have a positive effect on economic growth in developing countries. However, this variable is negative for low-middle income countries indicating that foreign aid has a negative effect on economic growth in these countries. Thus, the findings of this study are, for the most part, consistent with findings of previous studies on the effects of foreign aid on economic growth.
Hansen and Tarp (2001) examines the relationship between foreign aid and growth in 56 countries covering the years (1974-1993). They are formulating a unified empirical model where quadratic aid and policy terms appear together with the aid-policy interaction. They hypothesize that the regression results may be biased as a result of the joint effect of endogeneity of the aid flows, unobserved country specific factors, and conditional convergence. So they re-visit the endogeneity issue by using ordinary least squares as well as a generalized method of moments estimator that yield consistent estimates, in the presence of both endogenous regressors and country specific effects.

They used an average rate of growth in per capita GDP as a dependent variable and several policies and institutional indicators which have appeared in empirical growth studies over the last decade as explanatory variables. Some of them that include in there model are, ethno-

linguistic fractionalization, assassinations, and a measure of institutional quality to capture political instability and government bureaucracy, the logarithm of the initial level of per capita GDP to capture conditional convergence effects and Official Development Aid (ODA).Their general model includes aid, aid squared, aid times policy, and policy squared and the above mentioned three policy index variables. In their estimation method they follow Burnside and Dollar (2000) approach and treated aid as endogenous however, they use different set of instruments (include all the aid regressors lagged one period).When we compare to other studies they find very different and positive estimates of the impact of aid because their estimation result shows there is a one-to-one relation between increased aid flows and increased investment and an increase of one percentage point in the aid per GDP ratio leads to an increase of roughly 0.25 percentage points in the growth rate. In general the relationship between aid and growth in real per capita shows that aid increases the growth rate via investment, and this result is not conditional on good policies which is opposed to (Burnside and Dollar, 2000) findings. They also noted that empirical conclusions about aid effectiveness, based on cross-country growth regressions, depend on poorly understood non-linearity and critical methodological choices.

Moreira (2005) assesses the macroeconomic impact of foreign aid on the economic growth by using differenced GMM (Generalized Method of Moments) estimation method in 48 developing countries for 29 years (1970 to 1998). He hypothesized that the quadratic term of ODA/GDP ratio is expected to be negatively related to growth; very high aid inflows (measured in relation to the GDP) are counterproductive which means too much of aid leads appreciation of foreign currency in recipient countries by adversely affect domestic firms. And also, the population growth rate is expected to have a negative effect on the growth rate of real per capita GDP.

The underlying theory of the macro studies in focus assumes that physical capital accumulation is the key to economic growth. He was focused on single-equation growth regressions and expressing the dependent variable in per capita terms and allowed for non-linear effects of aid on growth by including the squared aid term. Therefore, he used Arellano and Bond's GMM-type estimator to deal with the issue of endogeneity in the context of panel data models. He used six sub-period averages(1970-74, 75-79, 80-84, 85-89, 90-94, and 95-98) instead of yearly data ,due to missing values he used a total sample of 170 observations (unbalanced panel data).

His result shows highly significant positive, non-linear impact of aid in economic growth. Foreign aid contributes to economic growth as long as the aid to GDP ratio is not excessively high. In addition, he finds that aid has less effect on growth in the short-run than in the long-run. For developing countries an increase in the ratio of one percentage point leads approximately an increase of 0.16 percentage points per capita growth rate. The results achieved are in line with the micro results, and the common macro result from cross-country regression studies published in the last few years, i.e., foreign aid is beneficial to the economic growth of developing countries. Given this, one may then state that the method rather than the theoretical basis is the main problem inherent in the assessments being carried

out up to the mid-nineties. He proposed time lags in the aid-growth relationship should not be ignored and suggests improvements to the methodological and econometric procedures.

The existing empirical results also suggest that non-linearity (negative effects of high aid inflows) and time lags in the aid-growth, relationship, country heterogeneity, and endogeneity of foreign aid should be factored in when assessing the impact of foreign aid on the economic growth of developing countries. Moreover, aid also seems to be subject to diminishing returns, as the squared aid term is found consistently negative in a "new growth" framework (e.g.Hadjimichael, 1995; Hansen and Tarp, 2001).

Lensink and White (2001) examine whether empirical evidence supports the notion of negative effects of high aid inflows by using 2SLS estimator with a sample of 138 countries for a period of 1975–92. They hypothesized that the aid may have not only decreasing returns, but after a certain level, the returns to further aid inflows are negative. They are using per capita growth of real GDP as the dependent variable and introduce interaction of aid square as independent variables with other additional variables. The regression is a pooled cross-section time series analysis, using period averages calculated from three five-year periods (1975–79, 1980–84 and 1985–89) and one three year period (1990–92). The basic panel consists of 138 countries, from which they only included those countries which are aid recipients.

Their finding showed significant result on aid but interaction term between aid and policy is never significant which is in line with (Hansen and Tarp, 2001).In addition, the quadratic term is insignificant, however the insignificance of the quadratic term for the model using all observations suggests that the result is quite sensitive to some outliers. It appears that in more than 90 per cent of all regressions *AID* is significant at the 5 per cent level, whereas the quadratic term is significant at the 5 per cent level in about 40 per cent of all the regressions only. This casts some doubts about the robustness of the quadratic term. Therefore, although their study finds some empirical evidence for a negative effect of high aid inflows, the result seems to be quite sensitive to the exact specification of the model. Based on the average coefficients for the entire set of estimates the turning point of the aid to GNP ratio is about 50 per cent. Hence, their study suggests that the turning point is high (although some countries do receive aid at such levels). Their result is in line with Lensink and Morrissey (2000)and Moreira (2005) that the impacts of aid on economic growth of recipient countries is positive but decreasing return to scale.

2.1.2. Foreign Aid Hinders Economic Growth

Boone (1996) analyses the importance of political regime for the effectiveness of aid programs and examined how aid is used in recipient countries. In his framework, ruling politicians maximize welfare over a weighted sum of citizen's utilities. Politicians use distortionary taxation and foreign aid to finance productive government spending and their political supporters. So, aid does not promote economic development for two reasons. First, poverty is not caused by a capital shortage rather political regime shifts which affect macroeconomic variables, then decrease saving and income and second it is not optimal for politicians to adjust distortionary policies when they receive aid flows. In order to relate

political regimes to economic systems Boone (1996) categorizes alternative political regimes based on interest groups they support in to three.

First, an ***Elitist*** government, who maximizes the welfare of a fixed ruling coalition, its optimal policy is to transfer foreign aid to high-income political elite. Second, an ***Egalitarian*** government, who maximizes the welfare of a fixed group of citizens with relatively low endowments and its optimal policy, is to transfer foreign aid to households with low initial endowments. The third category is a ***laissez-faire*** government who maximizes the welfare of a minimum or substantial fraction of the population, its optimal policy is to use aid to lower distortionary taxes, which benefits only a few sectors, this leads to higher investment and income for targeted group. He tests the empirical predictions by using OLS and IV estimation methods and used data on foreign aid transfers (ODA), national accounts, human development indicators, and indexes of political liberties and political regime, from 97 countries for a time period between 1970 and 1990. His empirical results suggest that, even though in most countries aid primarily goes to consumption, it may still benefit the poor and reduce poverty, however, aid has not a significant impact on investment in countries that received less than 15% of GNP in aid. So in his view to bring impact on the economy the threshold should be greater than 15 % of GNP. In addition, he finds no significant impact of aid on tax proxies, but he does find that aid increases the size of government (government consumption rises by approximately three quarters of total aid receipts).

One important limitation of his findings is that, it's assumed that aid is fungible and the government can allocate the funds as needed, so it is exposed to corruption and transfer to non-productive political elite. But, in smaller countries or countries where the AID/GNP ratio is extremely large (over 15% of GNP) he finds that aid does lead to higher investment because in this case aid is no longer fungible. For example, in a small country one dam or large public infrastructure project can represent a sizable portion of GNP in this case the project is unlikely to be fungible. Second, he also assumes that aid is not conditional on political reforms, so that the policy choices and political regime of the nation are not directly affected or vice versa by aid flows, but his findings shows that all political regimes allocate foreign aid to high income political elite. In his framework, political regime shifts or revolutions can lead to improvements in poverty indicators if the new governments are more egalitarian and more representative. In his model, he showed that aid can be effective when it is conditional on policy and/or political reforms, and it can be effective in narrow cases where aid is non-fungible.Boone (1996) may be fails to observe positive results due to regressions specification or time period used. In addition he observes the relationship on average; in that case aid may only cause growth in some countries.

Finally, the studies by (Burnside and Dollar, 2000; Durbarry et al., 1998; Hadjimichael, 1995; Lensink and White, 2001) have a lot in common, including overlap in samples and estimation methods and all find positive impact of aid on growth in contrast to (Boone, 1996).The main difference between these studies is that Boone (1996) treats aid-growth relations as linear while Burnside and Dollar (2000), Durbarry et al.(1998), Hadjimichael (1995) and Lensink and White (2001) are modelled as non-linear. For example Burnside and Dollar (2000) use an

interaction term between aid and an index of economic policy whereas, (Durbarry et al., 1998; Hadjimichael, 1995; Lensink and White, 2001) include aid squared regressor.

(Boone, 1996; Burnside & Dollar, 2000 and, Hadjimichael, 1995) explicitly consider simultaneity bias which causes endogeneity problem. According to Boone (1996)and Burnside and Dollar (2000) reasons for the possible endogeneity of aid in the growth regressions is that difficulty to perceive aid as a lump-sum transfer, independent of the level of income. Empirically, a negative relation between aid and income per capita is well established. If aid depends on the level of income, it cannot be exogenous with respect to growth as traditionally assumed. So the endogeneity issue needs to be taken serious.

2.1.3. Insignificant Relationship between Foreign Aid and Economic Growth

Rajan and Subramanian (2005) test the general validity of the aid-growth relationship under one framework. They examine the robustness of the relationship across time horizons (medium and long run) and periods (1960s through 1990s), sources of aid (multilateral and bilateral), types of aid (economic, social, food, etc.), timing of impact of aid (short-term versus long-term), specifications (cross-section and panel), and samples (developing countries which have received aid during the post-war period and for which data are available) at the same time.

Aid flows are influenced by a countries situation. Aid may go to countries that frequently affected by natural disaster, which would explain a negative correlation between aid and growth (If donors are motivated by suffering in the recipient country) the greater the desire to give aid to alleviate it. Thus there might be a negative correlation between aid and growth but this does not reflect causation from aid to growth. It may also go to those who have used it well in the past implying, if growth is persistent, there will be a positive correlation between aid and growth (if donors are motivated to give to successful recipients, one might see a positive correlation between aid and growth, and this again would not reflect causation from aid to growth). Since neither of these relationships is causal, it is important to isolate the exogenous component of aid.

Rajan and Subramanian (2005) find little evidence of a robust positive impact of aid on growth. They are using an instrumental strategy to correct the bias of conventional (Ordinary Least Squares) estimation procedures against finding a positive impact of aid. In addition, in the cross-sectional analysis, they find some evidence for a negative relationship in the long run (40 year horizon), though this is not significant and does not survive instrumentation.

Further, they find some evidence of a positive relationship for the period 1980-2000, but only when outliers are included. And also, they find virtually no evidence that aid works better in better policy or institutional or geographical environments, or that certain kinds of aid work better than others. The simple theoretical model suggests that the predicted positive effects of aid inflows on growth are likely to be smaller than suggested by advocates, even if inflows are utilized well. In their panel estimation they are using Arellano-Bond and Blundell-Blond estimators, which address the potential endogeneity of the regressors, and incorporate (Implicitly) fixed effects. They find in four time periods 1960_00, 1960_80, 1970_00, 1980_00 the estimate of the aid coefficient is negative with the only significant estimate being

the one for the longest period 1960-2000. The magnitude in this case suggests that an increase in aid of 1 percentage point of GDP would *lower* long-run growth by about 0.07 percentage points per year. In addition, they also find that coefficient on the aid-policy interaction terms is never positive and significant which is contradicting Burnside and Dollar (2000) results.

Finally, they conclude that there is no robust positive relationship between aid and growth in the cross-section, and this despite the fact that their instrumenting strategy corrects for the bias in conventional (ordinary least squares) estimation procedures of finding a negative impact of aid on growth. In addition, they find that the results (whatever their sign) are reasonably uniform across different sub-categories of aid, suggesting a high degree of fungibility (Economic, social and food aid seem to have similar effects on growth, as do bilateral and multilateral aid).

2.2. Short and Long Run Impacts of Aid on Economic Growth

Several observers have argued that a large proportion of foreign aid is wasted and they believed that it only increases unproductive consumption. They argue that if recipient countries do not have the appropriate economic and political environment, foreign assistance will have no positive impact on their macroeconomic policies and growth rates (Azarnert, 2008). According to Clemens et al. (2004) past research on aid and growth were weak because usually they examines the impacts of aggregate aid on growth over a short period commonly four years, though significant portions of aid are unlikely to affect growth in such brief time. Second, the approach used in most studies is not well suited to detect the growth effects of large portions of aid. Almost all the macro-level research on this issue over the past decade has used one cross-country growth regressions based on panel data with four-year observations. However, growth regressions in general have many weaknesses.

Clemens et al. (2004) categories types of aid in to three based on time period needed to bring impacts on growth. The first one is **Short-term** aid which is expected to raise GDP per capita within roughly four years to a permanently higher level. It includes budget support or program aid given for any purpose and project aid given for production sector investments such as transportation (including roads), communications, energy, banking, agriculture and industry. The second classification is **Long-term** aid which might permanently raise GDP per capita, but is unlikely to do so within roughly four years of the disbursement. It includes technical cooperation given for any purpose, and most social sector investments, including in education, health, population control and water. The third one is **Humanitarian aid** which is intended to fill consumption gaps during an emergency situation and it includes emergency assistance and food aid.

They used 2SLS estimation methods and divide time period in six sub samples in four years average (1974-77, 1978-81, 1982-85, 1986-89, 1990-93, 1994-97 and 1998-2001).And they used a sample of 67 countries to see the short term impact of aid. First, they assign all 233 OECD purpose codes (disbursements record, the actual international transfer of financial resources) to one of three categories: short-impact (all program aid/cash flows), long-impact (all aid for technical cooperation) and humanitarian (all aid allocated for disaster assistance and food aid). Second, they assume that the fraction of disbursements in each of three aid

categories in a given period is equal to the fraction of commitments in each category in that period. Finally, they use 2SLS method to estimate disaggregated disbursements using disaggregated commitments data for the 1990s, and compare the estimates to the true values.

Their result shows that there is a positive causal relationship between short term aid (aid that brings impact in a four year period) and economic growth with diminishing returns. The non-linear relationship between aid and growth indicates that some limit on the ability of typical recipient countries to absorb a very large amount of aid. They find that an additional one percentage point of GDP in the short-impact aid produces an additional 0.58 percentage points of annual growth over the four year period. In addition, they suggest that the maximum aid effect occurs when short-impact aid occurs 8.1% turning point, this is when total aid reaches around 18% of GDP in the typical country. Further, they explore heterogeneity in the relationship by examining whether the aid-growth relationship is stronger or weaker in countries with particular characteristics; such as those with better policies, and stronger institutions. They find modest evidence that the aid-growth relationship has greater force in countries with stronger institutions as well as for those with higher life expectancy (better health). Hence, short-impact aid does seem to be somewhat more powerful in countries with healthier populations and strong institutions. However, unlike some previous research they do not find a positive aid-growth relationship depends on the strength of the institutions. Rather, they find a substantial positive relationship even in countries with weak institutions, and a slightly more powerful one in countries with more capable institutions.

In general, their result showed that there is a powerful relationship between short-term impact and growth across all countries on average, and find a slightly larger relationship in the presence of good institutions. In addition, they find little or no relationship between either humanitarian aid or long-term aid and economic growth over a four year period, even though they do not conclude that these kinds of aid flows have no impact on growth.

They used real per capita GDP as dependent variable and as independent variable macroeconomic policies such as inflation levels, fiscal policy and a balance of payments; physical capital, which is proxied by investment share over GDP and it is lagged one period to reflect the time needed for benefit of investments and expected to have positive sign; human capital which is proxied by mean years of schooling of those over the age of 25 and is expected to have a positive coefficient. As control variable, initial level of per capita GDP to capture convergence; an institutional quality which is proxied by efficient bureaucracy, an effective judiciary, and lower level of government corruption and is expected to be correlated with faster growth and to have a positive sign. In addition, they include population growth and the fraction of the country suited in the tropics.

Their result shows that both Aid/GDP and Aid Volatility are significant even at one percent significance level. However, Aid/GDP has positive coefficient and Aid Volatility has negative coefficient. In general the empirical analysis of their paper supports the idea that aid has positive effects on growth. Moreover, their result indicates investment and institutional quality are important for growth even though no significant indirect link was found between investment and foreign aid. Father a positive correlation was found between aid and consumption and a negative link between aid volatility and consumption, which reflect the

fact that foreign aid, is often diverted to consumption rather than promoting economic growth. Moreover the result indicates that aid has become a source of volatility rather than insuring against it and in that way has become unfavorable for economic growth. Finally, they regressed corruption on aid and aid volatility and found that aid volatility is positively related to corruption in recipient countries, but, possibly surprisingly, that the volume of aid is negatively correlated with corruption.

2.3. Humanitarian and Development Aid

There are two types of foreign aid which flow from donor's nation to developing countries, Development and Humanitarian aid. Development aid is a kind of financial aid given by foreign governments and other development agencies to support economic, environmental, social and political development in developing countries (Wikipedia). The key focus of such types of aid is to build capacity by transferring knowledge and resources through workshop, training and infrastructural development (Kopinak, 2013). Solow(1956) noted that accumulation of capital is the main factor that determine growth in the long run. Therefore, countries that received aid in the form of capital transfer, technical assistance or capacity building have high probability to grow faster than those who receive humanitarian aid. Development aid is different from humanitarian aid since it focuses on alleviating poverty in the long term, rather than a short term response (Wikipedia).

According to Development Assistance Committee data, As cited by Strömberg (2007) net disbursements on emergency and distress relief over 1995-2004 were around $4.6 billion per year (in constant 2004 dollars). The United States has been the largest donor by far, accounting for around a third of all relief. However, European countries as a group account for 57 percent of the funds. Among them, the largest donors are the Netherlands, the United Kingdom, Sweden, Norway, Germany, and France, each contributing 6-9 percent. The majority of the relief has been given to Africa, Asia and Europe which is 40,35 and 19 percent consequently (Strömberg, 2007).

Humanitarian aid is short-term in nature, focusing on addressing immediate basic needs and preventing morbidity and mortality. It represents a commitment to support vulnerable host populations that have experienced a sudden emergency, requiring ongoing assistance to maintain or improve their quality of life (Kopinak, 2013).The characteristics that distinguishes it from other forms of foreign assistance and development aid is, it intends to be short-term in nature and provide for activities in the immediate aftermath of a disaster (Kopinak, 2013). Further Clemens et al. (2004) define Humanitarian aid as a small proportion of total aid that allocated for smoothing consumption for short period of time and is not directly intended to promote long term increases in income per capita, includes emergency assistance and food aid.

In general, the distinction between development and humanitarian aid are with respect to time boundary. Development aid is primarily focus on the contributions of countries economic development and welfare by providing technical assistance such as know-how and material capacity and capital transfer for long period of time (Britannica, 2013). While in the latter is given for short term and focus on filling consumption gaps during disasters.

2.3.1. Humanitarian Aid

The Paper of Azarnert (2008) provides theoretical framework that explain the effect of foreign aid on fertility levels, human capital accumulation and economic growth in recipient countries. The base of the model traced back to Malthus's theory which states that aggregate income may bring about a proportional rise in population without any improvement in living standards. The evidence indicated that countries which their source of revenue is depending on foreign aid characterized by lower levels of educational attainment and slower decline in fertility. Even though the aim of foreign aid is to improve the welfare of the poor, non- labor income support decreases the relative importance of human capital in an individual's lifetime income. Asaresult, foreign aid increases the return on child quantity while returns on children's human capital remain unchanged.

He used the time period from 1980-2000 and categorized countries based on the amount of foreign aid as a share of GNI to estimate the effect of aid on growth. He categorized percentage of foreign aid as a share of GNI into three. The first one is Almost Independent Countries (AIC) which is average annual ODA $\leq$ 6% of GNI. Second Dependent Countries (DC) which is 6% of GNI$\leq$ average annual ODA < 12% of GNI and the third one is Heavily Dependent Countries (HDC) which the average annual ODA $\geq$ 12% of GNI. He assumed that donors have altruistic motives for giving foreign aid so; humanitarian aid may work against its goals of diminishing population growth and raising economic development. Foreign assistance is an important source of revenue for more than one-third of sub-Saharan countries; it has constituted more than 10% of their gross national income (GNI) since their independence.

Olsen et al. (2003) studies assume that the volumes of emergency aid allocations are determined by three main factors. First, it depends on the intensity of media coverage. Second, it depends on the degree of political interest, particularly related to security, that donor governments have in a particular region. Third, it depends on the strength of humanitarian NGOs and international organization present in specific countries experiencing a humanitarian emergency. The link between media attention and political action is often known as the 'CNN-effect', a term which implies that the media, particularly television are able to influence the decisions of political leaders, including the foreign policy agendas of Western governments. Commonly it is assumed that massive media coverage of humanitarian crisis will lead to increased allocations of emergency funds, thus humanitarian needs have a better chance of being met.

They used four comparisons to analyze the effect. The first comparison examines two humanitarian crises caused by natural disasters: the Indian cyclone of October 1999 and the Mozambique floods of late-January 2000.The other three Comparisons deal with complex emergencies such as media coverage of Kosovo, Sudan and Angola (1997-2001); Comparison of Angola, Sudan and Korea media coverage (1997–2001) and Media coverage of Afghanistan, 2000–2002.

Their result confirmed media coverage has significant impact in the amounts of emergency aid going to specific crises in case of India cyclone(1999) and the Mozambique floods (2000).Whereas none of the other three cases analysed in their paper confirm the

importance of media coverage. Further, they found that the Noticeable differences in aid allocation to Angola, Sudan and Kosovo in 1999 are a result of the immense political and security interests vested in the European realm. In addition, their analysis of emergency aid to North Korea and Afghanistan, also points to the vast significance of donor interests, more specifically, security concerns.
In general, they found that only occasionally media play a key role in influencing decision makers to allocate large amounts of aid. Relatively the political interest and the strength of NGOs are important to influence donors. Further, they stated that natural disasters and complex emergencies have a greater tendency to become 'forgotten crises' (a severe and long-term crisis) when major aid donors like Western governments have no particular security interests in the distressed regions. In that case, two factors may very well determine the volume of emergency aid that is being allocated such as the presence and strength of humanitarian stakeholders in the region and the interest and persistency of the international press.

Neanidis (2012) examines the effect of humanitarian aid on the rates of fertility and economic growth in recipient countries. He made the assumption that, aid impacts economy through the accumulation of physical and human capital or a combination of the two. From these, the studies that highlight the human capital creation channel largely neglects the potential link between aid and demographic transitions in recipient nations. Moreover, he assumes that each period foreign donors with altruistic motives provide humanitarian aid to the economy and this aid transfer comes in two forms: monetary aid per adult individual (measured in units of labor income) and in kind aid per child. In addition, he assumes humanitarian aid influences the probability of survival to adulthood, health in childhood, and the time adults allocate to child rearing activities.
His empirical analysis considers 66 aid recipient countries and undertakes a static (Fixed effect and Random effect) and dynamic (First difference, Instrumental variable and Arellano-Bond) panel data estimations over the period 1974-2007. He develops a two-period overlapping generations model (Individuals live for two periods, so that in any period the economy has two cohorts) interacting with each other, where reproductive agents face a non-zero probability of death in childhood. As adults, agents allocate their time to work, leisure, and child rearing activities of surviving children.

He finds that an increase in humanitarian aid has an ambiguous effect on fertility rate and reduces time parents allocate to surviving children. In kind aid has a negative effect on fertility by increasing the probability of survival from childhood to adulthood. On the other hand monetary (per-adult) aid increases fertility by reducing the quantity cost of children, thereby shifting resources from quality of children to quantity of children. This result is in line with Azarnert (2008) per adult aid increases the return on child quantity. Moreover, he finds that an increase in humanitarian aid has an ambiguous effect on the growth rate of output per worker. The reason behind this result is that, in kind aid has a positive impact on growth by directly enhancing the health status of surviving children and their productivity during adulthood. Whereas Aid per adult reduces the child-rearing time adults allocate to their children, which lowers the child's health status. This, in turn, reduces health status in

adulthood, and subsequently the rate of economic growth. This result also in line with Azarnert, (2008)which is the effect of per adult aid reduces human capital accumulation and growth.

In general, he concludes that humanitarian aid has on average a zero effect on both the fertility rate and the rate of per capita output growth. Which is contradictory with Azarnert (2008) result, humanitarian foreign aid increases fertility and reduces human capital accumulation.

Strömberg (2007) hypothesise that economic donors' interest motives may initiative disaster relief. To capture donors' economic motive they include the variable "trade value" which is the bilateral trade flow between the donor and the recipient. Their result shows, trade flows increase the chance of receiving relief by 8 percent and the amount of relief by 27 percent. This evidence that economic donor interests affect relief is suggestive, but far from conclusive. The problem is that trade and aid would be positively related even if economic interests played no role in real-life. The two are driven by similar factors, such as geographic and cultural closeness.

They also investigate whether foreign policy motives drive relief to friendly governments. It proxy by whether the donor has a formal alliance with the country and the similarity between the donor's and the recipient's voting pattern in the United Nations. They find little evidence that these measures of government friendliness are of importance for disaster relief. A recipient with similar voting patterns to a donor is less likely to receive relief from that donor, and the effect on the amount is positive, although only significant at the 10 percent significance level. The net effect is not significant. In addition, they found that common colonial history increases the probability of getting relief by 8 percentage points. Donors give more to countries with a common language. Their estimation result indicates that having a common language does not significantly affect whether aid is given. However, when relief is provided, the amount given is around 46 percent higher. More distant countries are less likely to receive relief. The variable "geographic distance" contains the distance between the capitals of the donor and the recipient country: The estimated coefficients imply that a country on the other side of the earth is 11 percent less likely to receive relief than a country at distance zero.

In general, International relief for natural disasters does increase with the severity of the disaster, as measured by the number of killed and affected, and also rises when the income of the affected country is lower. However, relief is also driven by factors other than need. News coverage appears to drive disaster relief. Donors also give more to countries that lie closer, and with which they share a common language and colonial ties. These effects are sizeable

2.3.2. Development Aid

Minoiu and Reddy (2010) provide new cross country evidence on positive impacts of aid on economic growth. They make distinction between developmental and non- developmental aid based on effect on per capita GDP growth. Their specification allows aid flows to translate in to economic growth after long time periods. They used cross-sectional and panel regressions to estimate a standard cross-country growth-aid model in a sample of developing countries over 1960–2000. The aid variable is defined as grants plus net loans with a grant element

higher than 25 percent. Lagged values of Development Aid (*DA)* and Non Development Aid (*NDA)* are included to explain variations in the recipients' average growth rate of per capita GDP. The control variables are initial per capita income, initial level of life expectancy, institutional quality, geography, growth rate of terms of trade and their standard deviation, initial economic policy and continent dummies.

To estimate the long-term effect of aid on growth and allow for deep lags on the aid variable, the dependent variable (per capita GDP) is averaged over 1990-2000 while the explanatory variables DA, *MA* and *NDA* average over 1960-90. Their result shows an increase of total aid during this period by one percentage point of GDP is associated with an average per capita GDP growth rate that is higher by approximately 0.068 to 0.085 percentage points in 1990s. In addition, they find a positive and statistically significant estimated effect of bilateral aid from donors on growth, with coefficients that are large in magnitude. Moreover, an average growth in 1990s is higher by as much as 1.2-1.3 percentage points for countries which had received additional one percentage point of GDP as aid transfers from these donor countries.

They re-estimate their model by using panel data comprised of eight five-year averages between 1960 and 2000 and the system GMM estimator. This estimation strategy is appropriate to eliminate unobserved country specific fixed effects through first differencing and to instrument out the endogenous variables. The system GMM estimator uses a system of equations in first differences and levels (of GDP), where the instruments employed in the levels equations are suitably lagged first-differences of the endogenous series, while those used in the difference equation are lagged levels of the endogenous series.

They found that development aid has a positive, large, and robust effect on growth, while non-developmental aid is mostly growth-neutral and occasionally negatively associated with economic growth. In addition, aid of the right kind is good for growth and that it translates into growth outcomes over sufficiently long periods of time. Their results carry potentially significant policy implications, as they entail that shifting the composition of aid in favour of developmental aid or increasing its quantity can lead to sizable long-term benefits. Further, an increase in average bilateral aid of one percentage point of GDP is associated with average per capita GDP growth 15 years later that is higher by 0.2 percentage points. This result is consistent with the view that development aid may support investments in physical infrastructure, organizational development, and human capabilities, which bear fruit only over long periods.

Chapter 3. Research Methodology

In this paper, longitudinal research design was used to observe individual dynamic effect across many time periods. The study covered two decade period from 1990-2010 and used 81 aid recipient countries comprised of 1181 observations. To choose Fixed Effect (FE) or Random effect (RE) model, Hausman specification test was employed and the test confirmed that FE estimator was consistent. In addition, cross sectional regression was conducted by taking ten years average for both dependent and independent variables. For this regression, 74 countries were used and regressions were done. For panel as well as cross sectional data set both OLS and IV estimation methods were used. In this section, empirical and conceptual framework, the relationship between dependent and independent variables and data description were explained.

3.1. Empirical Framework

A lot of studies were conducted to know theoretical and empirical determinants of aggregate economic growth. For instance, Barro and Sala-i-Martin (2004) argued that investigating the determinants of aggregate economic growth helps to know how to increase individuals' living standard in the world and thus minimize world poverty. Most early as well as recent studies on growth determinants have used the Solow growth model framework as a benchmark.

Solow growth model explains long run economic growth by considering population growth, capital accumulation, technological progress and productivity. Hence, implicitly assumes exogenously determined economic growth and advancement of a given country. "*When countries differ in their micro economic specification and consequently have different steady-state levels of income per capita, the Solow model predicts that, after controlling for steady-state differences, poor countries should grow faster than rich countries. This prediction of the model is known as conditional convergence*"(Barro, 1991,407)

Many researchers agreed that cross-country regression analysis has a paramount importance to explore determinants of growth. As suggested by Doucouliagos and Paldam (2008), Barro type regression recognized as the best empirical tool in the modern growth theory since in the early 1990s and has relation with neoclassical model. It draws transitional dynamics that include speed of convergence and steady state aspects, but the true left hand side of Barro equation is averaged compounded annual growth rate of many years. In the basic Barro specification (equation 1) initial per capita GDP(Gross Domestic Product) and human capital per person should be included when we measure countries economic growth rate (Barro and Sala-i-Martin, 2004).

The basics of Barro regression model can be written as:

Basic Barro specification

$D_{yt} = F (y_{t-1}, h_{t-1,} Z_{t-1})$..... (1)

Where D_{yt} is growth rate, y_{t-1} is initial per capita GDP; h_{t-1} is initial human capital per person (based on measurements of educational attainment). Whereas, z_{t-1} stands for a bunch of control and other choice variables which would be included based on the researchers' objective.

3.2. Conceptual Framework

Model Specification

This study was intended to see the effect of aid on GDP per capita growth. The hypothesis that we set in this paper is that foreign aid has a positive impacts on GDP per capita growth. GDP per capita growth is a function of**;** lag initial GDP per capita, percent of population age 25 and over, official development aid as a percentage of GNI, official humanitarian assistance as a share of GDP, Sub-Saharan African (SSA) dummy, and interaction between SSA and aid, annual percentage of inflation, trade openness, institutional quality, ethnic fractionalization, agricultural share, annual population growth, rural population share, capital investment and domestic credit to private sector as a percentage of GDP. In this section we employ both cross sectional and panel data techniques. The panel model which we estimate is of the following form:

$$\mathbf{Y_{it} = \alpha_i + \beta_1 logy_{i,t-10} + \beta_2 logh_{i,t-1} + \beta_3 ODA_{i,t-1} + \beta_{4dum..Africa} + \beta_5 (lagODA_{it\_1} \text{ x dum.SSA}) + \beta_6 z_{it-1} + \varepsilon_{it}}$$

$$\mathbf{Y_{it} = \alpha_i + \beta_1 logy_{i,t-10} + \beta_2 logh_{i,t-1} + \beta_3 OHA_{i,t-1} + \beta_{4dum..Africa} + \beta_5 (lagOHA_{it\_1} \text{ x dum.SSA}) + \beta_6 z_{it-1} + \varepsilon_{it}}$$

Where the subscript i denotes 136 countries and t =1990 ....2010 the time period.

Where Y_{it} is GDP per capita growth

$ODAaid_{i,t-1}$ and $OHAaid_{i,t-1}$ denotes lag of development and humanitarian aid respectively, which is our state variables.

The variable $logy_{i,t-10}$ denotes initial per capita GDP of country i, which is lagged 10 years to capture the speed of convergence, $logh_{i,t-1}$ denotes initial human capital per person, (dum.SSA) denotes dummy for SSA countries, (aid_{it} x dum.SSA) denotes interaction term between aid and SSA countries, to see if aid is conditional on regional specific characteristics, α_i the country fixed effect\(heterogeneity among countries not vary over time), z_{it} denotes a bunch of control variables which stated above and finally ε_{it} is error term of country i at a time t.

Using cross-section methods allows us to investigate the effects of data averaging over the 1990-2010 period. The cross-section model which we estimate is the following form:

$$\mathbf{Y_{i(10)} = \alpha_i + \beta_1 logy_i + \beta_2 logh_i + \beta_3 logODA_i + \beta_{4dum.SSA} + \beta_5 (logaid_i \text{ x dum.SSA}) + \beta_6 lagz_i + \varepsilon_i} \text{ .....(1)}$$

$$\mathbf{Y_i = \alpha_i + \beta_1 logy_i + \beta_2 logh_i + \beta_3 logOHA_i + \beta_{4dum.SSA} + \beta_5 (aid_i \text{ x dum.SSA}) + \beta_6 z_i + \varepsilon_i} \text{ .....(2)}$$

Where i= 1, 2 ...136 For dependent variable 10 years average (2000-2010) is used and for all explanatory variable (1990-2000)

Where Y_i is averaged GDP per capita growth over the period 1990-2010 for countryi, ODA_i official development aid for country i, $OHA_{i\ is}$ official humanitarian aid for countryi, $_{dum.SSA}$ is dummy for SSA countries, aid_i x dum.SSA is interaction term between aid and SSA countries, z_i is control variables stated above and ε_i is an error term.

3.3. The relationship between Dependent and Independent variable

In this paper GDP per capita growth is the dependent variable. The selection of independent variables included in the model is based on the literature which finds that these explanatory variables explain well the variation in GDP growth per capita.

State Variables

Chenery and Strout (1966) explain about two gap model which give theoretical description for the relationship of economic growth and development aid . The first gap explains that the amount of investment in the country which is depends on the availability of domestic saving and foreign aid is necessary to attain a certain growth . The second gap explains developing countries face shortage of foreign currency, which is important to import inputs for production, so foreign aid helps in filling those gaps. Official Development Assistance(ODA) as a percentage of GNI is used here because most empirical studies use aid as a percentage of GNI to study the effect of development aid on economic growth (Boone, 1996).We expect a positive relation with economic growth since several researchers such as Burnside and Dollar (2000), Durbarry et al.(1998), Hadjimichael (1995) and Lensink and White (2001) found positive relationship between development aid and growth. In addition,Official Humanitarian Assistance(OHA) as a percentage of GDP is used to obseve its impacts on economic growth. For this type of aid we expect ethier positive or no effect on growth. For example, Neanidis (2012) analysis suggests that foreign aid may cause lower economic growth in recipient countries by increasing reproduction rate and lowering human capital level. Whereas, Azarnert (2008) found ambiguous results, in kind aid(Food) has a positive impact on growth by directly enhancing the health status of surviving children and their productivity during adulthood. Whereas, Aid per adult (monetary) reduces the child-rearing time adults allocate to their children which lowers children health status, hence the rate of economic growth.

Macroeconomic Policy and Growth

Stable macroeconomic policy environment is a necessary condition for economic growth and effective aid implementation. According to Fischer (1993) low and predictable inflation; competitive and predictable real exchange rate; appropriate interest rate and stable and sustainable fiscal policy is perceived as viable. If there are stable and few distortions in macroeconomic variables the effectiveness of capital flows and investment will be greater. Distortionary policies like trade restrictions reduce the efficiency of capital investment and thus rate of growth for a given level of capital investment, whereas removing this distortionary policies(trade openness) does the reverse (Durbarry et al., 1998).

Macroeconomic variables such as: trade openness has a positive relation with per capita GDP since developing countries benefit from increased economic activities and economy of scale. That would create more jobs for the people. Whereas, inflation distorts incentive to invest and reduce productivity, thus it will reduce economic growth. Inflation rate is the best single

indicator of macroeconomic policies with the budget surplus as a second indicator (Fischer, 1993).
Human capital plays a significant role to the sectors that generating new ideas. Countries with larger stocks of human capital tend to grow faster as they experience a faster rate of introduction of new technology, which helps to promote economic growth. Countries with low initial per capita GDP is growing faster than those with high initial per capita GDP. So a country's GDP per capita growth tends to be inversely related to its initial level of per capita GDP (Barro, 1991).

Economic growth has a positive relationship with capital investments as a percentage of GDP. According to Moreira (2005) developing countries are characterized by shortage of capital to make huge investment in industries and exportable sectors. So, increasing capital helps to fill those gaps and foster their economy. In addition, financial depth measure, which represents the general level of development in the banking sector relative to the economy has positive and strong links to long-term economic growth, poverty reduction and income level.

Ethno-linguistic fractionalization negatively affects the rate of economic growth since country with heterogeneous population would be less likely to grow than the more homogeneous one. Whereas, institutional quality contributes positively for per capita growth since it is associated with political and social stability and reductions of uncertainty, which is critical to attract investment (Chervin and Van Wijnbergen, 2010).

According to Rostow (1990) agricultural productivity increases countries ability to produce more food with less labour input which allows them to feed their growing population while releasing labor for manufacturing sector. Moreover, the increase in income and the surplus created in the agricultural sector would create demand for the manufacturing products and serve as a means to finance the manufacturing sector. So we expect to have a positive impact on per capita GDP since developing country's economy mainly depends on agricultural production.

According to Solow growth model, an increase annual population can potentially increase the economic growth as more population could supply a larger labour force for the economy. Rural population growth may have either positive or negative effect depending on the age group and the economy. Increasing population in rural areas may increase the area of cultivated land which causes deforestation. On the other hand, increasing population means increasing human capital working in the sector, so in this case it increases productivity since cheap labor will be available in the market.

3.4. Descriptions of Data

The data set for this study covered 136 aid recipient countries; most of them are developing countries. It covered 20 years period, from 1990 to 2010. The sources of these data are from Organization for Economic Co-operation and Development (OECD),World bank Database (2012), International Countries Risk Guide (ICRG)(2010), and La porta database[2].

[2] Ethno linguistic fractionalization, 1985, = probability that two randomly selected individuals from a given country will not be from same ethno linguistic group, from Roeder, Philip. 2001. Ethno linguistic fractionalization indices, 1961 and 1985,.

The Dependent variable is GDP per capita growth, which is measured by percentage of annual growth in GDP per capita. It is defined as the total market value of all final goods and services produced within the country in a one calendar year and divided by total population. It is usually used to represent the economic growth of a country. It is also the primary indicator of a country's economic performance, sometimes it is used as an indicator of standard of living as well. It is especially useful to compare one country from other because it shows the relative performance of countries.

Our State variable is official development aid as a percentage of GNI. Development Assistance Committee (DAC) defines this type of aid as "*those flows to countries and territories on the list of ODA recipients and to multilateral institutions which are provided by official agencies, including state and local governments*". It is overseen as the promotion of the economic development and welfare of developing countries. And also it is concessional in character; it is loan with below market interest rates and conveys a grant element of at least 25 percent calculated at a rate of discount of 10 percent.[3] However, we used ODA as a share of GNI from World Bank data base. we expect the aid coefficient to have positive sign and statistically significant (OECD, 2012).

The other main variable is humanitarian aid as a percentage of GDP. The organization of global humanitarian assistance defines humanitarian assistance as, *aid and action designed to save lives, alleviate suffering and maintain and protect human dignity during and in the aftermath of emergencies.* It is intended to be short-term in nature and provide for activities in the immediate aftermath of a disaster. In practice it is often difficult to say where 'during and in the immediate aftermath of emergencies' ends and other types of assistance begin, especially in situations of prolonged vulnerability. we expect either positive or negative sign since several researchers found contradict results(GHA, 2013).

Inflation rate measured by Consumer price index (CPI) is the overall increase in prices of goods and services in the economy. Higher inflation levels tend to be more unstable and are generally associated with poor macroeconomic performance implying that the government has lost control. It used as a proxy for macroeconomic instability and a negative sign is hypothesized for the coefficient (Chervin and Van Wijnbergen, 2010).

Trade openness shows countries place in world trade market, how much they produce and their dependency on import goods. It raises growth through creating access to advanced technology from abroad, access to a variety of input production and access to broader markets that increase the efficiency of domestic production through increased specialization. In our case it is proxied by the sum of Export and Import as a share of GDP.

Capital investment as a percentage of GDP is a percentage of the total value of annual additions to fixed assets purchased by private companies and government divided by GDP. Gross capital formation over GDP is used to proxy changes in physical capital endowment. Since higher investment leads to higher growth rates, a positive sign is expected for the coefficient (Chervin and Van Wijnbergen, 2010).

3 The grant element itself is not reportable as a flow. Reporting is on a cash (nominal) basis

The financial depth measure is proxied by domestic credit to the private sector as a percentage of GDP. The higher ratio indicates greater financial sector depth. In addition, it shows the amount of money or asset equivalent to which a company, organisation or an individual person has access. The private credit, therefore, excludes credit issued to governments, government agencies, public enterprises and also excludes credit issued by central banks (WB, 2013).

Most of the time good institutions such as efficient bureaucracy, effective judiciary and lower level of government corruption are expected to be correlated with faster growth. On the other hand, poor institutions are harming economic growth by reducing entrepreneurial activities and negatively influencing investment behavior. The quality of institutions is assumed to change slowly over time and thus captures the long-term characteristics of countries affecting policies as well as growth. This variable is proxied by democracy and expected to have a positive sign. The democracy index measures general openness of political institutions on a scale from 0 to 10. A country which has full democracy would receive a positive 10 value(Chervin and Van Wijnbergen, 2010).

We are including initial per capita GDP to capture the speed of convergence. If countries are similar in their initial income levels, poor countries are predicted to grow faster than rich countries. The coefficient of initial GDP per capita is therefore expected to have a negative sign (Chervin and Van Wijnbergen, 2010).

Human capital is proxy by mean years of schooling of those over the age of 25 and expected to have a positive coefficient (Chervin and Van Wijnbergen, 2010)

Ethnic fractionalization in this paper is proxied by linguistic and racial index. If there is high conflict due to ethnic fractionalization then government shifts the budget from productive sector to military. It measures the probability that two randomly selected individuals from a given country will not belong to the same ethno linguistic group(Chervin and Van Wijnbergen, 2010).

Annual population growth is added to proxy labor force growth and positive sign is expected. Though past literatures argue that population growth are negatively affected economic growth.

Agricultural share in GDP which is proxy by value added (% of GDP). It seems there is a general consensus that agriculture is less productive than the non-agriculture sectors in terms of value creation. In other words, most countries that have larger non agriculture sector in relative terms are richer than those whose economies dominated by agriculture. However, the role of agriculture in achieving sustainable economic growth is still debatable. In our case we expect positive sign since developing countries economy is depend on agriculture.

All data source except humanitarian aid, Institutional quality and ethnic fractionalization are taken from World Development Indicators database. The data on humanitarian aid is from the Organization for Economic Corporation Development (OECD), for Institutional quality (democracy) is from ICRG and for ethnic fractionalization from La porta database.

3.5. Endogeneity of Aid

Current studies on foreign aid showed that the amount of aid given to countries is conditional on certain characteristics of a recipient or donor country. Some of them are; former colonial ties, having a common language, being located in neighboring countries, media coverage, political/economic interest, ownership of mineral and oil, population size, land area, etc. In the empirical model, there is concern regarding potential endogeneity of aid which is caused by omitting relevant variables in the aid-growth regressions. The OLS estimation method is biased in three situations; first, due to omitting relevant variables from the model, second, due to measurement error in the right hand side variables (correlated with one of the Xi's) and third, due to Simultaneity or reverse causality.

To solve these kind of problem, instrumental variables which fulfill the following conditions are used. First, the instrument must be exogenous and strongly correlated with endogenous variables. Second, the covariance between the instrumental variable and error term must be zero otherwise the instrument will be inconsistent. To check endogeneity problem Hausman specification test is used. If the result shows all variables are exogenous then OLS and 2SLS are consistent (Schuetze, 2013). So it is crucial to determine instrumental variables, which are correlated with endogenous variable (aid) but uncorrelated with the dependent variable growth.

3.6. Instrumental Variables

The purpose of this section is to determine which variables to include as instruments. The first instrumental variable is total population, which determines the influence a donor has on recipient countries. Particularly, donors will generally have more influence over countries that received aid with low populations. It is the key determinants of aid especially when donors don't have colonial ties with the recipient countries. However, if countries have colonial ties, donors provides most aid regardless of population.Burnside and Dollar (2000) used logarithms of population among their instrumental variables during their investigation. They argue that these variables reflect donor's strategic interests and therefore should fulfil condition of instrument relevance.

The second instrument is temperature. As Burke et al. (2009) stated temperature can affect agricultural yields both through increases in crop evapotranspiration and water stress in the absence of irrigation, and through accelerated crop development. Since the vast majority of poor developing country's households are rural and their income depends on agricultural activities, temperature-related yield declines can have serious consequences on the entire society that depend heavily on agriculture. So this situation exposed countries to borrow money and request assistance from international organizations and the developed world.

The third instrument is land area (in square km), which is strategic variable that proxies donor strategic interests. Donors give aid to recipient countries based on land area since countries with large land area require more aid as their projects will be larger.

The fourth instrumental variable is precipitation. According to McKee et al. (1993) drought is a condition of insufficient moisture caused by a deficit in precipitation over some time period.

Precipitation is the amount of water that falls down from clouds. It is a key determinant of aid because donors are interested to give aid for countries that are unable to feed their people due to low agricultural production. The main characteristics of these countries are, they are located in tropical areas and mainly vulnerable to potential damage from erratic rainfall since the poor soils which cover large areas of these regions already have made much of the land unusable for agriculture (Mendelsohn and Dinar, 1999).We used logarithms of precipitation to proxy humanitarian aid. Sometimes donors are supporting countries from their human perspective since natural disaster seen as exogenously determined.

As explained in the methodology section the following types of variables are included as independent variables

Type	**Independent Variable**
Convergence	Initial GDP per capita
Institutional quality	Democracy
Regional dummy	Sub-Sahara Africa East Asia
Macroeconomic Policy	Log inflation (Annual % CPI) Openness (Export+ Import) /GDP
Endogenous	Humanitarian aid Development aid
	Agriculture value added Rural population as a share of all pop. Population growth
Financial depth measure	Domestic credit as a share of GDP
Physical and human capital	Capital investment Secondary school enrollment
Ethnic fractionalization	Ethno- linguistic
Instruments	Logarithm of land area in (km^2) Logarithm of total population Logarithm of precipitation Temperature

Chapter4. Results

4.1. Data and sample countries

The data set we used for this study covers 20 years period, from 1990 to 2010. Originally we chose all (136) aid recipient countries but in the regression we used 81 countries after cleaning our data (replacing maximum and minimum values as missing). Primarily we used the World Development Indicators (WDI) for the following economic data; development aid ,capital investment, population growth rate, rural population as a share of the total population, the volume of export and import, inflation rate and school enrolment. The data on humanitarian aid is from the Organization for Economic Corporation Development (OECD), for Institutional quality (democracy) is from ICRG and for ethnic fractionalization from La porta database.

4.2. Descriptive Statistics

Descriptive statistics are numbers that are used to summarize and describe data. In this paper, we used different data sources for explanatory variables.Below we present the maximum and minimum value of variables and also shows in graph the relationship between our interest variable and the dependent variable.

Dependent Variable GDP per Capita Growth

The maximum value of average GDP per capita growth, in the sample is 19.92 with mean growth rate 1.72. Whereas the minimum value of growth rate is -50.23.

The maximum and minimum values of GDP per capita growth

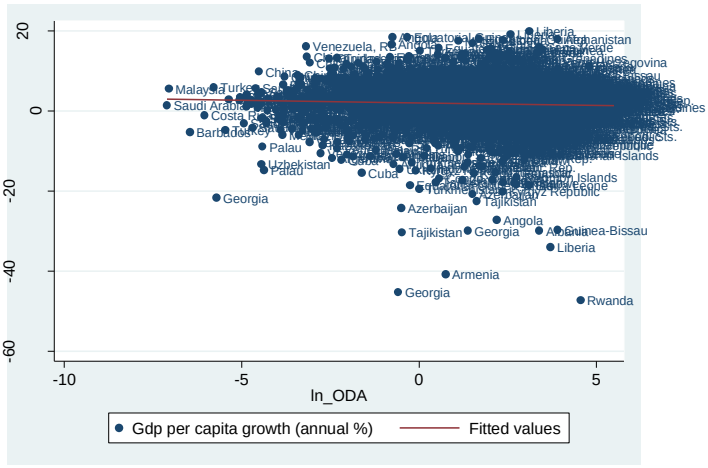
Variable	Obs	Mean	Std. Dev.	Min	Max
Growth	2739	1.715387	5.708529	-50.23583	19.92491

Development aid

The maximum value of development aid in the sample is 145.12 with a mean value of 8.49. Whereas, the minimum value of development aid is -.6895.

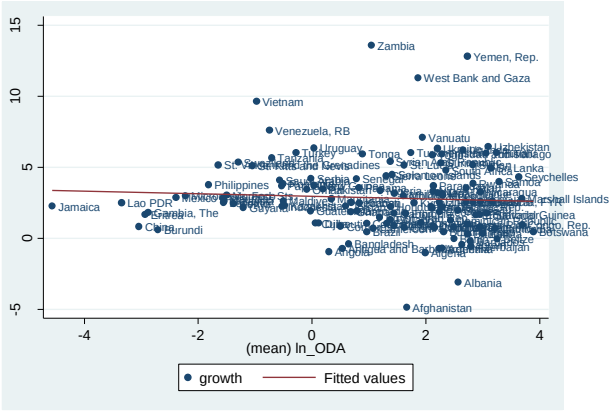
Variable	Obs	Mean	Std. Dev.	Min	Max
ODA	2678	8.491284	11.67865	-.6895173	145.1223

Figure 1. Partial relationship between GDP per capita growth and Development aid (Panel data set)



As we can see from Figure (1) the line depicting the relationship between annual GDP growth rate and development aid as a share of GNI seems downward slopping. It indicates that there is a weak relationship between the two variables. Moreover, as we can see from the correlation output (Appendix B) the sign of the partial correlation coefficient between GDP per capita growth and development aid is also negative (-0.0480). This shows that when other variables are not yet controlled, there is a negative relationship between those variables.

Figure 2. Partial relationship between GDP per capita growth and Development aid (Cross sectional data set)



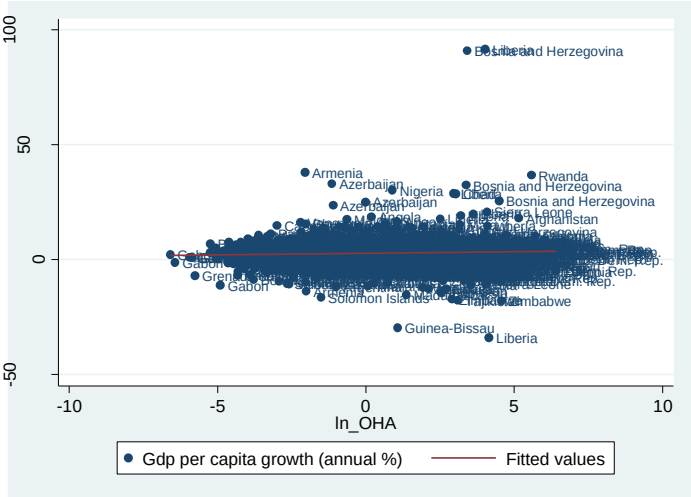
As we can see from the graph there is a negative relationship between development and growth rate in the long run.

Humanitarian aid

The maximum value of humanitarian aid is 199.032 with a mean value of 8.42.

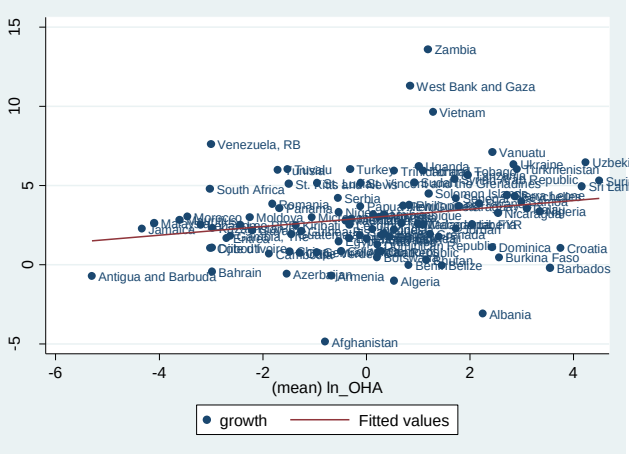
Variable	Obs	Mean	Std. Dev.	Min	Max
OHA	1650	8.424845	22.83209	0	199.032

Figure 3. Partial relationship between GDP per capita growth and Humanitarian aid (Panel data set)



The above graph shows that there is a positive relationship between humanitarian aid and growth rate. As we can see the correlation coefficients in (Appendix 2) the sign of the partial correlation coefficient between GDP per capita growth and humanitarian aid is also positive (0.0070) sign.

Figure 4. Partial relationship between GDP per capita growth and Humanitarian aid (Cross sectional data set)



Growth rate of Sub-Saharan countries compared with other aid recipient countries.

subsahara	variable	N	mean	sd	min	max
0	Growth	1813	2.085453	5.530845	-45.32511	18.06814
1	Growth	926	.9908427	5.978348	-50.23583	19.92491
Total	Growth	2739	1.715387	5.708529	-50.23583	19.92491

The table shows that the GDP per capita growth is lower in SSA as compared to other aid recipient countries. The growth rate in SSA is on average 0.99 whereas 2.1 on other aid

recipient countries. To check whether the mean difference is significant, we employed the following t-test.

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	1813	2.085453	.1298951	5.530845	1.830693	2.340212
1	926	.9908427	.1964607	5.978348	.6052823	1.376403
combined	2739	1.715387	.1090757	5.708529	1.501508	1.929266
diff		1.09461	.229668		.6442698	1.54495

diff = mean(0) - mean(1) t = 4.7661
Ho: diff = 0 degrees of freedom = 2737

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
Pr(T < t) = 1.0000 Pr(|T| > |t|) = 0.0000 Pr(T > t) = 0.0000

The t-test confirmed that there is a mean difference between those countries. The test rejected the null hypothesis that states there is no mean difference between those countries and accept the alternative that there is a difference at t=4.76 and significant at 1% significance level.

4.3. Regression Results

In this section we present regression results from both panel and cross sectional data using OLS and 2SLS estimation methods. In section 4.1 we present results from panel data set and in section 4.2 we address results of cross sectional data.

4.3.1. Panel Regression Results

In the first and second tables our report regression results from a panel data set (model 1 and 2) under both OLS and 2SLS estimation methods.

Growth regression using panel data with OLS and 2SLS estimation methods

The empirical model which I have estimated is of the following form:

$$Growth_{it} = \beta_i + \beta_1 logln\_GDP_{it-10} + \beta_2 lagln\_ODA/GNI_{it} + \beta_3\ lag\ ln\_Inflation_{it} + \beta_4 lagln\_Capinves_{it} + \beta_5 lag\ Rurpop_{it} + \beta_6\ popgrowth_{it} + \beta_7 lagln\_Domcredit_{it} + \beta_8 lagln\_schoolenr_{it} + \beta_9 lagln\_Agrshare_{it} + \beta_{10} lagInsquality_{it} + \beta_{11} lagln\_Tradeopp_{it} + \beta_{12} SSAdummy + \beta_{13}\ lag\ intODSSA + \varepsilon_{it}$$

Where i= 1,2,.....136 countries t= 1990,....., 2010

To make the result presentation more convenient, we call model-1 when ODA/GNI is entered in the growth regression and call model-2 when we include OHA/GDP in growth regression.

Table 1. Short run impacts of ODA and OHA on GDP per capita growth, OLS/IV Estimations

Independent variable	Model-1 include ODA/GNI in growth regression		Model-2 include OHA/GDP in growth regression	
	OLS	2SLS	OLS	2SLS
Lagged log of ODA/GNI	1.19 (.366)***	-6.62 (3.68)*	-	-
Lagged log of OHA/GDP	-	-	.68 (.212)***	1.72 (1.05)

Lagged log of initial GDP (1980)	-.236 (1.495)	-5.64 (2.89)**	1.65 (2.35)	1.73 (1.56)
Lagged log of Annual inflation rate	-.283 (.157)*	.282 (.311)	-.444 (.168)**	-.222 (.172)
Lagged log of Capital investment	.49 (.846)	1.41 (.946)	.647 (1.0)	1.68 (.968)*
Lagged log of Rural population (% of total population)	-.064 (.077)	.362 (.194)*	-.034 (.087)	-.048 (.112)
Lagged Annual Population Growth	.763 (.166)***	1.162 (.866)	-.37 (.36)	-.49 (.27)*
Lagged log of Financial depth measure	-.838 (.511)	-2.313 (.907)***	-1.23 (.71)*	-.903 (.684)
Lagged log of Secondary school enrolment	2.51 (1.256)**	-2.27 (2.44)	-.61 (1.79)	-1.62 (1.88)
Lagged log of Agricultural value added as a share of GDP	-.631 (.852)	1.94 (1.73)	-.084 (.776)	-1.06 (.954)
Lagged Institutional Quality	.076 (.096)	.132 (.118)	.176 (.127)	.105 (.131)
Lagged log of Ethnic fractionalization	-.244 (.193)	-.533 (.267)		
Lagged log of Trade openness	2.31 (.99)**	6.47 (2.3)**	3.9 (1.37)**	4.39 (1.29)***
Log aid squared	.088 (.095)	-.026 (.16)	-.003 (.033)	.04 (.053)
Observation	1180	1098	854	723

Note: * Significant at least at the 10 % level.
** Significant at least at the 5 % level.
*** Significant at least at the 1 % level

*The coefficients within bracket indicates robust standard error, we used robust standard errors because when we checked heteroskedasticity, the modified Wald test for group wise heteroskedasticity in FE model suggests that the model fails to meet the assumption of constant variance (homoscedasticity of error variance).

To obtain a prediction equation using linear regression, some of the basic assumptions have to be checked. The two basic assumptions are data should be normally distributed and there should be a constant variance of the error term across observations. We have done graphical investigations using Histogram for normality of both dependent and independent variables. Some variables have distributions that do not seem normally skewed. For those variables, we transformed the data using a logarithmic transformation prior to entering them into the regression models.

For the constant variance assumption we tested whether or not the variance of the error term is *homoscedastic* using Modified Wald test for group wise heteroskedasticity test in a fixed effects regression model. Under the null hypothesis that constant variance, H0: sigma(i)^2 = sigma^2 for all i. Our model at χ^2=26808.95 with p-value of 0.0000 suggests that the null hypothesis is rejected at 0% significance level. Therefore, we used heteroskedasticity robust standard error in the estimation of our Model. In addition, we employed Multicollinearity test and we found that the average value of Variance Inflation Factor (VIF) for all explanatory variables are 2.02 which indicates there is no multicollinearity among explanatory variables.

4.3.1.1. Estimation result of OLS panel regression (ODA &OHA)

In this analysis, we have two specifications Model-1 and Model-2. Before starting interpretations of the results, we should have to choose between Fixed Effects (FE) and Random Effects (RE) model. To do so we used Hausman specification test. The null hypothesis under this test stated that RE&FE both consistent, RE efficient and in the alternative FE consistent, RE not consistent.[4]The test rejected the null hypothesis at Chi2(12) =99.29 with p-value >chi2=0.0000 and accepted the alternative hypothesis that stated Fixed Effects (FE) model is consistent for model-1. We did the same test for model-2 and the test rejected the null hypothesis at chi2 (11) = 68.57 with p-value 0.000, so we accepted the alternative hypothesis that stated FE model is consistent. So to estimate both models we used Fixed Effects model.

In this part we present estimation results from model-1, when development aid is included in growth regression. As we can see from table 4.1 column 1, the coefficient for ODA/GNI has a positive sign and is significant at 1%. This shows that a one percent increase in development aid increases GDP per capita growth by 1.19 percentage points on average for aid recipient countries. This indicates that development aid contributes to the promotion of economic development and welfare of developing countries. This result is consistent with our hypothesis and some of the recent literature on aid and economic growth such as Clemens et al. (2004), Durbarry et al. (1998) and, Hansen and Tarp (2001). Moreover, the coefficient for OHA/GDP has a positive sign and is significant at 1%. This shows that a one percent increase in humanitarian aid leads to a 0.68 percentage point increase in GDP per capita growth. Even though the coefficients of ODA and OHA have a positive sign and is significant at 1% significance level, the magnitude of humanitarian aid is smaller than development aid. This might be due to difficulties to measure impacts of humanitarian aid since it is allocated to fill consumption gaps during disaster situations rather than contributing to development activities.

The coefficient for initial per capita GDP has a negative sign in model-1 but positive sign in model-2 however it is not significant in both.

In model-1 the coefficient for inflation rate has a negative sign and is significant at 10%. This shows that a one percent increase in annual inflation rate decreases GDP per capita growth by 0.28 percentage points. This indicates that inflation (macroeconomic instability) affects the growth rate of a country negatively. Similarly, we find the coefficient for inflation rate has negative sign and is significant at 5% in model-2. But when we compare the magnitudes of their coefficients, inflation rate affects GDP per capita growth of aid recipient countries by 0.4 percentage points in model 2 compare to 0.28 percentage points in model 1.

In model-1, the coefficient for annual population growth has a positive sign and significantly different from zero in OLS method. A one unit increase in annual population growth leads to

[4] *If E{xit' αi}=0, RE&FE both consistent, RE efficient*

If E{xit' αi}≠0, FE consistent, RE not consistent

If H0 : E{xit' αi}=0 holds, both estimators will not differ much, but RE is more efficient. If H0 does not hold, difference in estimators due to inconsistent RE

a 0.76 percentage point increase in GDP per capita growth. This result is inconsistent with our expectation that population growth has a negative impact on the country's growth. The Solow - swan model explains that when capital is fixed and population grow constantly the efficiency of the worker decreases, which affect the productivity of labor hence affect economic growth negatively. In the case of model-2 when humanitarian aid is entered in the growth regression we find a negative and insignificant relationship between population growth and GDP per capita growth.

In both models the coefficients for trade openness have positive signs and are significant at 5% significance level. A one percent increase in trade openness (which is proxied by export plus import as a share of GDP) raises GDP per capita growth by 2.3 and 3.9 percentage points in the model-1 and model-2 respectively. This signifies that regardless of any types of aid is given to countries trade openness has a positive and significant relationship with growth rate. This result is consistent with our expectations since countries open to international trade can get demand for their product and can access advanced technology easily from abroad, which increase the efficiency of domestic production.

In model-1 and model-2 we find negative signs for the coefficients on financial depth measure (domestic credit to private sector as a percentage of GDP) but only significant at 10% in model-2. A one percent increase in domestic credit to private sector decreases GDP per capita growth by 1.23 percentage points in model-2.We were expecting positive and significant relationship between financial depth measure and growth rate since it captures the financial sector development relative to the economy of countries. Development in this sector creates favorable conditions for individuals and companies to get access to money, which increases the investment activities, hence growth.

We used total secondary school enrollment (percent of population age 25 and over) to proxy human capital of countries. In the first model, a one percent increase in human capital increases GDP per capita growth by 2.5 percentage points and the coefficient is significant at 5% significance level. This signifies that countries with larger stocks of human capital tend to grow faster, as high human capital means high productions of new knowledge and high ability to adopt technology, which is the source of innovation and technical change. However, in model-2, we find a negative and insignificant relationship between human capital and growth rate. The rest of the explanatory variables such as: capital investment, rural population, ethnic fractionalization, democracy and agricultural value added are insignificant in both models. This indicates that there is no correlation between these variables and growth rate of sample countries. However, in reality agricultural value added which includes forestry, hunting and fishery as well as cultivations of crops and livestock production is the major backbone of their economy in aid recipient countries.

Diminishing Returns to Aid

To check diminishing returns to aid, squared aid was included in both models. In model-1, when squared aid is included, the coefficient for ODA/GNI maintained its positive sign and significance. However, the coefficient of squared aid has positive sign though insignificant in this model. The sign is inconsistent with our hypothesis that aid beyond certain threshold is adversely affected countries economic growth, expected to have a negative sign. On the other hand, in model-2, the coefficient for OHA/GDP maintained its sign (positive) and significance, and we find the negative sign for squared aid but insignificant. This result shows that the effect of OHA on economic growth does not depend on whether countries receive huge amount of aid or not.

Conditionality of aid

In recent literatures interacting aid with macroeconomic and institutional policies has been becoming more common to see conditionality of aid. To test this conditionality on macroeconomic policies, aid is interacted with inflation and trade openness. In addition, to test conditionality of aid on institutions, aid is interacted with ethnic fractionalization and democracy. Finally, to see conditionality of aid on regional characteristics, aid is interacted with Sub-Saharan Africa and East Asian countries. We employed separate regressions for the interactions and present it in table 4.2.

Table 2. Conditionality of development and humanitarian aid on macroeconomic, institution and regional specific characteristics under panel data set

	Interactions	Development aid			OHA	
		OLS	2SLS		OLS	2SLS
Regional dummies	Main effect ODA/GNI	1.26 (0.414)***	-11.93 (4.21)***	Main effect OHA/GDP	0.179 (1.63)	3.97 (2.77)
	Interaction Sub-Saharan Africa and ODA	.421 (.792)	8.21 (5.14)	Interaction Sub-Saharan Africa and OHA	-.419 (.523)	-3.51 (2.88)
	Interaction East Asia and ODA	-.686 (.584)	7.11 (4.91)	Interaction East Asia and OHA	-.384 (.355)	-3.54 (2.84)
Macroeconomic policy	Main effect of ODA	-.452 (1.85)	-23.85 (12.64)*	Main effect of ODA	-.42 (1.16)	-8.86 (19.27)
	Interaction log inflation*log ODA	-.063 (.065)	-.002 (.082)	Interaction log inflation*log OHA	-.0075 (.062)	-.034 (.074)
	Interaction log tradeopp*log ODA	.404 (.441)	5.51 (2.76)**	Interaction log tradeopp*log OHA	.256 (.387)	2.15 (4.3)
Institutions	Main effect of ODA	0.578 (0.801)	-12.09 (5.34)**	Main effect of OHA	1.3 (0.57)**	-5.69 (6.05)
	Interaction democracy*log ODA	.275 (.211)	3.03 (1.164)***	Interaction democracy*log OHA	-.176 (.158)	1.52 (1.42)
	Interaction log Ethnic*log ODA	.375 (.298)*	-1.23 (.773)	Interaction log Ethnic*log OHA	.078 (.30)	-1.18 (1.43)

Note: The above table shows the results from the interactions of aid with macroeconomic, institutions and regional dummies. We test the hypothesis that effectiveness of aid is conditional on such variables.

*We are not reporting East Asia and Sub-Saharan Africa dummy separately because the fixed effect model removes time invariant variables but was included during regression.

Below we are going to explain the interaction results stated above

Interactions with macroeconomic policy

As we mentioned above, ODA is interacted with inflation rate and trade openness to test conditionality on macroeconomic policies. In model-1, the coefficient for the interaction between development aid and inflation rate has negative sign but insignificant. This shows the effectiveness of aid is not influenced by whether there is high inflation rate or not in the aid recipient countries. In addition, we find insignificant, but positive sign for the coefficients of interaction between humanitarian aid and the inflation rate. On the other hand, for both models we find positive sign, but an insignificant relationship between GDP per capita growth and interaction between trade openness and foreign aid. This indicates that the effectiveness of ODA aid doesn't depend on whether the countries are open to trade or not.

Interactions with Institutions

Here to test conditionality on institutions, ODA is interacted with democracy (institutional quality) and ethno-linguistic (ethnic fractionalization) variables. The coefficients for interactions between democracy (measured by the polity IV index) and both types of aid have positive signs but insignificant relationship in both. This indicates that the contribution of aid towards GDP per capita growth is not conditional on the presence of quality institutions in the country.

On the other hand, we find a positive and significant relationship between GDP per capita growth and interactions of ODA and ethnic fractionalization. This result is inconsistent with our expectations that ethnic conflict has negative impacts on GDP per capita growth. Since ethnic conflict creates political instability and civil war in countries, in response government increase consumption to mitigate potential conflicts which affects the economy negatively. In addition, we find positive, but insignificant results from the interaction between humanitarian aid and ethnic fractionalization.

Regional dummies

Finally, aid is interacted with Sub-Saharan Africa and East-Asia countries, these countries have been the major recipients of foreign aid flows. The coefficient for interaction term between ODA and Sub-Saharan Africa has positive sign though insignificant. This indicates that as compared to all aid recipient countries being located in sub-Saharan Africa doesn't have a significant impact on the effectiveness of aid. However, we find a negative, but an insignificant relationship between GDP per capita growth and the interaction of East Asian region and ODA.

4.3.1.2. Estimation result from 2SLS panel regression, ODA and OHA included in growth regression

To estimate our model using Instrumental Variable (IV) estimation method, we choose three instruments to proxy development aid. The first instrument is logarithms of population; it is a key determinant of aid when a donor doesn't have colonial ties with the recipient countries. Particularly in countries which received aid with low populations, donors will generally have more influence over the country. Second, land area in (sq. Km), countries which have a large land area require more aid as their projects will be larger and donors have a strategic interest

to give aid, to benefit from investment activities in that country. The third one is temperature, the majority of developing country's households is rural and their income depends on agricultural activities, temperature-related yield declines cause serious problem of the entire society and also on a country's economy as a whole, so donors are motivated to give aid to those countries to save human beings from disaster situation and to protect their economies from worsening situation. To check the validity of those instruments we employed Sargan statistic test. It states in the null hypothesis that instruments are valid. The Sargan statistic test accepted the null hypothesis at (x^2) =1.23 that instruments are valid.[5]

To proxy humanitarian aid, we choose total population and precipitation as instruments. Precipitation is the major determinant of donors' interest because donors are willing to give aid to countries which are mainly vulnerable to potential damage from erratic rainfall. The other one is total population, donors also motivated to give aid to countries which have a small number of population. To test the validity of these instruments Sargan statistic test is employed. The test accepted the null hypothesis that confirmed instruments are valid at (x2) = 0.672.[6] However, the endogeneity test confirmed that humanitarian aid is exogenous; in this case the OLS method is more efficient than IV since the OLS estimator gives lower standard error than IV.

In this part we present estimation results from table 4.2. To make the analysis clear we call model-A when ODA is instrumented with total population, land area and temperature and we call model-B when humanitarian aid is instrumented with total population and precipitation. When we allow for country and time effects, a Hausman test clearly favors the fixed effects model over the random effects model in both model-A and model-B.[7]

The regression result shows that the coefficient for ODA/GNI has a negative sign and significant at 5% in model-A. This shows a one percent increase in development aid leads to the reductions of GDP per capita growth by 6.62 percentage points on average for aid recipient countries. The big difference in the magnitude of the impacts of ODA on economic growth under OLS and 2SLS estimation methods might be due to development aid is endogenously determined. Since under OLS estimation the unobservable effect has been included in the error term, the coefficient has small value; the unobservable negative shock may be included in the error term. Whereas, in the case of IV the unobservable effect is captured by the instrumental variables so the coefficient has high value.

We used Durbin-Wu-Hausman (DWH) test to compare OLS and IV estimation methods. Under the null hypothesis, the OLS estimator will be consistent (and unbiased), and more

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[5] *Second, Sargan statistic (over identification test of all instruments): 1.23; Chi-sq(2) P-val = 0.5411*
Under identification test (Anderson canon. corr. LM statistic): 10.517; Chi-sq(3) P-val = 0.0146
Endogeneity test of endogenous regressor(l.ODA): 6.863 ; Chi-sq(1) P-val = 0.0088

[6] *Under identification test (Anderson canon. corr. LM statistic): 11.816; Chi-sq(2) P-val = 0.0027*
Hansen J statistic, (over identification test of all instruments): 0.672 ; Chi-sq(1) P-val = 0.4123
Endogeneity test of endogenous regressors (l.OHA): 1.183 ; Chi-sq(1) P-val = 0.2766

[7] *Model –A The null hypothesis that the random effects model is preferred is rejected:(x^2) = 40.99; prob>chi2=0.0001*
Model-B The null hypothesis that the random effects model is preferred is rejected: (x^2) = 67.52; prob>chi2=0.0000

efficient than the IV estimator, whereas IV estimator is consistent under both the null hypothesis and the alternative. The test result shows that we have to accept the null hypothesis that confirmed OLS estimator is consistent and more efficient.[8] However, in reality development aid is given to countries based on certain characteristics of the countries which makes development aid endogenous.In addition, recent studies also confirmed that this type of aid is endogenous. For example, Boone (1996) and Burnside and Dollar (2000) explain the reasons for the possible endogeneity of aid in growth regression is difficult to perceive aid as a lump-sum transfer, independent of the levels of income. On the other hand, when we did the same test for model-B, the DWH test reject the null hypothesis and accepted the alternative one that confirmed IV estimator is consistent at Chi2 (11) =32. 41(p=0. 0007).We were expecting the reverse since we find humanitarian aid is exogenously determined, OLS estimator gives unbiased and efficient results. So it is difficult to relay on DWH test to choose among OLS or IV estimators.

In model-A the coefficient for initial per capita GDP has negative sign and significant at 5%. This is not the case in model-1 (ODA under OLS estimation). The negative sign implies that on average countries with low initial per capita income growing faster than those with higher initial per capita income. This shows a one percent increase in initial GDP per capita of aid recipient countries reduces GDP per capita growth by 5.64 percentage points. However, In model-B the coefficient for initial per capita GDP maintained its positive sign but insignificant.

The coefficients for capital investment have positive signs in both models, but only significant in the model-B. In model-B, a one percent increase in capital investment leads to a 1.68 percentage point increase in GDP per capita growth.

For the coefficients of trade openness, we find positive and significant results for both models. In model-A & model-B a one percent increase in trade openness increases aid recipient countries GDP per capita growth by 6.5 & 4.4 percentage points respectively. This indicates that countries open to trade grow faster than countries which have restricted trade. For example, Barro (1995) discusses countries more open to trade have a great ability to catch up to leading technologies of the rest of the world. Moreover, (Chang et al., 2009) explain openness allows the dissemination of knowledge and technological progress and encourages competition in domestic and international market.

The coefficient for annual population growth has positive sign, but insignificant in model-A. However, in a model-B, for the coefficient of population growth, we find negative sign and significant at 10 %. This shows that a one percent increase in population growth reduces GDP per capita growth by 0.5 percentage points. This result is in line with Solow-swan model, that explains when capital is fixed and population grows constantly the efficiency of the worker decreases which affect the productivity of the labor hence economy.

[8] *Chi2(12)=7.10 prob> chi2=0.8511*

Furthermore, in model-A, we find a positive and significant relationship between the share of rural population and growth rate. The result shows that a one percent increase in rural population as a share of the whole population increases GDP per capita growth by 0.36 percentage points. This indicates that rural population contributes to growth by supplying human capital for agricultural sector. In both models (A&B) we find negative sign for coefficients of financial depth measure, however it is significant only under model-A. In model-A a one percent increase in the financial depth measure contributes to the reductions of GDP per capita growth by 2.31 percentage points. We were expecting positive results since domestic credit to private sector increase means the ratio of liquid liability to GDP increases, which helps to increase saving and capital transfer hence, the economy will more likely to grow. However, as we see above, we didn't get positive relationship, this may be due to our sample countries, most of them are developing countries, as we know these countries have a problem of managing financial sectors. The rest of the variables such as inflation rate, secondary school enrollment, and agricultural value added, institutional quality and ethnic fractionalization are insignificant. This indicates that there is no correlation between this variable and growth; however, in reality, for example, institutional quality is expected to have positive relationship with growth since quality institutions are an indicator of good governance and stable political condition which encourages investors to invest more.

Diminishing Returns to Aid

When squared aid is included in both model A&B, the coefficients of squared aid have negative signs under model-A but positive sign under model B, however insignificant in both. The negative sign might be indicating that there is negative relationship between them, but we couldn't say anything about it since we find an insignificant relationship with GDP per capita growth.

Conditionality on Macroeconomic Policy

In both models we find an insignificant relationship between GDP per capita growth and the interaction between development aid and the inflation rate. This indicates that the effectiveness of aid is not conditional on whether countries have high inflation rate or not. On the other hand, we find a positive sign for the interactions of trade openness and both types of aid but significant only in model-A. In model-A a one percent increase in development aid conditional on trade openness increases GDP per capita growth by 5.51 percentage points. This indicates that development aid is more effective in countries that are open to trade.

Conditionality on Institutional Variables

When the interaction between aid and democracy (quality institution) is included in the regression, we find positive signs for the coefficients of interaction in both types of aid. However,it only significant in the model-A. In model-A, a one unit increase in aid conditional on good institutions increased GDP per capita growth by 3.03 percentage points. This signifies that aid is effective for countries which have quality institutions. This result is in line with our expectation that quality institutions favors countries economic growth since quality institutions is related with low government corruptions which encourage investors to accumulate their wealth in the country.

Moreover, we find a negative sign in both models for the coefficients of interaction between aid and ethnic fractionalization with GDP per capita growth. However, it is not significant in both models.

Regional Dummies

The coefficient for the interaction between development aid and Sub-Saharan Africa dummy has positive signs but insignificant. However, when aid is interacted with humanitarian aid, we find a negative sign for the coefficient but insignificant. In addition, the coefficient for the interaction between development aid and East Asia region has positive sign though it is insignificant. Even though there is no significant relationship the positive sign might be indicating that there is a positive correlation between development aid and GDP per capita growth in this region.

4.3.2. Cross Sectional Regression Results

In this section we did cross sectional regression to observe long term impacts of foreign aid on GDP per capita growth of aid recipient countries. Cross sectional data are observations that coming from different individuals or groups at a single point in time. To see long term impacts of foreign aid we used data on foreign aid averaged ten years for both dependent and independent variables. For dependent variable we take the time period between 2000 and2010 by assuming that current aid contributes to growth over ten years and for all explanatory varies between 1990 and 2000.

Growth regression using cross sectional data with OLS and 2SLS estimation methods

The empirical model which I have estimated is of the following form:

$$Growth_{i(mean)} = \beta_{0+}\beta_1 ln\_GDP_{t-10}\, mean + \beta_2\, ln\_ODA/GNImean + \beta_3\, ln\_Inflation\ mean + \beta_4 ln\_Capinvesmean + \beta_5\, Rurpopmean + \beta_6\, popgrowth\ mean + \beta_7 ln\_Domcreditmean + \beta_8 ln\_schoolenrmean + \beta_9 ln\_Agrsharemean + \beta_{10} Insquality\ mean + \beta_{11} ln\_Tradeopp\ mean + \beta_{12} afrdummy\ mean + \beta_{13} intODAafr\ mean + \varepsilon$$

Where i= 1,2,..... 74 countries; For dependent variable we used 10 years average (2000-2010) in the regression and for all explanatory variable, average (1990- 2000) used.

To make clear analysis, we call model -3 when ODA/GNI is entered in the growth, regression and call model-4 when OHA/GDP is entered in OLS estimations, whereas we call model-C and model-D under 2SLS estimation.

Table 3. Long term impacts of ODA and OHA on the growth rate of GDP per capita, OLS/IV estimations

	Model-3		Model-4	
Independent variable	OLS	2SLS	OLS	2SLS
log ODA/GNI	-.525 (.213)**	-1.129 (.397)***	-	-
log OHA/GDP	-	-	.616 (.212)***	-.718 (.822)
Initial GDP	-2.05	-3.034	-.514	-2.396

	(.675)**	(.728)***	(.633)	(1.31)*
Annual inflation rate	-.344	-.489	-.355	-.003
	(.288)	(.316)	(.273)	(.398)
Capital investment	2.106	1.992	1.951	2.44
	(.732)**	(.737)**	(.786)**	(.981)**
Rural population (% of	-.015	-.0206	-.0349	-.022
total population)	(.021)	(.020)	(.021)	.026
Annual Population	-1.054	-1.022	-1.035	-.955
Growth	(.341)***	(.314)***	(.287)***	(.344)***
Financial depth measure	-.666	-.897	-.563	-.203
	(.46)	(.475)*	(.377)	(.497)
Secondary school	.408	.338	.564	.513
enrolment	(.392)	(.401)	(.394)	(.478)
Agricultural value added	-.912	-1.114	-.385	-.476
as a share of GDP	(.61)	(.598)*	(.749)	(.899)
Institutional Quality	.014	.0467	-.003	-.098
	(.087)	(.083)	(.082)	(.114)
Ethnic fractionalization	-.306	-.398	-.323	-.61
	(.226)	(.236)*	(.319)	(.430)
Trade openness	-.205	.552	-.239	-1.89
	(.556)	(.720)	(.573)	(1.159)
Average of aid squared	-.021	-.029	051	-.006
	(.043)	(.053)	(.047)	(.069)
Observation	74	73	67	66
R^2	43.4		50	
Constant	19.02	25.55	23.37	23.22
	(6.62)***	(7.01)***	(12.35)*	(13.05)*

Note: * significant at least at the 10 % level.
** Significant at least at the 5 % level.
*** Significant at least at the 1 % level

*Results in () shows robust standard error.

We tested whether or not the variance of the error term is ***homoscedastic*** using ***Breusch-Pagan/Cook-Weisberg*** test for heteroskedasticity. The test rejects the null hypothesis that the variance of the error term is constant at chi2 (1) =4. 9 with p-value of 0.0267. Therefore, we used robust standard error.

4.3.2.1. Results from OLS Estimations for both ODA and OHA

In this section we report results from table 4.2. It can be seen that in general the model performs well, explaining around 43 % of the variation in country GDP per capita growth in model-3 and 50 % in model-4. The coefficient for ODA/GNI has a negative sign and significant at 5%. This shows a one percent increase in ODA/GNI reduces GDP per capita growth by 0.53 percentage points, whereas in panel data we find a 1.19 percentage points increase. However, in model-4, we find a one percent increase in OHA/GDP increases GDP per capita growth by 0.62 percentage points and in panel by 0.68 percentage points.

The coefficient for initial per capita GDP has negative sign and significant at 5% in model-3. The negative sign indicates that in the long run countries which have low initial per capita GDP growing faster than those which have high initial per capita GDP. This shows a one percent increase in initial GDP per capita of aid recipient countries reduces GDP per capita growth by 2.05 percentage points. However, we find negative sign, but insignificant result in module-4. For the coefficients of population growth, we find negative sign and significant at 1% in both models. This result is consistent with Solow model, which state population growth does not affect the amount of capital in the economy, but it does decrease the amount of capital per worker. The model predicts that economies with higher rates of population growth will have lower levels of capital per worker and lower levels of income.

The coefficients for capital investment have positive sign and significant at 5% in both models. This result shows that a one percent increase in capital investment leads to a 2.11 and 1.95 percentage points increases in GDP per capita growth for model-3 and model4 respectively. This indicates that when capital investment is increased it has a positive contribution to countries growth since the capital investment increase means ownership of manufacturing increases thus productivity. Whereas, for the coefficients of financial depth measure, inflation rate, rural population, agricultural value added ethnic fractionalization,institutional quality, total secondary school enrollment and trade openness we find insignificant results in both models. This shows that no clear pattern or correlation between this variable and GDP per capita growth in the long run. But in reality, for example, human capital, which is proxied by secondary school enrollment in this study has positively affected economic growth since human capital plays a major role in factors of production.

When squared aid is included in growth regression, we find a negative sign in model-3 and positive sign in model-4 but insignificant in both. This indicates that in the long run, huge amount of aid doesn't have a significant impact on economic growth of the aid recipient's country.

In table 4.2 we report estimation results for interaction terms. Aid interacts with macroeconomic policy, institutions and regional dummies to observe conditionality of aid.

Table 4.2. Conditionality of development and humanitarian aid on macroeconomic, institution and regional specific characteristic under cross sectional data set

Conditionality on	**Model-3**			**Model-4**		
		OLS	2SLS		OLS	2SLS
	Main effect of ODA	-.26 (.28)	-.68 (.39)	Main effect of OHA	.46 (.25)*	-.29 (.69)
Regional dummies	Sub-Saharan Africa Dummy	-.969 (1.06)	-.939 (.912)	Sub-Saharan Africa Dummy	-.077 (.794)	-.38 (.801)
	East Asia Dummy	1.26 (.70) *	.784 (.67)	East Asia Dummy	2.124 (.753)***	2.08 (.72)***
	Interaction between Sub-Saharan Africa and ODA	-.152 (.468)	-.088 (.42)	Interaction between Sub-Saharan Africa and OHA	.246 (.289)	.697 (.474)
	Interaction between East Asia and ODA	-.337 (.445)	-.096 (.464)	Interaction between East Asia	.197 (.386)	.716 (.533)

	Main effect	1.02 (1.07)	.932 (2.49)	Main effect	.86 (1.01)	-5.41 (3.93)
Macroeconomic policy	Interaction between log inflation and ODA	.038 (.241)	-.034 (.142)	Interaction between log inflation and OHA	-.049 (.106)	.193 (.189)
	Interaction between log tradeopp and ODA	-.39 (.241)	-.369 (.552)	Interaction between log tradeopp and OHA	-.038 (.223)	1.29 (.837)
	Main effect	.83 (.62)	-3.23 (3.16)	Main effect	.87 (.415)**	-1.08 (1.57)
Institutions	Interaction between democracy and ODA	-.472 (.168)**	.46 (.73)	Interaction between democracy and OHA	-.119 (.128)	.303 (.367)
	Interaction between log Ethnic and ODA	-.18 (.195)	-.644 (.429)	Interaction between log Ethnic and OHA	-.051 (.169)	-.494 (.345)

Conditionality of aid on Macroeconomic and Institutions

When both types of aid are interacted separately with macroeconomic policy (inflation and trade openness) and institutions (democracy and ethnic fractionalization) we find insignificant results except or interaction with democracy in model-3 which is significant at 5% but has negative sign. In general this indicates that the effectiveness of aid towards GDP per capita growth is not conditional on whether the country has good institutions or not or has a problem of ethnic conflict.

Regional Estimation

The coefficient for the interaction between aid and sub-Saharan African dummies has negative sign but insignificant in both models. This indicates that the effectiveness of aid is not conditional on countries specific characteristics. However, the coefficient for the interaction between aid and East Asia countries has positive sign significant in both models. This shows a one percent increase in humanitarian aid for the East Asia region increases GDP per capita growth by 1.26 in model-3 and 2.12 percentage points in model-4. This result is consistent with reality.Since one of the characteristics of these country is highest number of fragile and conflict-affected states and are most disasters stricken region in the world. Most of the time umanitarian aid is given to countries which affected by ethnic conflict and natural disaster.

4.3.2.2. Results from 2SLS Estimations for both ODA and OHA

To estimate our model using IV estimation method, we used the same instruments that used under panel estimation. For development aid; total population, land area in square (km.) and temperature and for humanitarian aid; total population and precipitation, the explanation is given on page 6. To check the validity of instruments under cross sectional regression, we did the same test. For the estimation of model-C the Sargan statistic test (x2) = 0.6325 accepted the null hypothesis that confirmed the instruments are valid.[9] For model-D the Sargan statistic (x2) = 0.6631 accepted the null hypothesis that confirmed the instruments are valid.[10]

[9] *Under identification test (Anderson canon. corr. LM statistic): 18.179; Chi-sq(3) P-val = 0.0004*
Sargan statistic (over identification test of all instruments): 0.916; Chi-sq(2) P-val = 0.6084

[10] *Under identification test = 6.192 Chi-sq (2) P-val = 0.0452,*
Sargan statistic (over identification test of all instruments): 0.19; Chi-sq (1) P-val = 0.6631

However, we suspect that this type of aid is exogenously determined since drought and civil war are the main driving force to give this type of aid by donors.

From table 4.2 column 2, it can be seen that the coefficient for ODA has a negative sign and significant at 1%. It shows a one percent increase in development aid reduces GDP per capita growth by 1.13 percentage points in the long run. We find a 6.62 percentage point reduction in the case of panel estimation. This indicates that in the long run the macroeconomic policies and financial sectors of aid recipient countries are improving so they can manage aid and allocate on development activities. This prevents foreign aid to adversely affect the competitiveness of domestic firms. However, we find negative sign and insignificant relationship between OHA and GDP per capita growth in model-D. This result is consistent with the purpose of this type of aid, which is allocated for short term and not intended to have an impact on economic growth in the long run.

Most importantly the coefficient for initial per capita GDP and annual population growth have negative sign and significant in both models. The explanation is same as on page 11 under OLS estimation. In both models (C&D) we find for the coefficients of inflation rate negative sign, but an insignificant relationship with growth rate. In both models the coefficients for capital investment have positive signs and significant at 5%. This shows that a one percent increase in gross capital formation leads to 1.99 &2.44 percentage points increase in GDP per capita growth in model-C and model-D respectively. In both models we find negative signs for the coefficients of the financial depth measure and agricultural value added, but both coefficients are only significant at 10% in model-C. However, we were expecting positive signs in both coefficients. In model-C, ethnic fractionalization has a negative sign and significant at 10%. This shows that, countries which have heterogeneous population most likely exposed to ethnic conflict which affect economic growth negatively. This result supports the hypothesis that on average, higher levels of ethnic fractionalization are associated with lower levels of GDP per capita.

However, the coefficients for: rural population, trade openness, institutional quality and secondary school enrollment are insignificant in both models. This indicates that in the long run these variables do not explain the variation on GDP per capita growth of sample countries. The other problem that causes insignificance of variables are multi-collinearity problem, we have checked that and all variables Variance Inflation factor (VIF) is less than 10, which confirms no multi-collinearity problem.

When squared aid is included in both models we find negative and insignificant results. The sign is in accordance with our hypothesis that too much aid is detrimental though it is not significant.
To observe conditionality on macroeconomic policy and institutions, humanitarian and development aid was interacted with inflation, trade openness, democracy and ethnic fractionalization. Amazingly, we couldn't find any significant relationship in all interactions. This indicates that in the long run effectiveness of aid is not conditional on either macroeconomic or institutions.

Regional Dummies

In both models the coefficients for interaction term between aid and Sub-Saharan African dummy have negative sign and insignificant. This indicates in the long run effectiveness of aid is not conditional on certain characteristics of the country. However, in both models the coefficients between the interaction of aid and East Asia dummy have positive sign, but it only significant in the model-D. A one percent increase in humanitarian aid increases GDP per capita growth by 2.1 percentage points for the East Asia region as compared to other aid recipient countries. Since humanitarian aid is given to countries which affect by ethnic conflict and strike by disaster, these countries have the second highest number of fragile and conflict-affected states and are most disaster stricken area in the world. As a result they received huge amount of humanitarian aid as compared to other aid recipient countries.

Chapter 5. Discussion

In this paper, we used OLS and 2SLS estimation methods, panel and cross sectional data to identify causal relationships between aid and GDP per capita growth in 136 aid recipient countries. The hypothesis made in this study was that impacts of foreign aid have a positive impact in economic growth per capita, and this impact may differ between development and humanitarian aid in the short and long run. When we say short term, it refers to year by year impacts and when we refer long term we mean that 10 years average. In table A we report major findings of this study.

Table A. ODA and OHA results

Methods	**Development aid**		**Humanitarian aid**	
	Panel regr.	Cross-sectional regr.	Panel	Cross-se
OLS	1.19 (.366)***	-.53 (.213)**	.68 (.212)***	.616 (.212)**
2SLS	-6.62 (3.68)*	-1.13 (.39)** *	1.72 (1.05)	-.718 (.822)

5.1. Comparing Development and Humanitarian aid in the short and long run

When we compare development and humanitarian aid under panel(fixed effect) OLS estimation method, we find a one percent increase in development aid increases GDP per capita growth by 1.19 percentage points on average for developing countries. Whereas a one percent increase in humanitarian aid leads to a 0.68 percentage points increment on GDP per capita growth. These results are in accordance with Durbarry et al.(1998), Hansen&Tarp. (2001) and, Lensink&White(2001), who find positive relationship between foreign aid and economic growth. For example, Hansen and Tarp (2001) find a one percentage points in the aid per GDP ratio leads to an increase of roughly 0.25 percentage points in the growth rate. Whereas, in this paper, we find a one percent increase in ODA/GNI leads to a 1.19 percentage point increase in GDP per capita growth. The difference may arise due to measurement, they used aid as ashare of GDP, where as, we used aid as a share of GNI; they used a time period between (1974-1993) but ours is between (1990-2010) ; they cover 56 countries and we take 81 countries. However, there is similarity in using lagged aid as regressor in the model. In addition, (Durbarry et al., 1998) finding strongly support the view point that foreign aid does have some positive impact on growth. Especially the huge amount of foreign aid inflows has a beneficial effect on LDC growth.

Furthermore, humanitarian aid has small positive impact on growth rate. A one percent increase in humanitarian aid increases GDP per capita growth by 0.68 percentage points. This result has some similarity with the findings of Neanidis (2012). He finds that humanitarian aid (in kind aid) has a positive impact on growth by directly enhancing the health status of

surviving children and their productivity during adulthood, which contributes positively for growth. However, others argued that a proportional increase in income (due to aid) contributes to population growth without improving their living standard. For example, Azarnert (2008) distinguishes two types of aid, per adult aid, which is allocated to fill consumption gaps and per child aid, which is given to combat malnutrition, especially among children. His result shows both types of aid increases fertility by reducing the quantity cost of children. Parents invest less on children's education; hence reduce human capital accumulation then economic growth. In general, it is difficult to reach on conclusion about the impacts of humanitarian aid since it is difficult to measure its impacts on countries economic growth.

The vast difference appears in the panel 2SLS estimation method, since we find a negative and significant relationship between development aid and GDP per capita growth. In model-A when development aid is included in the gross regression, we find a one percent increase in development aid leads to a reduction of GDP per capita growth by 6.62 percentage points. This result is in line with Burnside and Dollar (2000) who find negative relationship in 2SLS estimation though insignificant. This finding disproved our hypothesis that aid has a positive relationship with growth rate. But in reality specially for developing countries, foreign aid seen as a source of income, and they used to import raw materials for their manufacturing sectors and also to finance huge infrastructure like road and bridges which is the stepping stone to meet their development target. So there is most likely to have a positive impact on those countries. On the other hand, some scholars are arguing that in developing countries, there is a problem of managing macroeconomic policies and absorptive capacity constraints, huge amount of aid flow causes appreciations of exchange rate and institutional distraction which affect those countries negatively.

For cross sectional regression, we find a one percent increase in development aid reduces GDP per capita growth by 0.51 percentage points under OLS and 1.13 percentage points under 2SLS estimations in aid recipient countries. These result is in accordance with (Rajan and Subramanian, 2005) who find a negative relationship in the long run (40 year horizon) in the cross-sectional analysis though they find insignificant relationship with growth. The magnitude in this case suggests that an increase in aid of 1 percentage point of GDP would lower long-run growth by about 0.07 percentage points per year. In addition, Boone (1996) also find negative relationship between aid and growth, he explains that most of the time aid is allocated to increase consumption and government size rather than investment.
On the other hand, we find positive and significant relationship between humanitarian aid and GDP per capita growth in the long run. A one percent increase in humanitarian aid leads to a 0.62 percentage points increases in GDP per capita growth. This might be true since our sample size is countries which received humanitarian aid within our preferred time period. They are most likely to receive this type of aid repeatedly, which helps the country to minimize government expenditure on consumption goods.
In conclusion, it is difficult to say development aid has positive, negative or insignificant impacts on aid recipient countries. Since we find positive relationship under OLS and negative under 2SLS estimation methods. In my view, development aid has positively

contributed to countries growth because most of aid recipient countries used aid as a source of income to support their development plan. On the other hand, there are a lot of reasons to suspect that this type of aid is allocated based on certain characteristics of countries like geographical location, colonial ties, economic benefits and so on. In this case it is obvious that development aid has faced the endogeneity problem. To solve the endogeneity problem, it is better to use valid instruments which are correlated with development aid but uncorrelated with the error term. We find negative and significant relationship between development aid and GDP per capita growth under 2SLS panel estimation. In addition, we find negative and significant relationship between development aid and growth rate under OLS and 2SLS estimation method in cross sectional regressions. There are few scholars who support our findings. For example, Boone (1996) explain that in most countries foreign aid is goes to consumption , it doesn't have any significant impact on investment. In addition it benefits political elite rather than the nations as a whole, which creates corruption in those countries. Moreover, Rajan and Subramanian (2005) also argue that aid is allocated for consumption rather that investment, which is adversely affect countries economic growth by lowering the competitiveness of domestic exportable industries internationally. This process affects aid recipient countries, since those countries are unable to meet their development plan because the volatile nature of foreign aid. It is difficult to rely on foreign aid nowadays, since global financial crises and recurrent occurrence of natural disasters shifts international donors' attention to humanitarian aid, which is short term in nature and allocated only to fill consumption gaps.

In my view, humanitarian aid is exogenously determined, since it is allocated to countries which are recurrently affected by natural disaster and civil war. In this case the OLS estimator gives unbiased and efficient results. We conclude that humanitarian aid has a positive and significant impact on humanitarian aid recipient countries in the panel as well as cross sectional data set.

5.2. Diminishing returns to aid

To observe diminishing return on aid, squared aid is included in all model specifications. We find negative sign, but insignificant results in six out of 8 regressions. The negative sign is in accordance with our hypothesis that too much aid is detrimental. However, recent literatures find negative and significant relationship and explain the reason behind why too much aid, beyond a certain threshold is adversely affecting aid recipient country's growth. For example,Durbarry et al. (1998) discuss too much aid caused Dutch disease problems which reflect poor management of the exchange rate and domestic fiscal and monetary policy. Whereas, Lensink and White (2001) consider inappropriate technology and institutional destruction which is closely related to macroeconomic governance is the problem. According to Chenery and Strout (1966) the capacity to make productive use of external resources depends on numerous factors such as the existing infrastructure, the available skilled labor and, the institutional and administrative capacity of national and local governments.

5.3. Conditionality on Macro Economic Variables

Development aid interacts with macroeconomic policy (inflation and trade openness) to test the hypothesis that aid is most effective under good policy environments. Burnside and Dollar

(2000) argued that, good macroeconomic policy is important to be aid more effective. To examine this we interact aid with inflation rate since Fischer (1993) explain that inflation is the first variable to proxies macroeconomic policy. When we include this interaction terms in the growth regressions, we find insignificant results in the interaction between both types of aid and inflation rate under OLS as well as 2SLS estimation methods. This finding is in accordance with recent findings. For example Easterly et al. (2003) extend the sample of Burnside and Dollar (2000) time period and no longer find that aid promotes growth in good policy environments. In addition, Hansen and Tarp (2001) also find insignificant relationship between aid and policy variables. Even though we find the same results with those scholars, our technique in calculating policy index is different. This study used inflation and trade openness separately to proxy macroeconomic policy, whereas, the above scholars calculated policy index for inflation, budget balance and trade openness. On the other hand, we find a positive and significant relationship between growth rate and interactions of trade openness and both types of aid.

Conditionality on Institutions

To test conditionality of aid on institutions aid is interacted with democracy and ethnic fractionalization. We find a significant relationship between GDP per capita growth and interactions of development aid with democracy, under OLS and 2SLS panel estimations. However, we couldn't get any significant relationship in the long run. Moreover, we find an insignificant relationship in most of regressions between interactions of both types of aid and ethnic fractionalization with GDP per capita growth.

Regional dummies

When development and humanitarian aid is interacted with SSA dummy, we find positive and significant results in few regressions. This result is in accordance with Ekanayake and Chatrna (2010) who find aid has a positive and significant impact on African countries. Furthermore, we find a positive and significant relationship between GDP per capita growth and interaction between humanitarian aid and East Asia countries in the long run.

In general the sign and significance of explanatory variables are sometimes inconsistent with economic theory and other findings.

Below we present the limitations of this paper which might be contributing for difference among others studies.

- We used recent data set from 1990-2010 for development aid and from 1995-2010 for humanitarian aid.
- Our sample size includes all aid recipient countries 136 which received development aid out of this 107 countries received both humanitarian and development aid between our preferred time period.
- Only secondary data are used from different data sources, other studies might have used their primary data.
- We used inflation rate and trade openness to proxy macroeconomic policy whereas others, construct policy index from inflation, budget balance and trade openness which is developed by (Sachs et al., 1995)

Another reason might be as a result of unobservable variables that could not be controlled, though all econometric models potentially face the same problem.

Chapter 6. Conclusion

In this paper, an immense endeavor was made to scrutinize the relationship between GDP per capita growth and humanitarian and development aid. The hypothesis that we set was impact of foreign aid on economic growth of per capita may differ between humanitarian and development aid in the short and long run. To test this hypothesis first the impacts of development aid is estimated in the short run and long run using Barro regression model. In line with other authors we find that development aid has a positive impact in growth under OLS panel estimation and negative and significant effect under 2SLS. In addition, we find a negative and significant relationship in the long run, averaged ten years.

Second to test the hypothesis that the impacts of humanitarian aid towards economic growth may differ between short and long run, we used same specification and estimation methods like development aid, the only difference is replacing development aid by humanitarian aid. We find that humanitarian aid has positive impact on economic growth of aid recipient countries in the short (panel) and long term (cross sectional) under OLS estimation method. However, we found negative, but insignificant result under 2SLS estimation in cross sectional regression. When we compare our results with other studies, as to my knowledge, I couldn't find any study who find a positive and significant relationship between humanitarian aid and GDP per capita growth. However, few of the studies shows humanitarian aid has zero impact on economic growth. It is difficult to conclude that it has positive, negative or zero impact on the country's growth. Because measuring the direct effect of humanitarian aid is difficult, since most of the time humanitarian aid is intended to be short term and allocated to fill consumption gaps during disaster situations.

In addition to our hypothesis, we test whether aid beyond certain threshold is harmful to countries growth by including squared aid in growth regressions. Amazingly, we didn't find any significant results in all regressions, types of aid and in OLS as well as 2SLS estimation methods. Furthermore, both types of aid are interacted with the inflation rate and trade openness to check conditionality on macroeconomic policy. The estimation result shows that the effectiveness of aid is not conditional on the inflation rate in all regressions. However, it is conditional on whether aid recipient countries are open to trade or not.

To cross check conditionality of aid on institutions, both aid types are interacted with institutional quality (democracy) and ethnic fractionalization. The regression result shows that there is positive and significant relationship between GDP per capita growth and interactions of quality institutions and development aid in the short run in some of the regressions. In my view even though we couldn't find positive and significant relationship in all regressions, we concluded that development aid contributes to economic growth in aid recipient countries in the presence of quality institutions. However, the effectiveness of humanitarian aid is not conditional on institutions in all regressions. Moreover, the estimation result shows there is

negative and significant relationship between the interactions of ethnic fractionalization and development aid in panel 2SLS estimations.

After reviewing a dozen articles on various scholars' hypothesis, model specifications, methods, empirical and theoretical analysis and findings, it seems difficult to find sound conclusions on the study of the effectiveness of aid in developing countries. My research conclusion is that no model is perfect, slight manipulations of data or methodology produce very different results in both coefficient and significance of variables and even sign.

To conclude, I propose three explanations that may explain the lack of consistent findings across studies. First, the data issue. Finding accurate data on official development and humanitarian aid is difficult due to diverse nature of foreign aid. Second, finding exact relationship between aid and economic growth is difficult due to differences in model specification and the third challenge is finding good instruments for foreign aid since different instruments result in different findings.

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Appendices

Appendix .1. Summary statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Growth	2762	2.012725	6.78858	-50.23583	91.67289
GDP	3859	2593.707	3129.834	50.04221	21432.29
ODA	2681	8.638728	12.95326	-2.701247	242.2864
Inflation	2350	47.67136	565.3098	-13.22581	23773.13
Capinves	2558	22.89069	9.78609	-2.424358	113.5779
Rurpop	2850	55.40319	20.41591	6.686	94.584
popgrowth	2849	1.746328	1.361021	-7.597309	11.18066
Domcredit	2552	29.7773	26.02943	.5573513	167.536
schoolenr	1995	29.29835	19.8432	.6	86.4
Agrshare	2615	20.40705	14.59028	.3783195	93.97742
Insquality	2166	4.284395	3.645923	0	10
Etnicfrac	2724	12.03637	301.1644	0	7864
subsahara	4210	.3313539	.4707559	0	1
eastasia	4210	.1030879	.3041098	0	1
OHA	1671	12.16369	41.5482	0	601.4368
Tradeopp	2690	80.59786	38.49866	10.83072	280.361

Appendix.2. Panel regression

Pearson Correlation Coefficient

	Growth	ln_GDP	ln_ODA	ln_Inf~n	ln_Cap~s	ln_Rur~p	ln_Dom~t
Growth	1.0000						
ln_GDP	0.1002 0.0000	1.0000					
ln_ODA	-0.0480 0.0149	-0.6085 0.0000	1.0000				
ln_Inflation	-0.1817 0.0000	-0.2197 0.0000	0.0542 0.0128	1.0000			
ln_Capinves	0.2861 0.0000	0.2657 0.0000	-0.0969 0.0000	-0.1752 0.0000	1.0000		
ln_Rurpop	-0.0072 0.7079	-0.5777 0.0000	0.5412 0.0000	0.0546 0.0100	-0.0320 0.1055	1.0000	
ln_Domcredit	0.0892 0.0000	0.5409 0.0000	-0.3642 0.0000	-0.3080 0.0000	0.2709 0.0000	-0.2304 0.0000	1.0000
ln_schoolenr	0.0629 0.0056	0.5564 0.0000	-0.4119 0.0000	-0.0617 0.0112	0.1889 0.0000	-0.3597 0.0000	0.3763 0.0000
ln_Agrshare	-0.0964 0.0000	-0.8362 0.0000	0.5761 0.0000	0.2107 0.0000	-0.2042 0.0000	0.5086 0.0000	-0.5003 0.0000
ln_Etnicfrac	-0.0644 0.0010	-0.2794 0.0000	0.1017 0.0000	0.1221 0.0000	-0.1542 0.0000	0.0529 0.0059	-0.2954 0.0000
ln_Tradeopp	0.0782 0.0001	0.3214 0.0000	0.0995 0.0000	-0.1822 0.0000	0.3294 0.0000	0.0272 0.1581	0.2609 0.0000
ln_OHA	0.0070 0.7780	-0.7236 0.0000	0.5019 0.0000	0.2113 0.0000	-0.1861 0.0000	0.4773 0.0000	-0.3376 0.0000
popgrowth	-0.0144 0.4512	-0.3247 0.0000	0.2013 0.0000	0.0166 0.4345	-0.0909 0.0000	0.1150 0.0000	-0.2526 0.0000
Insquality	0.0558 0.0101	0.2854 0.0000	-0.1836 0.0000	0.0266 0.2600	0.0542 0.0134	-0.1899 0.0000	0.2995 0.0000

	ln_sch~r	ln_Agr~e	ln_Etn~c	ln_Tra~p	ln_OHA	popgro~h	Insqua~y
ln_schoolenr	1.0000						
ln_Agrshare	-0.4654 0.0000	1.0000					
ln_Etnicfrac	-0.2375 0.0000	0.1404 0.0000	1.0000				
ln_Tradeopp	0.3317 0.0000	-0.2765 0.0000	-0.1313 0.0000	1.0000			
ln_OHA	-0.4368 0.0000	0.5562 0.0000	0.2460 0.0000	-0.2587 0.0000	1.0000		
popgrowth	-0.4994 0.0000	0.2405 0.0000	0.2533 0.0000	-0.1360 0.0000	0.3222 0.0000	1.0000	
Insquality	0.2413 0.0000	-0.2577 0.0000	-0.0358 0.1024	0.0403 0.0627	-0.2419 0.0000	-0.2544 0.0000	1.0000

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Development aid under OLS estimation

Fixed effect

```
Fixed-effects (within) regression               Number of obs      =      1180
Group variable: country1                        Number of groups   =        81

R-sq:  within  = 0.0825                         Obs per group: min =         1
       between = 0.0104                                        avg =      14.6
       overall = 0.0076                                        max =        20

                                                F(12,1087)         =      8.14
corr(u_i, Xb)  = -0.7787                        Prob > F           =    0.0000
```

Growth	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ln_GDP L10.	-.2358589	.8336591	-0.28	0.777	-1.871622	1.399904
ln_ODA L1.	1.192239	.2425417	4.92	0.000	.7163362	1.668142
ln_Inflation L1.	-.2832169	.1227901	-2.31	0.021	-.5241493	-.0422845
ln_Capinves L1.	.4908425	.4951303	0.99	0.322	-.4806768	1.462362
Rurpop L1.	-.0644134	.0586849	-1.10	0.273	-.1795619	.050735
popgrowth L1.	.7633631	.1621862	4.71	0.000	.4451295	1.081597
ln_Domcredit L1.	-.8381633	.3619038	-2.32	0.021	-1.548272	-.1280542
ln_schoolenr L1.	2.508306	.8984275	2.79	0.005	.7454571	4.271154
ln_Agrshare L1.	-.6312825	.6501448	-0.97	0.332	-1.906963	.6443983
Insquality L1.	.0756454	.0775378	0.98	0.329	-.0764953	.2277862
ln_Etnicfrac L1.	-.244259	.2550095	-0.96	0.338	-.7446256	.2561075
ln_Tradeopp L1.	2.307435	.726752	3.17	0.002	.8814393	3.733431
_cons	-9.064156	8.943983	-1.01	0.311	-26.61358	8.48527
sigma_u	3.7314835					
sigma_e	3.7924844					
rho	.49189299	(fraction of variance due to u_i)				

```
F test that all u_i=0:     F(80, 1087) =     3.40                 Prob > F = 0.0000
```

Random effect

```
Random-effects GLS regression                   Number of obs      =      1180
Group variable: country1                        Number of groups   =        81

R-sq:  within  = 0.0407                         Obs per group: min =         1
       between = 0.2360                                        avg =      14.6
       overall = 0.0773                                        max =        20

Random effects u_i ~ Gaussian                   Wald chi2(12)      =     70.51
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =    0.0000
```

Growth	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
ln_GDP L10.	-.7647794	.3664038	-2.09	0.037	-1.482918	-.0466411
ln_ODA L1.	.0658224	.1559534	0.42	0.673	-.2398407	.3714854
ln_Inflation L1.	-.2990419	.1108564	-2.70	0.007	-.5163166	-.0817673
ln_Capinves L1.	1.656315	.4090721	4.05	0.000	.8545482	2.458081
Rurpop L1.	-.004551	.013818	-0.33	0.742	-.0316338	.0225317
popgrowth L1.	.3845012	.1416756	2.71	0.007	.1068221	.6621802
ln_Domcredit L1.	-.3858156	.2490398	-1.55	0.121	-.8739246	.1022934
ln_schoolenr L1.	1.373295	.3166507	4.34	0.000	.7526713	1.993919
ln_Agrshare L1.	-.4351612	.4017219	-1.08	0.279	-1.222522	.3521993
Insquality L1.	.0885502	.0502489	1.76	0.078	-.0099359	.1870363
ln_Etnicfrac L1.	-.4444614	.187696	-2.37	0.018	-.8123389	-.076584
ln_Tradeopp L1.	.1018315	.4119468	0.25	0.805	-.7055694	.9092324
_cons	-.1071714	3.989823	-0.03	0.979	-7.927081	7.712738
sigma_u	1.4018276					
sigma_e	3.7924844					
rho	.12020514	(fraction of variance due to u_i)				

To choose between fixed effect and Random effect we employed Hausman specification test for model-1

2.1. Hausman Specification Test

```
. hausman ODAFIXED ODARANDOM
```

	Coefficients (b) ODAFIXED	(B) ODARANDOM	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
L10.ln_GDP	-.0857311	-.8072441	.721513	.769117
L.ln_ODA	1.14989	.0816852	1.068205	.1911514
L.ln_Infla~n	-.2602597	-.2961444	.0358847	.054673
L.ln_Capin~s	.676198	1.8171	-1.140902	.2878349
L.Rurpop	-.0565465	-.0069718	-.0495746	.0585507
L.popgrowth	.7630072	.354555	.4084522	.081809
L.ln_Domcr~t	-.7869742	-.4050901	-.3818841	.2704761
L.ln_schoo~r	2.606035	1.440003	1.166032	.8635957
L.ln_Agrsh~e	-.6830237	-.4401663	-.2428574	.5260631
L.Insquality	.0761096	.0865707	-.0104611	.0608007
L.ln_Etnic~c	-.2492108	-.4708917	.2216809	.1780146
L.ln_Trade~p	2.05439	-.0029032	2.057293	.6150645

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(12) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 99.29
Prob>chi2 = 0.0000

The test rejected the null hypothesis that Random effect model is consistent and efficient under Ho, so we accepted the alternative that stated FE model is consistent.

2.2. Multicollinearity Test

Collinearity Diagnostics

Variable	VIF	SQRT VIF	Tolerance	R-Squared
GDP	2.90	1.70	0.3445	0.6555
ln_ODA	2.91	1.71	0.3439	0.6561
ln_Inflation	1.13	1.06	0.8866	0.1134
ln_Capinves	1.19	1.09	0.8413	0.1587
ln_Rurpop	2.18	1.48	0.4591	0.5409
popgrowth	1.63	1.28	0.6148	0.3852
Insquality	1.16	1.08	0.8614	0.1386
ln_Domcredit	1.71	1.31	0.5862	0.4138
ln_schoolenr	2.06	1.43	0.4862	0.5138
ln_Agrshare	3.26	1.81	0.3069	0.6931
ln_OHA	2.33	1.52	0.4300	0.5700
ln_Tradeopp	1.77	1.33	0.5651	0.4349
Mean VIF	2.02			

2.3. Heterogeneity test

Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model

H0: sigma(i)^2 = sigma^2 for all i

chi2 (81) = 26808.95
Prob>chi2 = 0.0000

2.4. Development aid under OLS estimation

```
Fixed-effects (within) regression               Number of obs      =      1180
Group variable: country1                        Number of groups   =        81

R-sq:  within  = 0.0825                         Obs per group: min =         1
       between = 0.0104                                        avg =      14.6
       overall = 0.0076                                        max =        20

                                                F(11,80)           =         .
corr(u_i, Xb)  = -0.7787                        Prob > F           =         .

                                    (Std. Err. adjusted for 81 clusters in country1)
```

Growth	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
ln_GDP L10.	-.2358589	1.495916	-0.16	0.875	-3.212826	2.741108
ln_ODA L1.	1.192239	.3658377	3.26	0.002	.464199	1.920279
ln_Inflation L1.	-.2832169	.1579403	-1.79	0.077	-.597528	.0310943
ln_Capinves L1.	.4908425	.846311	0.58	0.564	-1.19337	2.175055
Rurpop L1.	-.0644134	.0770133	-0.84	0.405	-.2176747	.0888479
popgrowth L1.	.7633631	.278229	2.74	0.007	.2096698	1.317056
ln_Domcredit L1.	-.8381633	.5110628	-1.64	0.105	-1.855211	.1788841
ln_schoolenr L1.	2.508306	1.256766	2.00	0.049	.0072614	5.00935
ln_Agrshare L1.	-.6312825	.8521354	-0.74	0.461	-2.327086	1.064521
Insquality L1.	.0756454	.0969432	0.78	0.438	-.1172776	.2685685
ln_Etnicfrac L1.	-.244259	.1929599	-1.27	0.209	-.6282616	.1397435
ln_Tradeopp L1.	2.307435	.9907425	2.33	0.022	.3357945	4.279075
_cons	-9.064156	14.8887	-0.61	0.544	-38.69361	20.5653
sigma_u	3.7314835					
sigma_e	3.7924844					
rho	.49189299	(fraction of variance due to u_i)				

ODA SQUARED INCLUDED IN THE REGRESSION

```
Fixed-effects (within) regression               Number of obs      =      1180
Group variable: country1                        Number of groups   =        81

R-sq:  within  = 0.0845                         Obs per group: min =         1
       between = 0.0099                                        avg =      14.6
       overall = 0.0084                                        max =        20

                                                F(12,80)           =         .
corr(u_i, Xb)  = -0.7738                        Prob > F           =         .

                                    (Std. Err. adjusted for 81 clusters in country1)
```

Growth	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
ln_GDP L10.	-.3087356	1.455466	-0.21	0.833	-3.205205	2.587734
ln_ODA L1.	1.205717	.3654075	3.30	0.001	.4785325	1.932901
ln_Inflation L1.	-.2819542	.162743	-1.73	0.087	-.6058231	.0419147
ln_Capinves L1.	.4485125	.8485203	0.53	0.599	-1.240097	2.137122
Rurpop L1.	-.0598508	.0789361	-0.76	0.451	-.2169386	.097237
popgrowth L1.	.7442956	.2869436	2.59	0.011	.1732597	1.315331
ln_Domcredit L1.	-.7946528	.5326848	-1.49	0.140	-1.854729	.2654239
ln_schoolenr L1.	2.697364	1.21916	2.21	0.030	.2711591	5.123569
ln_Agrshare L1.	-.6239637	.8755697	-0.71	0.478	-2.366403	1.118475
Insquality L1.	.0782298	.0992406	0.79	0.433	-.1192653	.275725
ln_Etnicfrac L1.	-.2663191	.2050078	-1.30	0.198	-.6742976	.1416594
ln_Tradeopp L1.	2.121542	.9218316	2.30	0.024	.2870389	3.956046
ln_ODA2 L1.	.0882167	.0956866	0.92	0.359	-.1022056	.2786391
_cons	-8.9955	14.79786	-0.61	0.545	-38.44418	20.45318
sigma_u	3.7224562					
sigma_e	3.7899172					
rho	.49102074	(fraction of variance due to u_i)				

Interactions of ODA with Macroeconomic indicators

```
Fixed-effects (within) regression               Number of obs      =      1180
Group variable: country1                        Number of groups   =        81

R-sq:  within  = 0.0856                         Obs per group: min =         1
       between = 0.0094                                        avg =      14.6
       overall = 0.0088                                        max =        20

                                                F(13,80)           =         .
corr(u_i, Xb)  = -0.7822                        Prob > F           =         .

                                    (Std. Err. adjusted for 81 clusters in country1)
```

Growth	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
ln_GDP L10.	-.2011814	1.501414	-0.13	0.894	-3.189091	2.786728
ln_ODA L1.	-.4526895	1.853266	-0.24	0.808	-4.140807	3.235428
ln_Capinves L1.	.4094878	.8365403	0.49	0.626	-1.255281	2.074256
Rurpop L1.	-.0730667	.0761438	-0.96	0.340	-.2245977	.0784644
popgrowth L1.	.7526282	.2718393	2.77	0.007	.2116507	1.293606
ln_Domcredit L1.	-.9484513	.4820563	-1.97	0.053	-1.907774	.0108714
ln_schoolenr L1.	2.541299	1.239766	2.05	0.044	.0740857	5.008512
ln_Agrshare L1.	-.6605135	.86442	-0.76	0.447	-2.380764	1.059737
ln_Inflation L1.	-.2422174	.1551857	-1.56	0.123	-.5510467	.0666119
ln_Tradeopp L1.	2.020317	.9428252	2.14	0.035	.1440346	3.896599
Insquality L1.	.0576385	.0902385	0.64	0.525	-.1219417	.2372188
ln_Etnicfrac L1.	-.2260153	.192023	-1.18	0.243	-.6081534	.1561227
intrODAtropp L1.	.4043837	.4408087	0.92	0.362	-.4728535	1.281621
intODAinfl~n L1.	-.0632129	.0656236	-0.96	0.338	-.193808	.0673821
_cons	-6.983291	13.96912	-0.50	0.619	-34.78272	20.81614
sigma_u	3.8047689					
sigma_e	3.7894747					
rho	.50201391	(fraction of variance due to u_i)				

Interactions of ODA with institutions indicators

```
Fixed-effects (within) regression               Number of obs      =      1180
Group variable: country1                        Number of groups   =        81

R-sq:  within  = 0.0864                         Obs per group: min =         1
       between = 0.0115                                        avg =      14.6
       overall = 0.0085                                        max =        20

                                                F(13,80)           =         .
corr(u_i, Xb)  = -0.7836                        Prob > F           =         .

                                    (Std. Err. adjusted for 81 clusters in country1)
```

Growth	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
ln_GDP L10.	-.3301695	1.481806	-0.22	0.824	-3.279057	2.618718
ln_ODA L1.	.5783576	.8012387	0.72	0.473	-1.016158	2.172873
ln_Capinves L1.	.4632475	.8437243	0.55	0.584	-1.215817	2.142312
Rurpop L1.	-.0725013	.0761961	-0.95	0.344	-.2241364	.0791337
popgrowth L1.	.7739016	.2643717	2.93	0.004	.2477851	1.300018
ln_Domcredit L1.	-1.183883	.5601005	-2.11	0.038	-2.298519	-.0692476
ln_schoolenr L1.	2.395353	1.255518	1.91	0.060	-.1032075	4.893913
ln_Agrshare L1.	-.698889	.8666858	-0.81	0.422	-2.423649	1.025871
ln_Inflation L1.	-.260837	.1601961	-1.63	0.107	-.5796374	.0579635
ln_Tradeopp L1.	2.161188	1.015776	2.13	0.036	.1397301	4.182647
Insquality L1.	.0682292	.0966539	0.71	0.482	-.1241181	.2605766
ln_Etnicfrac L1.	-1.276792	.8921951	-1.43	0.156	-3.052317	.4987331
intODAdemo~c L1.	.2754776	.2112837	1.30	0.196	-.1449904	.6959457
intODAethnic L1.	.3754141	.2987722	1.26	0.213	-.2191614	.9699897
_cons	-6.380923	14.49501	-0.44	0.661	-35.22691	22.46506
sigma_u	3.7580654					
sigma_e	3.7878689					
rho	.49605046	(fraction of variance due to u_i)				

Interactions of ODA with Regional dummies

```
Fixed-effects (within) regression               Number of obs      =      1180
Group variable: country1                        Number of groups   =        81

R-sq:  within  = 0.0857                         Obs per group: min =         1
       between = 0.0030                                        avg =      14.6
       overall = 0.0053                                        max =        20

                                                F(13,80)           =         .
corr(u_i, Xb)  = -0.7810                        Prob > F           =         .

                                    (Std. Err. adjusted for 81 clusters in country1)
------------------------------------------------------------------------------
             |               Robust
      Growth |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      ln_GDP |
        L10. |  -.5392897   1.588754    -0.34   0.735    -3.701011    2.622431
      ln_ODA |
        L1.  |   1.260887   .4141343     3.04   0.003     .4367331     2.08504
 ln_Capinves |
        L1.  |   .3955996   .8471405     0.47   0.642    -1.290264    2.081463
      Rurpop |
        L1.  |  -.0577963   .0805122    -0.72   0.475    -.2180208    .1024282
   popgrowth |
        L1.  |   .7538749   .2831539     2.66   0.009     .1903807    1.317369
ln_Domcredit |
        L1.  |  -.8828055   .5017937    -1.76   0.082    -1.881407    .1157957
ln_schoolenr |
        L1.  |   2.780021   1.250484     2.22   0.029     .2914777    5.268564
 ln_Agrshare |
        L1.  |  -.6101283   .8416336    -0.72   0.471    -2.285033    1.064776
ln_Inflation |
        L1.  |  -.2926818   .1591164    -1.84   0.070    -.6093335      .02397
 ln_Tradeopp |
        L1.  |   2.056907   .9135037     2.25   0.027     .2389771    3.874837
  Insquality |
        L1.  |   .0739537   .1017644     0.73   0.470    -.1285638    .2764713
ln_Etnicfrac |
        L1.  |  -.2597357   .2179506    -1.19   0.237    -.6934712    .1739999
  intODAsubA |
        L1.  |   .4214159   .7925364     0.53   0.596    -1.155782    1.998614
  intODAasia |
        L1.  |  -.6866025   .5841404    -1.18   0.243    -1.849079    .4758738
    eastasia |  (dropped)
   subsahara |  (dropped)
       _cons |  -7.022237   15.76412    -0.45   0.657    -38.39383    24.34936
-------------+----------------------------------------------------------------
     sigma_u |  3.8481966
     sigma_e |  3.7892861
         rho |   .50771288   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

With

2.5. Development aid under Instrumental variables

Fixed effect

```
Fixed-effects (within) IV regression            Number of obs      =      1099
Group variable: country1                        Number of groups   =        79

R-sq:  within  =      .                         Obs per group: min =         1
       between = 0.0037                                        avg =      13.9
       overall = 0.0012                                        max =        19

                                                Wald chi2(12)      =    291.32
corr(u_i, Xb)  = -0.9279                        Prob > chi2        =    0.0000

------------------------------------------------------------------------------
      Growth |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      ln_ODA |
        L1.  |  -6.618904   3.158681    -2.10   0.036    -12.80981   -.4280018
      ln_GDP |
        L10. |  -5.638731   2.441055    -2.31   0.021    -10.42311   -.8543519
ln_Inflation |
        L1.  |   .2823459   .2899709     0.97   0.330    -.2859867    .8506784
 ln_Capinves |
        L1.  |   1.406658   .7910327     1.78   0.075    -.1437377    2.957054
      Rurpop |
        L1.  |    .361752   .1815411     1.99   0.046     .0059379    .7175661
   popgrowth |
        L1.  |   1.162248   .2676552     4.34   0.000     .6376533    1.686842
ln_Domcredit |
        L1.  |  -2.313992    .75955    -3.05   0.002    -3.802682   -.8253008
ln_schoolenr |
        L1.  |  -2.270121   2.307522    -0.98   0.325    -6.792782    2.25254
 ln_Agrshare |
        L1.  |    1.9379   1.460879     1.33   0.185    -.9253697    4.80117
  Insquality |
        L1.  |   .1318453   .1174835     1.12   0.262    -.0984183    .3621088
 ln_Tradeopp |
        L1.  |   6.470446   1.896436     3.41   0.001      2.7535    10.18739
ln_Etnicfrac |
        L1.  |  -.5329515   .3737614    -1.43   0.154    -1.26551    .1996073
       _cons |   .1721851   13.72861     0.01   0.990    -26.7354    27.07977
-------------+----------------------------------------------------------------
     sigma_u |   9.965046
     sigma_e |   5.2992991
         rho |   .77954521   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F  test that all u_i=0:     F(78,1008) =     1.65         Prob > F    = 0.0005
------------------------------------------------------------------------------
Instrumented:   L.ln_ODA
Instruments:    L10.ln_GDP L.ln_Inflation L.ln_Capinves L.Rurpop L.popgrowth L.ln_Domcredit L.ln_schoolenr L.ln_Agrshare L.Insquality L.ln_Tradeopp L.ln_Etnicfrac L.ln_totpop L.ln_landsq L.temperature
------------------------------------------------------------------------------
```

Random effect

```
G2SLS random-effects IV regression              Number of obs      =      1099
Group variable: country1                        Number of groups   =        79

R-sq:  within  = 0.0111                         Obs per group: min =         1
       between = 0.3307                                        avg =      13.9
       overall = 0.0899                                        max =        19

                                                Wald chi2(12)      =    119.33
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =    0.0000
```

Growth	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
ln_ODA						
L1.	-.664091	.2116277	-3.14	0.002	-1.078874	-.2493084
ln_GDP						
L10.	-1.594692	.3457886	-4.61	0.000	-2.272425	-.916959
ln_Inflation						
L1.	-.3435826	.1106062	-3.11	0.002	-.5603667	-.1267985
ln_Capinves						
L1.	2.213352	.3805399	5.82	0.000	1.467507	2.959196
Rurpop						
L1.	-.0047305	.0097968	-0.48	0.629	-.0239318	.0144708
popgrowth						
L1.	.1256652	.1328269	0.95	0.344	-.1346708	.3860011
ln_Domcredit						
L1.	-.5898264	.2119496	-2.78	0.005	-1.00524	-.1744128
ln_schoolenr						
L1.	.9426626	.2353387	4.01	0.000	.4814072	1.403918
ln_Agrshare						
L1.	-.4170405	.3189854	-1.31	0.191	-1.04224	.2081594
Insquality						
L1.	.0561753	.04045	1.39	0.165	-.0231053	.1354559
ln_Tradeopp						
L1.	.2577544	.3992975	0.65	0.519	-.5248544	1.040363
ln_Etnicfrac						
L1.	-.4009321	.1630796	-2.46	0.014	-.7205622	-.0813019
_cons	6.514803	3.329586	1.96	0.050	-.011066	13.04067
sigma_u	.48094303					
sigma_e	5.2992991					
rho	.00816936	(fraction of variance due to u_i)				

```
Instrumented:   L.ln_ODA
Instruments:    L10.ln_GDP L.ln_Inflation L.ln_Capinves L.Rurpop L.popgrowth L.ln_Domcredit L.ln_schoolenr L.ln_Agrshare L.Insquality L.ln_Tradeopp L.ln_Etnicfrac L.ln_totpop L.ln_landsq L.temperature
```

Hausman Specification test

```
. hausman fixedODAIV randomODAIV
```

	(b) fixedODAIV	(B) randomODAIV	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
L.ln_ODA	-6.618904	-.664091	-5.954813	3.151584
L10.ln_GDP	-5.638731	-1.594692	-4.044039	2.416439
L.ln_Infla~n	.2823459	-.3435826	.6259285	.2680474
L.ln_Capin~s	1.406658	2.213352	-.8066939	.6934855
L.Rurpop	.361752	-.0047305	.3664824	.1812766
L.popgrowth	1.162248	.1256652	1.036583	.232371
L.ln_Domcr~t	-2.313992	-.5898264	-1.724165	.7293789
L.ln_schoo~r	-2.270121	.9426626	-3.212783	2.29549
L.ln_Agrsh~e	1.9379	-.4170405	2.354941	1.425628
L.Insquality	.1318453	.0561753	.07567	.1103004
L.ln_Trade~p	6.470446	.2577544	6.212691	1.853923
L.ln_Etnic~c	-.5329515	-.4009321	-.1320195	.3363073

```
                b = consistent under Ho and Ha; obtained from xtivreg
    B = inconsistent under Ha, efficient under Ho; obtained from xtivreg

Test:  Ho:  difference in coefficients not systematic

           chi2(12) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                    =       40.99
         Prob>chi2 =      0.0000
```

2SLS Fixed robust

```
FIXED EFFECTS ESTIMATION
------------------------

Number of groups =        78                    Obs per group: min =         2
                                                               avg =      14.1
                                                               max =        19

IV (2SLS) estimation
--------------------

Estimates efficient for homoskedasticity only
Statistics robust to heteroskedasticity

                                                      Number of obs =      1098
                                                      F( 12,  1008) =      2.09
                                                      Prob > F      =    0.0152
Total (centered) SS     =  16268.20042                Centered R2   =   -0.7400
Total (uncentered) SS   =  16268.20042                Uncentered R2 =   -0.7400
Residual SS             =   28307.2311                Root MSE      =     5.268

------------------------------------------------------------------------------
      Growth |      Coef.   Robust Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      ln_ODA |
         L1. |  -6.618904    3.68571    -1.80   0.073    -13.84276     .604956
      ln_GDP |
        L10. |  -5.638731   2.895535    -1.95   0.051    -11.31388    .0364126
ln_Inflation |
         L1. |   .2823459   .3116448     0.91   0.365    -.3284667    .8931585
 ln_Capinves |
         L1. |   1.406658   .9464308     1.49   0.137    -.4483123    3.261628
      Rurpop |
         L1. |    .361752   .1947617     1.86   0.063     -.019974    .7434779
   popgrowth |
         L1. |   1.162248   .8668933     1.34   0.180    -.5368319    2.861328
ln_Domcredit |
         L1. |  -2.313992   .9073713    -2.55   0.011    -4.092407   -.5355765
ln_schoolenr |
         L1. |  -2.270121    2.44495    -0.93   0.353    -7.062135    2.521893
 ln_Agrshare |
         L1. |     1.9379   1.737672     1.12   0.265    -1.467874    5.343674
  Insquality |
         L1. |   .1318453   .1185231     1.11   0.266    -.1004558    .3641463
 ln_Tradeopp |
         L1. |   6.470446   2.304111     2.81   0.005     1.954472    10.98642
ln_Etnicfrac |
         L1. |  -.5329515   .2672844    -1.99   0.046    -1.056819   -.0090838
------------------------------------------------------------------------------
Underidentification test (Kleibergen-Paap rk LM statistic):             10.517
                                                   Chi-sq(3) P-val =    0.0146
------------------------------------------------------------------------------
Weak identification test (Kleibergen-Paap rk Wald F statistic):          3.630
Stock-Yogo weak ID test critical values:  5% maximal IV relative bias    13.91
                                         10% maximal IV relative bias     9.08
                                         20% maximal IV relative bias     6.46
                                         30% maximal IV relative bias     5.39
                                         10% maximal IV size             22.30
                                         15% maximal IV size             12.83
                                         20% maximal IV size              9.54
                                         25% maximal IV size              7.80
Source: Stock-Yogo (2005).  Reproduced by permission.
NB: Critical values are for Cragg-Donald F statistic and i.i.d. errors.
------------------------------------------------------------------------------
Hansen J statistic (overidentification test of all instruments):         1.228
                                                   Chi-sq(2) P-val =    0.5411
-endog- option:
Endogeneity test of endogenous regressors:                               6.863
                                                   Chi-sq(1) P-val =    0.0088
Regressors tested:    L.ln_ODA
------------------------------------------------------------------------------
Instrumented:         L.ln_ODA
Included instruments: L10.ln_GDP L.ln_Inflation L.ln_Capinves L.Rurpop
                      L.popgrowth L.ln_Domcredit L.ln_schoolenr L.ln_Agrshare
                      L.Insquality L.ln_Tradeopp L.ln_Etnicfrac
Excluded instruments: L.ln_totpop L.ln_landsq L.temperature
------------------------------------------------------------------------------
```

Squared aid included in the regressions

```
FIXED EFFECTS ESTIMATION
------------------------

Number of groups =        78                     Obs per group: min =         2
                                                                avg =      14.1
                                                                max =        19

IV (2SLS) estimation
--------------------

Estimates efficient for homoskedasticity only
Statistics robust to heteroskedasticity

                                                       Number of obs =      1098
                                                       F( 13,  1007) =      1.94
                                                       Prob > F      =    0.0232
Total (centered) SS     =  16268.20042                 Centered R2   =   -0.7266
Total (uncentered) SS   =  16268.20042                 Uncentered R2 =   -0.7266
Residual SS             =  28088.49216                 Root MSE      =     5.248

------------------------------------------------------------------------------
      Growth |      Coef.   Robust Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      ln_ODA |
         L1. |  -6.556368   3.559342    -1.84   0.065    -13.53255    .4198144
      ln_GDP |
        L10. |  -5.563325   2.680594    -2.08   0.038    -10.81719   -.3094566
ln_Inflation |
         L1. |   .2761104   .2974295     0.93   0.353    -.3068408    .8590616
 ln_Capinves |
         L1. |    1.41188   .9500457     1.49   0.137     -.450175    3.273936
      Rurpop |
         L1. |   .3570817    .196049     1.82   0.069    -.0271674    .7413307
   popgrowth |
         L1. |   1.165016    .864551     1.35   0.178    -.5294729    2.859505
ln_Domcredit |
         L1. |  -2.314116   .8793978    -2.63   0.009    -4.037704   -.5905285
ln_schoolenr |
         L1. |  -2.295811   2.436225    -0.94   0.346    -7.070725    2.479103
 ln_Agrshare |
         L1. |   1.909554   1.683929     1.13   0.257    -1.390886    5.209993
  Insquality |
         L1. |    .130351   .1239103     1.05   0.293    -.1125088    .3732108
 ln_Tradeopp |
         L1. |   6.500319   2.306435     2.82   0.005     1.979789    11.02085
ln_Etnicfrac |
         L1. |  -.5243641   .2940283    -1.78   0.075    -1.100649    .0519208
     ln_ODA2 |
         L1. |   -.026402   .1608976    -0.16   0.870    -.3417554    .2889515
------------------------------------------------------------------------------

Underidentification test (Kleibergen-Paap rk LM statistic):             10.256
                                                   Chi-sq(3) P-val =    0.0165
------------------------------------------------------------------------------

Weak identification test (Kleibergen-Paap rk Wald F statistic):          3.543
Stock-Yogo weak ID test critical values:  5% maximal IV relative bias    13.91
                                         10% maximal IV relative bias     9.08
                                         20% maximal IV relative bias     6.46
                                         30% maximal IV relative bias     5.39
                                         10% maximal IV size             22.30
                                         15% maximal IV size             12.83
                                         20% maximal IV size              9.54
                                         25% maximal IV size              7.80
Source: Stock-Yogo (2005).  Reproduced by permission.
NB: Critical values are for Cragg-Donald F statistic and i.i.d. errors.
------------------------------------------------------------------------------

Hansen J statistic (overidentification test of all instruments):         1.185
                                                   Chi-sq(2) P-val =    0.5529
------------------------------------------------------------------------------

Instrumented:         L.ln_ODA
Included instruments: L10.ln_GDP L.ln_Inflation L.ln_Capinves L.Rurpop
                      L.popgrowth L.ln_Domcredit L.ln_schoolenr L.ln_Agrshare
                      L.Insquality L.ln_Tradeopp L.ln_Etnicfrac L.ln_ODA2
Excluded instruments: L.ln_totpop L.ln_landsq L.temperature
------------------------------------------------------------------------------
```

ODA interacted with Macroeconomic policy

FIXED EFFECTS ESTIMATION

Number of groups = 78 Obs per group: min = 2
avg = 14.1
max = 19

IV (2SLS) estimation

Estimates efficient for homoskedasticity only
Statistics robust to heteroskedasticity

Number of obs = 1098
F(14, 1006) = 2.73
Prob > F = 0.0006
Total (centered) SS = 16268.20042 Centered R2 = -0.2086
Total (uncentered) SS = 16268.20042 Uncentered R2 = -0.2086
Residual SS = 19661.18327 Root MSE = 4.39

Growth	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
ln_ODA						
L1.	-23.85518	12.64223	-1.89	0.059	-48.6335	.9231394
ln_GDP						
L10.	-.4580377	1.084673	-0.42	0.673	-2.583959	1.667883
ln_Capinves						
L1.	-.0816622	.9255481	-0.09	0.930	-1.895703	1.732379
Rurpop						
L1.	-.0547511	.0770233	-0.71	0.477	-.205714	.0962118
popgrowth						
L1.	.7486069	.7576852	0.99	0.323	-.7364288	2.233643
ln_Domcredit						
L1.	-2.151493	.8385586	-2.57	0.010	-3.795038	-.5079486
ln_schoolenr						
L1.	2.460958	1.200277	2.05	0.040	.1084592	4.813457
ln_Agrshare						
L1.	-.8875421	.9040128	-0.98	0.326	-2.659375	.8842905
ln_Inflation						
L1.	-.0773486	.177306	-0.44	0.663	-.424862	.2701648
Insquality						
L1.	-.1124924	.133551	-0.84	0.400	-.3742475	.1492628
ln_Tradeopp						
L1.	-1.551689	2.365405	-0.66	0.512	-6.187797	3.08442
ln_Etnicfrac						
L1.	-.283488	.3045143	-0.93	0.352	-.8803252	.3133491
intrODAtropp						
L1.	5.517572	2.764608	2.00	0.046	.0990385	10.9361
intODAinfl~n						
L1.	-.0024405	.081928	-0.03	0.976	-.1630163	.1581354

Underidentification test (Kleibergen-Paap rk LM statistic): 25.996
Chi-sq(3) P-val = 0.0000

Weak identification test (Kleibergen-Paap rk Wald F statistic): 9.533
Stock-Yogo weak ID test critical values: 5% maximal IV relative bias 13.91
10% maximal IV relative bias 9.08
20% maximal IV relative bias 6.46
30% maximal IV relative bias 5.39
10% maximal IV size 22.30
15% maximal IV size 12.83
20% maximal IV size 9.54
25% maximal IV size 7.80
Source: Stock-Yogo (2005). Reproduced by permission.
NB: Critical values are for Cragg-Donald F statistic and i.i.d. errors.

Hansen J statistic (overidentification test of all instruments): 2.622
Chi-sq(2) P-val = 0.2695

Instrumented: L.ln_ODA
Included instruments: L10.ln_GDP L.ln_Capinves L.Rurpop L.popgrowth
L.ln_Domcredit L.ln_schoolenr L.ln_Agrshare L.ln_Inflation
L.Insquality L.ln_Tradeopp L.ln_Etnicfrac L.intrODAtropp
L.intODAinflation
Excluded instruments: L.ln_totpop L.ln_landsq L.temperature

ODA interacted with institutions

FIXED EFFECTS ESTIMATION

Number of groups = 78 Obs per group: min = 2
avg = 14.1
max = 19

IV (2SLS) estimation

Estimates efficient for homoskedasticity only
Statistics robust to heteroskedasticity

Number of obs = 1098
F(14, 1006) = 2.30
Prob > F = 0.0042
Total (centered) SS = 16268.20042 Centered R2 = -0.2360
Total (uncentered) SS = 16268.20042 Uncentered R2 = -0.2360
Residual SS = 20107.67522 Root MSE = 4.44

Growth	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
ln_ODA						
L1.	-12.08672	5.345922	-2.26	0.024	-22.56454	-1.608908
ln_GDP						
L10.	.7634438	1.492997	0.51	0.609	-2.162777	3.689665
ln_Capinves						
L1.	.9285257	.7877404	1.18	0.239	-.6154172	2.472469
Rurpop						
L1.	.1113143	.0949342	1.17	0.241	-.0747534	.2973819
popgrowth						
L1.	.8910577	.7886571	1.13	0.259	-.6546819	2.436797
ln_Domcredit						
L1.	-4.071667	1.348239	-3.02	0.003	-6.714167	-1.429166
ln_schoolenr						
L1.	.9014085	1.354578	0.67	0.506	-1.753516	3.556333
ln_Agrshare						
L1.	-.5503625	.9879976	-0.56	0.577	-2.486802	1.386077
ln_Inflation						
L1.	.0541587	.2188812	0.25	0.805	-.3748406	.483158
Insquality						
L1.	-.0111107	.1032132	-0.11	0.914	-.213405	.1911835
ln_Tradeopp						
L1.	3.666455	1.246323	2.94	0.003	1.223707	6.109202
ln_Etnicfrac						
L1.	3.725466	2.422769	1.54	0.124	-1.023073	8.474005
intODAdemo~c						
L1.	3.030606	1.164755	2.60	0.009	.7477277	5.313484
intODAethnic						
L1.	-1.235392	.7736527	-1.60	0.110	-2.751723	.2809392

Underidentification test (Kleibergen-Paap rk LM statistic): 22.125
Chi-sq(3) P-val = 0.0001

Weak identification test (Kleibergen-Paap rk Wald F statistic): 7.810
Stock-Yogo weak ID test critical values: 5% maximal IV relative bias 13.91
10% maximal IV relative bias 9.08
20% maximal IV relative bias 6.46
30% maximal IV relative bias 5.39
10% maximal IV size 22.30
15% maximal IV size 12.83
20% maximal IV size 9.54
25% maximal IV size 7.80
Source: Stock-Yogo (2005). Reproduced by permission.
NB: Critical values are for Cragg-Donald F statistic and i.i.d. errors.

Hansen J statistic (overidentification test of all instruments): 0.572
Chi-sq(2) P-val = 0.7511

Instrumented: L.ln_ODA
Included instruments: L10.ln_GDP L.ln_Capinves L.Rurpop L.popgrowth
L.ln_Domcredit L.ln_schoolenr L.ln_Agrshare L.ln_Inflation
L.Insquality L.ln_Tradeopp L.ln_Etnicfrac L.intODAdemocrac
L.intODAethnic
Excluded instruments: L.ln_totpop L.ln_landsq L.temperature

ODA interacted with regional dummies

FIXED EFFECTS ESTIMATION

Number of groups = 78 Obs per group: min = 2
avg = 14.1
max = 19

IV (2SLS) estimation

Estimates efficient for homoskedasticity only
Statistics robust to heteroskedasticity

Number of obs = 1098
F(14, 1006) = 2.02
Prob > F = 0.0141
Total (centered) SS = 16268.20042 Centered R2 = -0.6191
Total (uncentered) SS = 16268.20042 Uncentered R2 = -0.6191
Residual SS = 26339.03853 Root MSE = 5.082

Growth	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
ln_ODA						
L1.	-8.261397	6.070395	-1.36	0.174	-20.15915	3.636358
ln_GDP						
L10.	-1.232471	1.624384	-0.76	0.448	-4.416206	1.951264
ln_Capinves						
L1.	.8176643	.8310335	0.98	0.325	-.8111314	2.44646
Rurpop						
L1.	.3048574	.2253266	1.35	0.176	-.1367746	.7464894
popgrowth						
L1.	1.02132	.8373247	1.22	0.223	-.6198061	2.662446
ln_Domcredit						
L1.	-2.801828	1.325912	-2.11	0.035	-5.400567	-.2030885
ln_schoolenr						
L1.	-.4498646	2.343958	-0.19	0.848	-5.043938	4.144209
ln_Agrshare						
L1.	1.354201	1.861462	0.73	0.467	-2.294198	5.002601
ln_Inflation						
L1.	.1294942	.3219019	0.40	0.687	-.501422	.7604104
Insquality						
L1.	.2262206	.1470623	1.54	0.124	-.0620162	.5144573
ln_Tradeopp						
L1.	4.721774	1.874962	2.52	0.012	1.046917	8.396632
ln_Etnicfrac						
L1.	-.964904	.4830577	-2.00	0.046	-1.91168	-.0181282
intODAsubA						
L1.	8.21341	5.135847	1.60	0.110	-1.852664	18.27948
intODAasia						
L1.	7.108483	4.906375	1.45	0.147	-2.507836	16.7248

Underidentification test (Kleibergen-Paap rk LM statistic): 6.394
Chi-sq(3) P-val = 0.0940

Weak identification test (Kleibergen-Paap rk Wald F statistic): 2.123
Stock-Yogo weak ID test critical values: 5% maximal IV relative bias 13.91
10% maximal IV relative bias 9.08
20% maximal IV relative bias 6.46
30% maximal IV relative bias 5.39
10% maximal IV size 22.30
15% maximal IV size 12.83
20% maximal IV size 9.54
25% maximal IV size 7.80
Source: Stock-Yogo (2005). Reproduced by permission.
NB: Critical values are for Cragg-Donald F statistic and i.i.d. errors.

Hansen J statistic (overidentification test of all instruments): 3.380
Chi-sq(2) P-val = 0.1845

Instrumented: L.ln_ODA
Included instruments: L10.ln_GDP L.ln_Capinves L.Rurpop L.popgrowth L.ln_Domcredit L.ln_schoolenr L.ln_Agrshare L.ln_Inflation L.Insquality L.ln_Tradeopp L.ln_Etnicfrac L.intODAsubA L.intODAasia
Excluded instruments: L.ln_totpop L.ln_landsq L.temperature
Dropped collinear: eastasia subsahara

2.6. Durbin Hausman test

Two choose from OLS or 2SLS Durbin Hausman test

```
. hausman IV OLS
```

	Coefficients (b) IV	(B) OLS	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
L.ln_ODA	-6.623627	1.14989	-7.773517	3.167472
L10.ln_GDP	-5.414831	-.0857311	-5.3291	2.30789
L.ln_Infla~n	.3018926	-.2602597	.5621523	.2625044
L.ln_Capin~s	1.605494	.676198	.9292956	.6086022
L.Rurpop	.3683274	-.0565465	.4248739	.1722023
L.popgrowth	1.161878	.7630072	.3988709	.2116348
L.ln_Domcr~t	-2.228512	-.7869742	-1.441537	.6697207
L.ln_schoo~r	-2.132341	2.606035	-4.738376	2.134021
L.ln_Agrsh~e	1.874144	-.6830237	2.557168	1.311041
L.Insquality	.1332416	.0761096	.0571319	.0873584
L.ln_Trade~p	6.150977	2.05439	4.096587	1.763989
L.ln_Etnic~c	-.5371778	-.2492108	-.287967	.2698872

b = consistent under Ho and Ha; obtained from xtivreg2
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(12) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 7.10
Prob>chi2 = 0.8511

2.7. Humanitarian aid under OLS estimation

Fixed effect estimation

Fixed-effects (within) regression — Number of obs = 854
Group variable: country1 — Number of groups = 72

R-sq: within = 0.0969 — Obs per group: min = 1
between = 0.0001 — avg = 11.9
overall = 0.0145 — max = 15

F(11,771) = 7.52
corr(u_i, Xb) = -0.6259 — Prob > F = 0.0000

Growth	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ln_GDP L10.	1.649676	.9820639	1.68	0.093	-.2781602	3.577512
ln_OHA L1.	.6845341	.1436614	4.76	0.000	.4025202	.966548
ln_Inflation L1.	-.443654	.1437445	-3.09	0.002	-.7258311	-.1614769
ln_Capinves L1.	.6472039	.5248383	1.23	0.218	-.3830776	1.677485
Rurpop L1.	-.0342423	.0796526	-0.43	0.667	-.1906039	.1221193
popgrowth L1.	-.3690008	.2628209	-1.40	0.161	-.8849301	.1469286
ln_Domcredit L1.	-1.230605	.422466	-2.91	0.004	-2.059925	-.4012849
ln_schoolenr L1.	-.6105899	1.263845	-0.48	0.629	-3.091576	1.870396
ln_Agrshare L1.	-.0836062	.8547464	-0.10	0.922	-1.761512	1.5943
Insquality L1.	.1759654	.0887392	1.98	0.048	.0017663	.3501644
ln_Etnicfrac L1.	(dropped)					
ln_Tradeopp L1.	3.908648	.8190285	4.77	0.000	2.300858	5.516438
_cons	-18.55336	11.15638	-1.66	0.097	-40.45385	3.34713
sigma_u	3.0347846					
sigma_e	3.3177667					
rho	.45554201	(fraction of variance due to u_i)				

F test that all u_i=0: F(71, 771) = 3.23 — Prob > F = 0.0000

Random effect model estimations

```
Random-effects GLS regression                   Number of obs      =       854
Group variable: country1                        Number of groups   =        72

R-sq:  within  = 0.0610                         Obs per group: min =         1
       between = 0.3592                                        avg =      11.9
       overall = 0.1397                                        max =        15

Random effects u_i ~ Gaussian                   Wald chi2(12)      =     93.79
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =    0.0000
```

Growth	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
ln_GDP L10.	-.1909947	.4026138	-0.47	0.635	-.9801033	.5981139
ln_OHA L1.	.5555227	.1087471	5.11	0.000	.3423824	.768663
ln_Inflation L1.	-.5267703	.1289428	-4.09	0.000	-.7794936	-.2740471
ln_Capinves L1.	1.364071	.4060949	3.36	0.001	.5681392	2.160002
Rurpop L1.	-.0141102	.0154535	-0.91	0.361	-.0443985	.0161781
popgrowth L1.	-.6116468	.1886057	-3.24	0.001	-.9813073	-.2419864
ln_Domcredit L1.	-.7226593	.2421208	-2.98	0.003	-1.197207	-.2481111
ln_schoolenr L1.	.5696922	.3187461	1.79	0.074	-.0550387	1.194423
ln_Agrshare L1.	-.4885421	.4560749	-1.07	0.284	-1.382432	.4053483
Insquality L1.	.0317001	.0510904	0.62	0.535	-.0684352	.1318355
ln_Etnicfrac L1.	-.6144909	.3192321	-1.92	0.054	-1.240174	.0111926
ln_Tradeopp L1.	.77583	.3955081	1.96	0.050	.0006483	1.551012
_cons	.5779127	4.614384	0.13	0.900	-8.466114	9.621939
sigma_u	1.1840446					
sigma_e	3.3177667					
rho	.11297453	(fraction of variance due to u_i)				

Hausman Specification test

```
. hausman fixedOHA randomOHA
```

	(b) fixedOHA	(B) randomOHA	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
L10.ln_GDP	1.649676	-.1909947	1.840671	.8957408
L.ln_OHA	.6845341	.5555227	.1290114	.0938759
L.ln_Infla~n	-.443654	-.5267703	.0831163	.0635315
L.ln_Capin~s	.6472039	1.364071	-.7168667	.3324788
L.Rurpop	-.0342423	-.0141102	-.0201321	.0781391
L.popgrowth	-.3690008	-.6116468	.2426461	.1830374
L.ln_Domcr~t	-1.230605	-.7226593	-.5079457	.3462008
L.ln_schoo~r	-.6105899	.5696922	-1.180282	1.222991
L.ln_Agrsh~e	-.0836062	-.4885421	.4049358	.7229019
L.Insquality	.1759654	.0317001	.1442653	.0725563
L.ln_Trade~p	3.908648	.77583	3.132818	.7172036

```
                b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                chi2(11) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                         =       68.57
              Prob>chi2 =      0.0000
```

Heterogeneity test

```
Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model

H0: sigma(i)^2 = sigma^2 for all i

chi2 (72)  =    3.8e+06
Prob>chi2 =     0.0000
```

Humanitarian aid under 2SLS estimations

```
Fixed-effects (within) regression               Number of obs      =       854
Group variable: country1                        Number of groups   =        72

R-sq:  within  = 0.0969                         Obs per group: min =         1
       between = 0.0001                                        avg =      11.9
       overall = 0.0145                                        max =        15

                                                F(11,71)           =      4.94
corr(u_i, Xb)  = -0.6259                        Prob > F           =    0.0000
```

(Std. Err. adjusted for 72 clusters in country1)

Growth	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
ln_GDP L10.	1.649676	2.346443	0.70	0.484	-3.028999	6.328351
ln_OHA L1.	.6845341	.2120538	3.23	0.002	.2617108	1.107357
ln_Inflation L1.	-.443654	.1687112	-2.63	0.010	-.7800545	-.1072535
ln_Capinves L1.	.6472039	1.003648	0.64	0.521	-1.354012	2.64842
Rurpop L1.	-.0342423	.0875992	-0.39	0.697	-.2089102	.1404255
popgrowth L1.	-.3690008	.3624268	-1.02	0.312	-1.091659	.3536577
ln_Domcredit L1.	-1.230605	.7131632	-1.73	0.089	-2.652612	.191402
ln_schoolenr L1.	-.6105899	1.786604	-0.34	0.734	-4.172977	2.951798
ln_Agrshare L1.	-.0836062	.7765252	-0.11	0.915	-1.631954	1.464741
Insquality L1.	.1759654	.1279896	1.37	0.174	-.0792387	.4311695
ln_Etnicfrac L1.	(dropped)					
ln_Tradeopp L1.	3.908648	1.368616	2.86	0.006	1.179705	6.637591
_cons	-18.55336	22.19435	-0.84	0.406	-62.80763	25.70092
sigma_u	3.0347846					
sigma_e	3.3177667					
rho	.45554201	(fraction of variance due to u_i)				

Square OHA included in the model

```
Fixed-effects (within) regression               Number of obs      =       854
Group variable: country1                        Number of groups   =        72

R-sq:  within  = 0.0970                         Obs per group: min =         1
       between = 0.0002                                        avg =      11.9
       overall = 0.0146                                        max =        15

                                                F(12,71)           =      4.86
corr(u_i, Xb)  = -0.6265                        Prob > F           =    0.0000

                                (Std. Err. adjusted for 72 clusters in country1)
------------------------------------------------------------------------------
             |               Robust
      Growth |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      ln_GDP |
        L10. |   1.662849   2.333406     0.71   0.478    -2.98983    6.315529
      ln_OHA |
        L1.  |   .6830886   .2175531     3.14   0.002       .2493    1.116877
ln_Inflation |
        L1.  |  -.4426433   .1680293    -2.63   0.010    -.7776843   -.1076024
 ln_Capinves |
        L1.  |   .6489434    1.00725     0.64   0.521    -1.359455    2.657342
      Rurpop |
        L1.  |  -.0328743   .0848829    -0.39   0.700    -.2021259    .1363773
   popgrowth |
        L1.  |  -.3682108   .3629288    -1.01   0.314     -1.09187    .3554487
ln_Domcredit |
        L1.  |  -1.230058    .711087    -1.73   0.088    -2.647925    .1878091
ln_schoolenr |
        L1.  |  -.5918239   1.755193    -0.34   0.737     -4.09158    2.907932
 ln_Agrshare |
        L1.  |  -.0943253   .7992236    -0.12   0.906    -1.687932    1.499281
  Insquality |
        L1.  |   .1767225   .1279607     1.38   0.172    -.0784239    .4318688
ln_Etnicfrac |
        L1.  |  (dropped)
 ln_Tradeopp |
        L1.  |   3.910698   1.370934     2.85   0.006     1.177133    6.644263
      ln_OHA2 |
        L1.  |  -.0032191   .0334636    -0.10   0.924    -.0699436    .0635055
       _cons |  -18.75425   21.86479    -0.86   0.394     -62.3514    24.8429
-------------+----------------------------------------------------------------
     sigma_u |   3.033286
     sigma_e |   3.3199013
         rho |    .454978   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

OHA interacted with macroeconomic policy

```
Fixed-effects (within) regression               Number of obs      =       854
Group variable: country1                        Number of groups   =        72

R-sq:  within  = 0.0982                         Obs per group: min =         1
       between = 0.0003                                        avg =      11.9
       overall = 0.0158                                        max =        15

                                                F(13,71)           =      4.34
corr(u_i, Xb)  = -0.6375                        Prob > F           =    0.0000

                                (Std. Err. adjusted for 72 clusters in country1)
------------------------------------------------------------------------------
             |               Robust
      Growth |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      ln_GDP |
        L10. |    1.58871   2.292256     0.69   0.491    -2.98192    6.159339
      ln_OHA |
        L1.  |  -.4200257   1.633653    -0.26   0.798    -3.677437    2.837386
 ln_Capinves |
        L1.  |   .6478117   .9728456     0.67   0.508    -1.291987    2.587611
      Rurpop |
        L1.  |   -.040973   .0837506    -0.49   0.626    -.2079669     .126021
   popgrowth |
        L1.  |  -.3644236   .3502903    -1.04   0.302    -1.062883    .3340355
ln_Domcredit |
        L1.  |  -1.298393   .6850082    -1.90   0.062    -2.664261    .0674742
ln_schoolenr |
        L1.  |   -.464544   1.685054    -0.28   0.784    -3.824446    2.895359
 ln_Agrshare |
        L1.  |  -.1040143   .8160618    -0.13   0.899    -1.731195    1.523167
ln_Inflation |
        L1.  |  -.4304168   .1597626    -2.69   0.009    -.7489743   -.1118593
  Insquality |
        L1.  |   .1698397    .124363     1.37   0.176     -.078133    .4178124
ln_Etnicfrac |
        L1.  |  (dropped)
 ln_Tradeopp |
        L1.  |   3.659649    1.24027     2.95   0.004      1.18662    6.132678
 intOHAtropp |
        L1.  |    .256998   .3877829     0.66   0.510     -.516219    1.030215
intOHAinfl~n |
        L1.  |  -.0075006   .0621665    -0.12   0.904    -.1314571    .1164559
       _cons |   -16.7995   20.69774    -0.81   0.420    -58.06963    24.47063
-------------+----------------------------------------------------------------
     sigma_u |   3.0896957
     sigma_e |   3.3197357
         rho |   .46415531   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

OHA interacted with institution

```
Fixed-effects (within) regression               Number of obs      =       854
Group variable: country1                        Number of groups   =        72

R-sq:  within  = 0.0993                         Obs per group: min =         1
       between = 0.0002                                        avg =      11.9
       overall = 0.0141                                        max =        15

                                                F(13,71)           =      5.99
corr(u_i, Xb)  = -0.6328                        Prob > F           =    0.0000

                                (Std. Err. adjusted for 72 clusters in country1)
------------------------------------------------------------------------------
             |               Robust
      Growth |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      ln_GDP |
        L10. |   1.835248   2.301593     0.80   0.428    -2.753999    6.424495
      ln_OHA |
        L1.  |   1.305072   .5708059     2.29   0.025     .1669174    2.443227
ln_Capinves  |
        L1.  |   .6077788   .9928971     0.61   0.542    -1.372002     2.58756
      Rurpop |
        L1.  |  -.0216844   .0853848    -0.25   0.800    -.1919368     .148568
   popgrowth |
        L1.  |  -.4131073   .3570668    -1.16   0.251    -1.125078    .2988636
ln_Domcredit |
        L1.  |  -1.175849   .6836911    -1.72   0.090     -2.53909    .1873924
ln_schoolenr |
        L1.  |  -.6434042   1.779929    -0.36   0.719    -4.192482    2.905674
 ln_Agrshare |
        L1.  |   .0349673   .7693473     0.05   0.964    -1.499068    1.569002
ln_Inflation |
        L1.  |  -.4438275   .1649506    -2.69   0.009    -.7727297   -.1149253
  Insquality |
        L1.  |   .1840698   .1260902     1.46   0.149     -.067347    .4354865
ln_Etnicfrac |
        L1.  |  (dropped)
 ln_Tradeopp |
        L1.  |   4.076837   1.334407     3.06   0.003     1.416106    6.737569
intOHAdemo~c |
        L1.  |  -.1767562   .1589798    -1.11   0.270    -.4937528    .1402405
intOHAethnic |
        L1.  |   .0782388   .3002369     0.26   0.795    -.5204165    .6768941
       _cons |  -21.59165   21.19114    -1.02   0.312    -63.84558    20.66229
-------------+----------------------------------------------------------------
     sigma_u |  3.0824138
     sigma_e |  3.3177063
         rho |   .46328586   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

Interactions of OHA with regional dummies

```
Fixed-effects (within) regression               Number of obs      =       854
Group variable: country1                        Number of groups   =        72

R-sq:  within  = 0.1004                         Obs per group: min =         1
       between = 0.0004                                        avg =      11.9
       overall = 0.0126                                        max =        15

                                                F(14,71)           =      4.84
corr(u_i, Xb)  = -0.6760                        Prob > F           =    0.0000

                                (Std. Err. adjusted for 72 clusters in country1)
------------------------------------------------------------------------------
             |               Robust
      Growth |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      ln_GDP |
        L10. |   1.613497   2.261542     0.71   0.478    -2.89589    6.122883
      ln_OHA |
        L1.  |  -.1792088   1.634335    -0.11   0.913    -3.43798    3.079562
ln_Capinves  |
        L1.  |   .5776865   .9714977     0.59   0.554   -1.359425    2.514798
      Rurpop |
        L1.  |  -.0371962   .0810704    -0.46   0.648   -.1988459    .1244536
   popgrowth |
        L1.  |   -.343325   .3551378    -0.97   0.337    -1.05145    .3647996
ln_Domcredit |
        L1.  |  -1.212296   .6507616    -1.86   0.067   -2.509877    .0852861
ln_schoolenr |
        L1.  |   -.354498   1.680141    -0.21   0.833   -3.704604    2.995608
 ln_Agrshare |
        L1.  |  -.1907672   .8091967    -0.24   0.814    -1.80426    1.422725
ln_Inflation |
        L1.  |  -.4163596   .1589191    -2.62   0.011   -.7332353   -.0994839
 intOHAtropp |
        L1.  |   .2516471   .3846883     0.65   0.515   -.5153997    1.018694
  Insquality |
        L1.  |   .1809497   .1292709     1.40   0.166   -.0768092    .4387087
ln_Etnicfrac |
        L1.  |  (dropped)
 ln_Tradeopp |
        L1.  |   3.677658   1.240476     2.96   0.004    1.204219    6.151096
  intOHAsubA |
        L1.  |  -.4192503   .5234912    -0.80   0.426   -1.463062    .6245616
  intOHAasia |
        L1.  |   -.384994   .3559627    -1.08   0.283   -1.094763    .3247754
   subsahara |  (dropped)
    eastasia |  (dropped)
       _cons |  -17.38687   20.27821    -0.86   0.394   -57.82049    23.04674
-------------+----------------------------------------------------------------
     sigma_u |  3.1878547
     sigma_e |    3.31791
         rho |   .48001721   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

2.8. Humanitarian aid under 2SLS estimations

FIXED effect

```
R-sq:  within  = 0.0552                         Obs per group: min =         1
       between = 0.0190                                        avg =      10.4
       overall = 0.0327                                        max =        13

                                                Wald chi2(11)      =    574.20
corr(u_i, Xb)  = -0.5574                        Prob > chi2        =    0.0000
```

Growth	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
ln_OHA						
L1.	1.336942	1.05743	1.26	0.206	-.7355821	3.409466
ln_GDP						
L10.	2.259052	1.152203	1.96	0.050	.0007755	4.517329
ln_Inflation						
L1.	-.1384261	.1710243	-0.81	0.418	-.4736275	.1967754
ln_Capinves						
L1.	1.833015	.853833	2.15	0.032	.1595331	3.506497
Rurpop						
L1.	-.0079212	.1019531	-0.08	0.938	-.2077455	.1919031
popgrowth						
L1.	-.5186291	.2910074	-1.78	0.075	-1.088993	.0517349
ln_Domcredit						
L1.	-.6734595	.5012259	-1.34	0.179	-1.655844	.3089253
ln_schoolenr						
L1.	-.9471123	1.814447	-0.52	0.602	-4.503362	2.609138
ln_Agrshare						
L1.	-1.499592	1.007019	-1.49	0.136	-3.473314	.4741293
Insquality						
L1.	.1275865	.1061257	1.20	0.229	-.080416	.3355891
ln_Tradeopp						
L1.	3.555964	.9940385	3.58	0.000	1.607684	5.504244
ln_Etnicfrac						
L1.	(dropped)					
subsahara	(dropped)					
eastasia	(dropped)					
_cons	-22.9193	12.8186	-1.79	0.074	-48.0433	2.204704
sigma_u	3.5258465					
sigma_e	3.3586851					
rho	.52426642	(fraction of variance due to u_i)				

```
F  test that all u_i=0:     F(69,644) =     3.63          Prob > F    = 0.0000

Instrumented:   L.ln_OHA
Instruments:    L10.ln_GDP L.ln_Inflation L.ln_Capinves L.Rurpop L.popgrowth L.ln_Domcredit L.ln_schoolenr L.ln_Agrshare L.Insquality L.ln_Tradeopp L.ln_Etnicfrac subsahara
                eastasia ln_totpop ln_perceptation
```

Random

```
G2SLS random-effects IV regression              Number of obs      =       725
Group variable: code                            Number of groups   =        70

R-sq:  within  = 0.0529                         Obs per group: min =         1
       between = 0.2052                                        avg =      10.4
       overall = 0.1236                                        max =        13

                                                Wald chi2(14)      =     71.39
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =    0.0000
```

Growth	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
ln_OHA						
L1.	1.643677	.5563335	2.95	0.003	.5532831	2.73407
ln_GDP						
L10.	1.329286	1.026883	1.29	0.195	-.6833686	3.34194
ln_Inflation						
L1.	-.3803734	.1648617	-2.31	0.021	-.7034965	-.0572504
ln_Capinves						
L1.	2.188897	.522926	4.19	0.000	1.163981	3.213813
Rurpop						
L1.	-.0353241	.0225265	-1.57	0.117	-.0794752	.0088269
popgrowth						
L1.	-.7368054	.2311479	-3.19	0.001	-1.189847	-.2837639
ln_Domcredit						
L1.	-.701533	.3245826	-2.16	0.031	-1.337703	-.0653628
ln_schoolenr						
L1.	.4743081	.4287467	1.11	0.269	-.36602	1.314636
ln_Agrshare						
L1.	-.2561655	.6865725	-0.37	0.709	-1.601823	1.089492
Insquality						
L1.	.0239283	.0648059	0.37	0.712	-.1030889	.1509456
ln_Tradeopp						
L1.	1.560487	.6367576	2.45	0.014	.3124655	2.808509
ln_Etnicfrac						
L1.	-1.588903	.5706205	-2.78	0.005	-2.707299	-.4705078
subsahara	.2849061	.8287334	0.34	0.731	-1.339381	1.909194
eastasia	.7996854	.8156244	0.98	0.327	-.7989092	2.39828
_cons	-15.68328	10.86421	-1.44	0.149	-36.97673	5.610167
sigma_u	1.6481					
sigma_e	3.3665355					
rho	.19332905	(fraction of variance due to u_i)				

```
Instrumented:   L.ln_OHA
Instruments:    L10.ln_GDP L.ln_Inflation L.ln_Capinves L.Rurpop L.popgrowth L.ln_Domcredit L.ln_schoolenr L.ln_Agrshare L.Insquality L.ln_Tradeopp L.ln_Etnicfrac subsahara
                eastasia ln_totpop ln_perceptation
```

Hausman specification test

```
. hausman fixedOHAIV randomOHAIV
```

	Coefficients (b) fixedOHAIV	(B) randomOHAIV	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
L.ln_OHA	1.336942	1.643677	-.3067348	.8992499
L10.ln_GDP	2.259052	1.329286	.9297666	.5225734
L.ln_Infla~n	-.1384261	-.3803734	.2419474	.0454963
L.ln_Capin~s	1.833015	2.188897	-.3558822	.674966
L.Rurpop	-.0079212	-.0353241	.0274029	.0994333
L.popgrowth	-.5186291	-.7368054	.2181763	.1767935
L.ln_Domcr~t	-.6734595	-.701533	.0280736	.381934
L.ln_schoo~r	-.9471123	.4743081	-1.42142	1.763063
L.ln_Agrsh~e	-1.499592	-.2561655	-1.243427	.7366858
L.Insquality	.1275865	.0239283	.1036582	.0840408
L.ln_Trade~p	3.555964	1.560487	1.995477	.7633166

```
                           b = consistent under Ho and Ha; obtained from xtivreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtivreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(11) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                           =        67.52
                Prob>chi2 =       0.0000
                (V_b-V_B is not positive definite)
```

Comparing IV and OLS

```
. hausman IVOHA OLSOHA
```

	Coefficients (b) IVOHA	(B) OLSOHA	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
L.ln_OHA	1.715931	.6845341	1.031397	1.0277
L10.ln_GDP	1.731188	1.649676	.0815124	.5260851
L.ln_Infla~n	-.2221284	-.443654	.2215256	.0847182
L.ln_Capin~s	1.680359	.6472039	1.033155	.6356875
L.Rurpop	-.0480232	-.0342423	-.0137808	.0593323
L.popgrowth	-.4912681	-.3690008	-.1222674	.1017076
L.ln_Domcr~t	-.9037445	-1.230605	.3268604	.240569
L.ln_schoo~r	-1.621548	-.6105899	-1.010959	1.244386
L.ln_Agrsh~e	-1.062504	-.0836062	-.9788974	.4815387
L.Insquality	.1056896	.1759654	-.0702757	.0525596
L.ln_Trade~p	4.393395	3.908648	.4847473	.5229478

b = consistent under Ho and Ha; obtained from xtivreg2
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(11) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 32.41
Prob>chi2 = 0.0007

OHA ROBUST standard errors

```
FIXED EFFECTS ESTIMATION
Number of groups =        69                    Obs per group: min =          2
                                                               avg =       10.5
                                                               max =         13

IV (2SLS) estimation

Estimates efficient for homoskedasticity only
Statistics robust to heteroskedasticity

                                                      Number of obs =        723
                                                      F( 11,   643) =       4.04
                                                      Prob > F      =     0.0000
Total (centered) SS     =  7118.532915                Centered R2   =     0.0269
Total (uncentered) SS   =  7118.532915                Uncentered R2 =     0.0269
Residual SS             =  6927.364366                Root MSE      =      3.255
```

Growth	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
ln_OHA L1.	1.715931	1.057328	1.62	0.105	-.3563936	3.788255
ln_GDP L10.	1.731188	1.559145	1.11	0.267	-1.32468	4.787057
ln_Inflation L1.	-.2221284	.1726929	-1.29	0.198	-.5606003	.1163435
ln_Capinves L1.	1.680359	.9689498	1.73	0.083	-.2187476	3.579466
Rurpop L1.	-.0480232	.1123099	-0.43	0.669	-.2681464	.1721001
popgrowth L1.	-.4912681	.2705984	-1.82	0.069	-1.021631	.039095
ln_Domcredit L1.	-.9037445	.6842919	-1.32	0.187	-2.244932	.4374429
ln_schoolenr L1.	-1.621548	1.882788	-0.86	0.389	-5.311745	2.068648
ln_Agrshare L1.	-1.062504	.9549085	-1.11	0.266	-2.93409	.8090827
Insquality L1.	.1056896	.1314635	0.80	0.421	-.1519741	.3633534
ln_Tradeopp L1.	4.393395	1.299537	3.38	0.001	1.846349	6.940442

```
Underidentification test (Kleibergen-Paap rk LM statistic):                11.816
                                                      Chi-sq(2) P-val =    0.0027

Weak identification test (Kleibergen-Paap rk Wald F statistic):             6.289
Stock-Yogo weak ID test critical values: 10% maximal IV size               19.93
                                         15% maximal IV size               11.59
                                         20% maximal IV size                8.75
                                         25% maximal IV size                7.25
Source: Stock-Yogo (2005).  Reproduced by permission.
NB: Critical values are for Cragg-Donald F statistic and i.i.d. errors.

Hansen J statistic (overidentification test of all instruments):           0.672
                                                      Chi-sq(1) P-val =    0.4123
-endog- option:
Endogeneity test of endogenous regressors:                                 1.183
                                                      Chi-sq(1) P-val =    0.2766
Regressors tested:    L.ln_OHA

Instrumented:         L.ln_OHA
Included instruments: L10.ln_GDP L.ln_Inflation L.ln_Capinves L.Rurpop
                      L.popgrowth L.ln_Domcredit L.ln_schoolenr L.ln_Agrshare
                      L.Insquality L.ln_Tradeopp
Excluded instruments: ln_totpop ln_perceptation
Dropped collinear:    L.ln_Etnicfrac
```

SQUARE OHA included

```
FIXED EFFECTS ESTIMATION
Number of groups =        69                    Obs per group: min =          2
                                                               avg =       10.5
                                                               max =         13

IV (2SLS) estimation

Estimates efficient for homoskedasticity only
Statistics robust to heteroskedasticity

                                                    Number of obs =        723
                                                    F( 12,    642) =       3.84
                                                    Prob > F      =     0.0000
Total (centered) SS     =  7118.532915              Centered R2   =     0.0317
Total (uncentered) SS   =  7118.532915              Uncentered R2 =     0.0317
Residual SS             =  6893.130019              Root MSE      =      3.247
```

Growth	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
ln_OHA L1.	1.6951	1.007606	1.68	0.093	-.2797706	3.669971
ln_GDP L10.	1.54845	1.496245	1.03	0.301	-1.384136	4.481037
ln_Inflation L1.	-.2290123	.1740395	-1.32	0.188	-.5701235	.1120988
ln_Capinves L1.	1.643729	.9541575	1.72	0.085	-.2263857	3.513843
Rurpop L1.	-.0659674	.1175323	-0.56	0.575	-.2963264	.1643917
popgrowth L1.	-.4991996	.2729908	-1.83	0.067	-1.034252	.0358526
ln_Domcredit L1.	-.898586	.6837413	-1.31	0.189	-2.238694	.4415222
ln_schoolenr L1.	-1.827725	1.982055	-0.92	0.356	-5.712483	2.057032
ln_Agrshare L1.	-.9501971	.9959486	-0.95	0.340	-2.902221	1.001826
Insquality L1.	.0971154	.1323347	0.73	0.463	-.1622558	.3564867
ln_Tradeopp L1.	4.329401	1.274159	3.40	0.001	1.832096	6.826707
ln_OHA2 L1.	.0402851	.0532389	0.76	0.449	-.0640611	.1446314

```
Underidentification test (Kleibergen-Paap rk LM statistic):              12.307
                                                  Chi-sq(2) P-val =      0.0021

Weak identification test (Kleibergen-Paap rk Wald F statistic):           6.332
Stock-Yogo weak ID test critical values: 10% maximal IV size             19.93
                                         15% maximal IV size             11.59
                                         20% maximal IV size              8.75
                                         25% maximal IV size              7.25
Source: Stock-Yogo (2005).  Reproduced by permission.
NB: Critical values are for Cragg-Donald F statistic and i.i.d. errors.

Hansen J statistic (overidentification test of all instruments):          0.599
                                                  Chi-sq(1) P-val =      0.4388

Instrumented:         L.ln_OHA
Included instruments: L10.ln_GDP L.ln_Inflation L.ln_Capinves L.Rurpop
                      L.popgrowth L.ln_Domcredit L.ln_schoolenr L.ln_Agrshare
                      L.Insquality L.ln_Tradeopp L.ln_OHA2
Excluded instruments: ln_totpop ln_perceptation
Dropped collinear:    L.ln_Etnicfrac
```

OHA interacted with macroeconomic policy

```
FIXED EFFECTS ESTIMATION
Number of groups =        69                    Obs per group: min =          2
                                                               avg =       10.5
                                                               max =         13

IV (2SLS) estimation

Estimates efficient for homoskedasticity only
Statistics robust to heteroskedasticity

                                                    Number of obs =        723
                                                    F( 13,    641) =       3.83
                                                    Prob > F      =     0.0000
Total (centered) SS     =  7118.532915              Centered R2   =     0.0543
Total (uncentered) SS   =  7118.532915              Uncentered R2 =     0.0543
Residual SS             =  6732.067582              Root MSE      =      3.208
```

Growth	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
ln_OHA L1.	-8.866636	19.27863	-0.46	0.646	-46.65207	28.91879
ln_GDP L10.	.9336248	1.85857	0.50	0.615	-2.709106	4.576356
ln_Capinves L1.	.881448	.7420408	1.19	0.235	-.5729252	2.335821
Rurpop L1.	-.0676181	.1561362	-0.43	0.665	-.3736395	.2384033
popgrowth L1.	-.2900586	.3817657	-0.76	0.447	-1.038306	.4581883
ln_Domcredit L1.	-1.580914	1.527175	-1.04	0.301	-4.574122	1.412293
ln_schoolenr L1.	.9430313	3.039667	0.31	0.756	-5.014606	6.900668
ln_Agrshare L1.	-1.454747	.9800348	-1.48	0.138	-3.37558	.4660859
ln_Inflation L1.	-.0825951	.2343163	-0.35	0.724	-.5418465	.3766564
Insquality L1.	.1002279	.1479101	0.68	0.498	-.1896705	.3901263
ln_Tradeopp L1.	2.558161	3.696599	0.69	0.489	-4.687041	9.803362
intOHAtropp L1.	2.149961	4.309792	0.50	0.618	-6.297076	10.597
intOHAinfl~n L1.	-.0343802	.074965	-0.46	0.647	-.1813088	.1125485

```
Underidentification test (Kleibergen-Paap rk LM statistic):              2.860
                                                  Chi-sq(2) P-val =      0.2393

Weak identification test (Kleibergen-Paap rk Wald F statistic):           1.400
Stock-Yogo weak ID test critical values: 10% maximal IV size             19.93
                                         15% maximal IV size             11.59
                                         20% maximal IV size              8.75
                                         25% maximal IV size              7.25
Source: Stock-Yogo (2005).  Reproduced by permission.
NB: Critical values are for Cragg-Donald F statistic and i.i.d. errors.

Hansen J statistic (overidentification test of all instruments):          1.505
                                                  Chi-sq(1) P-val =      0.2199

Instrumented:         L.ln_OHA
Included instruments: L10.ln_GDP L.ln_Capinves L.Rurpop L.popgrowth
                      L.ln_Domcredit L.ln_schoolenr L.ln_Agrshare L.ln_Inflation
                      L.Insquality L.ln_Tradeopp L.intOHAtropp L.intOHAinflation
Excluded instruments: ln_totpop ln_perceptation
Dropped collinear:    L.ln_Etnicfrac
```

OHA interacted with institutions

```
FIXED EFFECTS ESTIMATION
------------------------

Number of groups =        69                  Obs per group: min =          2
                                                             avg =       10.5
                                                             max =         13

IV (2SLS) estimation
--------------------

Estimates efficient for homoskedasticity only
Statistics robust to heteroskedasticity

                                                    Number of obs =       723
                                                    F( 13,   641) =      3.43
                                                    Prob > F      =    0.0000
Total (centered) SS     =  7118.532915              Centered R2   =   -0.1857
Total (uncentered) SS   =  7118.532915              Uncentered R2 =   -0.1857
Residual SS             =  8440.559265              Root MSE      =     3.592

------------------------------------------------------------------------------
      Growth |      Coef.   Robust Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      ln_OHA |
         L1. |  -5.699033   6.049764    -0.94   0.346    -17.55635    6.158287
      ln_GDP |
        L10. |   .2753619   1.831056     0.15   0.880    -3.313441    3.864165
 ln_Capinves |
         L1. |   1.231206    .887338     1.39   0.165    -.5079447    2.970356
       Rurpop |
         L1. |   -.150903   .1738668    -0.87   0.385    -.4916756    .1898696
   popgrowth |
         L1. |  -.0602175   .4501551    -0.13   0.894    -.9425052    .8220702
ln_Domcredit |
         L1. |  -1.321469    .945285    -1.40   0.162    -3.174193    .5312558
ln_schoolenr |
         L1. |   .1042352   1.856726     0.06   0.955    -3.534882    3.743352
 ln_Agrshare |
         L1. |  -2.571404   1.418059    -1.81   0.070    -5.350749    .2079416
ln_Inflation |
         L1. |  -.1310826   .2043993    -0.64   0.521    -.5316979    .2695327
  Insquality |
         L1. |   .1143744   .1316605     0.87   0.385    -.1436755    .3724242
 ln_Tradeopp |
         L1. |   2.635304   2.062816     1.28   0.201    -1.407742     6.67835
intOHAdemo~c |
         L1. |   1.529852   1.418624     1.08   0.281    -1.250601    4.310305
intOHAethnic |
         L1. |  -1.180732   1.436466    -0.82   0.411    -3.996153     1.63469
------------------------------------------------------------------------------
Underidentification test (Kleibergen-Paap rk LM statistic):             5.457
                                                   Chi-sq(2) P-val =    0.0653
------------------------------------------------------------------------------
Weak identification test (Kleibergen-Paap rk Wald F statistic):         2.800
Stock-Yogo weak ID test critical values: 10% maximal IV size           19.93
                                         15% maximal IV size           11.59
                                         20% maximal IV size            8.75
                                         25% maximal IV size            7.25
Source: Stock-Yogo (2005).  Reproduced by permission.
NB: Critical values are for Cragg-Donald F statistic and i.i.d. errors.
------------------------------------------------------------------------------
Hansen J statistic (overidentification test of all instruments):        0.294
                                                   Chi-sq(1) P-val =    0.5877
------------------------------------------------------------------------------
Instrumented:         L.ln_OHA
Included instruments: L10.ln_GDP L.ln_Capinves L.Rurpop L.popgrowth
                      L.ln_Domcredit L.ln_schoolenr L.ln_Agrshare L.ln_Inflation
                      L.Insquality L.ln_Tradeopp L.intOHAdemocrac L.intOHAethnic
Excluded instruments: ln_totpop ln_perceptation
Dropped collinear:    L.ln_Etnicfrac
------------------------------------------------------------------------------
```

OHA interacted with regional dummies

```
FIXED EFFECTS ESTIMATION
------------------------

Number of groups =        69                    Obs per group: min =          2
                                                               avg =       10.5
                                                               max =         13

IV (2SLS) estimation
--------------------

Estimates efficient for homoskedasticity only
Statistics robust to heteroskedasticity

                                                      Number of obs =       723
                                                      F( 13,   641) =      2.98
                                                      Prob > F      =    0.0003
Total (centered) SS     =  7118.532915                Centered R2   =   -0.1634
Total (uncentered) SS   =  7118.532915                Uncentered R2 =   -0.1634
Residual SS             =  8281.439767                Root MSE      =     3.558

------------------------------------------------------------------------------
      Growth |      Coef.   Robust Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      ln_OHA |
         L1. |   3.972258   2.778748     1.43   0.153    -1.473989    9.418505
      ln_GDP |
        L10. |   1.490869   1.471864     1.01   0.311    -1.393931    4.375669
 ln_Capinves |
         L1. |   .9143727   .7844998     1.17   0.244    -.6232186    2.451964
       Rurpop |
         L1. |  -.0668181   .1163158    -0.57   0.566    -.2947928    .1611567
   popgrowth |
         L1. |  -.3317009   .2729033    -1.22   0.224    -.8665816    .2031798
ln_Domcredit |
         L1. |  -.2172339   .7890626    -0.28   0.783    -1.763768     1.3293
ln_schoolenr |
         L1. |  -.8692273   1.937558    -0.45   0.654    -4.666771    2.928317
 ln_Agrshare |
         L1. |  -1.487948   1.009693    -1.47   0.141     -3.46691    .4910145
ln_Inflation |
         L1. |  -.1014659   .1818248    -0.56   0.577     -.457836    .2549043
  Insquality |
         L1. |    .209631   .1160384     1.81   0.071       -.0178    .437062
 ln_Tradeopp |
         L1. |   4.803215   1.455297     3.30   0.001     1.950886    7.655545
  intOHAsubA |
         L1. |  -3.507287    2.88022    -1.22   0.223    -9.152414    2.137841
  intOHAasia |
         L1. |   -3.5473   2.842929    -1.25   0.212    -9.119338    2.024737
------------------------------------------------------------------------------
Underidentification test (Kleibergen-Paap rk LM statistic):             6.609
                                                   Chi-sq(2) P-val =    0.0367
------------------------------------------------------------------------------
Weak identification test (Kleibergen-Paap rk Wald F statistic):         3.321
Stock-Yogo weak ID test critical values: 10% maximal IV size           19.93
                                         15% maximal IV size           11.59
                                         20% maximal IV size            8.75
                                         25% maximal IV size            7.25
Source: Stock-Yogo (2005).  Reproduced by permission.
NB: Critical values are for Cragg-Donald F statistic and i.i.d. errors.
------------------------------------------------------------------------------
Hansen J statistic (overidentification test of all instruments):        0.106
                                                   Chi-sq(1) P-val =    0.7449
------------------------------------------------------------------------------
Instrumented:         L.ln_OHA
Included instruments: L10.ln_GDP L.ln_Capinves L.Rurpop L.popgrowth
                      L.ln_Domcredit L.ln_schoolenr L.ln_Agrshare L.ln_Inflation
                      L.Insquality L.ln_Tradeopp L.intOHAsubA L.intOHAasia
Excluded instruments: ln_totpop ln_perceptation
Dropped collinear:    L.ln_Etnicfrac subsahara eastasia
------------------------------------------------------------------------------
```

Appendix 3. Cross sectional regression

Correlation

```
. pwcorr ln_GDP ln_ODA ln_inflation ln_Capinves ln_Rurpop ln_Domcredit ln_schoolenr ln_Agrshare ln_Etnicfrac ln_Tradeopp ln_OHA popgrowth Insquality,sig
```

	ln_GDP	ln_ODA	ln_inf~n	ln_Cap~s	ln_Rur~p	ln_Dom~t	ln_sch~r
ln_GDP	1.0000						
ln_ODA	-0.6140 0.0000	1.0000					
ln_inflation	-0.2168 0.0217	-0.0518 0.5894	1.0000				
ln_Capinves	0.3043 0.0005	-0.0973 0.2783	-0.2473 0.0092	1.0000			
ln_Rurpop	-0.5987 0.0000	0.5316 0.0000	-0.0554 0.5599	-0.0446 0.6172	1.0000		
ln_Domcredit	0.5321 0.0000	-0.3416 0.0001	-0.5042 0.0000	0.3744 0.0000	-0.2472 0.0049	1.0000	
ln_schoolenr	0.5366 0.0000	-0.4107 0.0000	0.0393 0.7197	0.2689 0.0088	-0.3575 0.0004	0.3081 0.0027	1.0000
ln_Agrshare	-0.8373 0.0000	0.5847 0.0000	0.2168 0.0229	-0.2120 0.0172	0.6012 0.0000	-0.5314 0.0000	-0.4299 0.0000
ln_Etnicfrac	-0.2955 0.0008	0.1057 0.2408	0.1584 0.1033	-0.2927 0.0011	0.0696 0.4329	-0.2926 0.0011	-0.2526 0.0151
ln_Tradeopp	0.3483 0.0000	0.1393 0.1139	-0.2981 0.0013	0.4039 0.0000	0.0409 0.6418	0.2683 0.0023	0.3483 0.0006
ln_OHA	-0.7290 0.0000	0.4993 0.0000	0.1818 0.0882	-0.2740 0.0053	0.4702 0.0000	-0.3357 0.0006	-0.4338 0.0001
popgrowth	-0.3417 0.0001	0.2097 0.0158	-0.1119 0.2382	-0.1291 0.1464	0.1448 0.0927	-0.2081 0.0184	-0.5882 0.0000
Insquality	0.3512 0.0002	-0.2667 0.0060	0.0528 0.6152	0.1353 0.1667	-0.2295 0.0169	0.3576 0.0002	0.3068 0.0038

	ln_Agr~e	ln_Etn~c	ln_Tra~p	ln_OHA	popgro~h	Insqua~y
ln_Agrshare	1.0000					
ln_Etnicfrac	0.1239 0.1703	1.0000				
ln_Tradeopp	-0.2988 0.0006	-0.1684 0.0604	1.0000			
ln_OHA	0.5896 0.0000	0.1691 0.0977	-0.3484 0.0003	1.0000		
popgrowth	0.1245 0.1583	0.3062 0.0004	-0.1669 0.0558	0.1742 0.0784	1.0000	
Insquality	-0.2525 0.0094	-0.1158 0.2419	0.0219 0.8230	-0.3704 0.0002	-0.2672 0.0052	1.0000

.

3.1. Multicollinearity test

Variable	VIF	1/VIF
ln_GDP	10.08	0.099164
ln_Agrshare	5.11	0.195598
ln_ODA	4.23	0.236562
ln_Domcredit	2.43	0.412018
ln_Rurpop	2.38	0.420868
ln_Tradeopp	2.34	0.427206
ln_schoolenr	2.20	0.454300
popgrowth	1.79	0.557657
ln_Capinves	1.64	0.609142
ln_inflation	1.53	0.655538
Insquality	1.29	0.773871
ln_Etnicfrac	1.20	0.831643
Mean VIF	3.02	

3.2. Hetroskidacity test

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of growth

         chi2(1)      =     5.08
         Prob > chi2  =   0.0242
```

3.3. Development aid under OLS

Source	SS	df	MS	Number of obs =	74
				F(12, 61) =	3.90
Model	171.026604	12	14.252217	Prob > F =	0.0002
Residual	222.738366	61	3.65144862	R-squared =	0.4343
				Adj R-squared =	0.3231
Total	393.76497	73	5.39404068	Root MSE =	1.9109

growth	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ln_GDP	-2.049847	.6675605	-3.07	0.003	-3.384716	-.7149768
ln_ODA	-.5246598	.2614062	-2.01	0.049	-1.047374	-.0019458
ln_inflation	-.3435763	.2667179	-1.29	0.203	-.8769118	.1897591
ln_Capinves	2.106072	.7698678	2.74	0.008	.5666261	3.645518
Rurpop	-.015359	.0172377	-0.89	0.376	-.0498278	.0191099
popgrowth	-1.054241	.2893734	-3.64	0.001	-1.632879	-.4756027
ln_Domcredit	-.6659704	.381249	-1.75	0.086	-1.428325	.096384
ln_schoolenr	.4081834	.4000575	1.02	0.312	-.3917811	1.208148
ln_Agrshare	-.9122991	.6215872	-1.47	0.147	-2.15524	.3306415
Insquality	.0139881	.0766386	0.18	0.856	-.1392603	.1672366
ln_Etnicfrac	-.3060258	.2986181	-1.02	0.310	-.9031495	.2910979
ln_Tradeopp	-.2046052	.6220362	-0.33	0.743	-1.448444	1.039233
_cons	19.01459	6.636648	2.87	0.006	5.74379	32.28539

Hetroskidasticity test

```
. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of growth

         chi2(1)      =     4.90
         Prob > chi2  =   0.0269
```

For the constant variance assumption we tested whether or not the variance of the error term is ***homoscedastic*** using ***Breusch-Pagan/Cook-Weisberg*** test for heteroskedasticity. The test rejects that variance of the error term is constant at chi2(1)=4.9 with p-value of 0.0267. There for we used robust standard error to correct the error term.

Linear regression

Number of obs =	74
F(12, 61) =	3.87
Prob > F =	0.0002
R-squared =	0.4343
Root MSE =	1.9109

growth	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
ln_GDP	-2.049847	.6752347	-3.04	0.004	-3.400062	-.6996313
ln_ODA	-.5246598	.2139356	-2.45	0.017	-.9524505	-.096869
ln_inflation	-.3435763	.2886604	-1.19	0.239	-.9207885	.2336359
ln_Capinves	2.106072	.7324836	2.88	0.006	.6413804	3.570764
Rurpop	-.015359	.0211677	-0.73	0.471	-.0576864	.0269684
popgrowth	-1.054241	.3416768	-3.09	0.003	-1.737466	-.3710158
ln_Domcredit	-.6659704	.4607443	-1.45	0.153	-1.587285	.2553447
ln_schoolenr	.4081834	.3925218	1.04	0.302	-.3767124	1.193079
ln_Agrshare	-.9122991	.6108021	-1.49	0.140	-2.133673	.3090753
Insquality	.0139881	.0873913	0.16	0.873	-.1607615	.1887378
ln_Etnicfrac	-.3060258	.2261405	-1.35	0.181	-.7582216	.14617
ln_Tradeopp	-.2046052	.5565508	-0.37	0.714	-1.317497	.908287
_cons	19.01459	6.688671	2.84	0.006	5.639764	32.38941

ODA SQUARED included

```
Linear regression                               Number of obs =      74
                                                F( 13,    60) =    3.53
                                                Prob > F      =  0.0004
                                                R-squared     =  0.4292
                                                Root MSE      =  1.9355
```

growth	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
ln_GDP	-1.854423	.632869	-2.93	0.005	-3.12035	-.5884968
ln_ODA	-.5046602	.2154559	-2.34	0.023	-.9356362	-.0736841
ln_inflation	-.3299186	.2900559	-1.14	0.260	-.9101168	.2502797
ln_Capinves	2.103986	.7549006	2.79	0.007	.5939597	3.614012
ln_Rurpop	-.3101174	.8458827	-0.37	0.715	-2.002135	1.3819
popgrowth	-1.039638	.3490923	-2.98	0.004	-1.737927	-.3413497
ln_Domcredit	-.6665987	.4644478	-1.44	0.156	-1.595633	.2624352
ln_schoolenr	.4238113	.4035065	1.05	0.298	-.3833219	1.230945
ln_Agrshare	-.828142	.6145263	-1.35	0.183	-2.057378	.4010936
Insquality	.0102257	.0880134	0.12	0.908	-.1658273	.1862787
ln_Etnicfrac	-.2798427	.2198333	-1.27	0.208	-.7195747	.1598893
ln_Tradeopp	-.277232	.5533294	-0.50	0.618	-1.384056	.8295915
ln_ODA2	-.0207794	.0432687	-0.48	0.633	-.1073297	.0657709
_cons	18.05622	7.246203	2.49	0.015	3.56166	32.55079

Interacted with macroeconomic policy

```
Linear regression                               Number of obs =      74
                                                F( 14,    59) =    3.59
                                                Prob > F      =  0.0003
                                                R-squared     =  0.4552
                                                Root MSE      =  1.9068
```

growth	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
ln_GDP	-1.996465	.6011669	-3.32	0.002	-3.199398	-.7935332
ln_ODA	1.022078	1.079645	0.95	0.348	-1.138286	3.182442
ln_Capinves	2.430946	.7506823	3.24	0.002	.9288346	3.933058
ln_Rurpop	-.73785	.8588884	-0.86	0.394	-2.456482	.9807818
popgrowth	-1.036206	.3444953	-3.01	0.004	-1.725539	-.3468725
ln_Domcredit	-.5739557	.5210268	-1.10	0.275	-1.616528	.4686165
ln_schoolenr	.5152363	.3906539	1.32	0.192	-.2664605	1.296933
ln_Agrshare	-.8471851	.5756171	-1.47	0.146	-1.998992	.3046221
ln_inflation	-.2507055	.2931342	-0.86	0.396	-.8372656	.3358546
Insquality	.0242284	.0888348	0.27	0.786	-.1535296	.2019864
ln_Etnicfrac	-.2450707	.2448319	-1.00	0.321	-.7349782	.2448369
ln_Tradeopp	-.1909034	.5676804	-0.34	0.738	-1.326829	.9450225
intrODAtropp	-.3888767	.2419757	-1.61	0.113	-.8730689	.0953155
intODAinfl~n	.0389138	.1125265	0.35	0.731	-.1862511	.2640788
_cons	18.66274	6.407609	2.91	0.005	5.841146	31.48434

Interacted with institutions

```
Linear regression                               Number of obs =      74
                                                F( 14,    59) =    4.47
                                                Prob > F      =  0.0000
                                                R-squared     =  0.4891
                                                Root MSE      =  1.8465
```

growth	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
ln_GDP	-1.79952	.6327198	-2.84	0.006	-3.065589	-.5334505
ln_ODA	.8309137	.6176123	1.35	0.184	-.4049257	2.066753
ln_Capinves	2.280057	.7807323	2.92	0.005	.7178152	3.842298
ln_Rurpop	-.6604959	.8457315	-0.78	0.438	-2.352801	1.031809
popgrowth	-1.046833	.3355511	-3.12	0.003	-1.718269	-.3753964
ln_Domcredit	-.3050534	.4468727	-0.68	0.498	-1.199244	.5891369
ln_schoolenr	.4841569	.393547	1.23	0.223	-.3033289	1.271643
ln_Agrshare	-.7929177	.5982718	-1.33	0.190	-1.990057	.4042213
ln_inflation	-.3668794	.3075262	-1.19	0.238	-.9822378	.248479
Insquality	-.0283723	.0809424	-0.35	0.727	-.1903377	.1335931
ln_Etnicfrac	-.1198326	.2807004	-0.43	0.671	-.6815127	.4418476
ln_Tradeopp	-.1665787	.535287	-0.31	0.757	-1.237685	.9045281
intODAdemo~c	-.4727255	.1683364	-2.81	0.007	-.8095658	-.1358852
intODAethnic	-.1820398	.1959785	-0.93	0.357	-.5741918	.2101122
_cons	16.67261	7.684364	2.17	0.034	1.296233	32.04899

Interacted with Regional dummies

```
Linear regression                               Number of obs =      74
                                                F( 16,    57) =    3.80
                                                Prob > F      =  0.0001
                                                R-squared     =  0.4872
                                                Root MSE      =  1.8822
```

growth	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
ln_GDP	-1.490384	.673634	-2.21	0.031	-2.839312	-.1414548
ln_ODA	-.242783	.2177112	-1.12	0.269	-.6787421	.1931761
ln_Capinves	1.768074	.6365286	2.78	0.007	.4934477	3.042701
ln_Rurpop	-.1014927	.9010816	-0.11	0.911	-1.905878	1.702892
popgrowth	-1.002853	.3801363	-2.64	0.011	-1.764063	-.2416436
ln_Domcredit	-.9197837	.5140516	-1.79	0.079	-1.949154	.1095869
ln_schoolenr	.0500791	.4832162	0.10	0.918	-.9175446	1.017703
ln_Agrshare	-1.089516	.5575849	-1.95	0.056	-2.20606	.0270289
ln_inflation	-.2216549	.2612429	-0.85	0.400	-.7447848	.301475
Insquality	-.0136363	.0826132	-0.17	0.869	-.1790664	.1517937
ln_Etnicfrac	-.1602949	.2358521	-0.68	0.499	-.6325805	.3119908
ln_Tradeopp	-.31823	.5570978	-0.57	0.570	-1.433799	.7973391
subsahara	-.9693637	1.065397	-0.91	0.367	-3.102785	1.164057
eastasia	1.263333	.7093899	1.78	0.080	-.1571954	2.683862
intODAsubA	-.1522144	.4683015	-0.33	0.746	-1.089972	.7855432
intODAasia	-.337849	.4445993	-0.76	0.450	-1.228144	.5524457
_cons	18.26844	7.839774	2.33	0.023	2.569562	33.96731

3.4.Development aid included in the growth regression 2SLS

```
IV (2SLS) estimation
--------------------

Estimates efficient for homoskedasticity only
Statistics consistent for homoskedasticity only

                                                Number of obs =      73
                                                F( 12,    60) =    3.82
                                                Prob > F      =  0.0003
Total (centered) SS     =  391.2890487          Centered R2   =  0.3860
Total (uncentered) SS   =  967.6794053          Uncentered R2 =  0.7517
Residual SS             =  240.2577951          Root MSE      =   1.814
```

growth	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
ln_ODA	-1.129496	.38517	-2.93	0.003	-1.884415	-.3745768
ln_GDP	-3.034166	.7819226	-3.88	0.000	-4.566706	-1.501626
ln_inflation	-.4887981	.263771	-1.85	0.064	-1.00578	.0281834
ln_Capinves	1.99239	.7328107	2.72	0.007	.556108	3.428673
Rurpop	-.0206273	.0166284	-1.24	0.215	-.0532183	.0119637
popgrowth	-1.022646	.2755237	-3.71	0.000	-1.562663	-.4826298
ln_Domcredit	-.8972551	.3780324	-2.37	0.018	-1.638185	-.1563253
ln_schoolenr	.338155	.3910584	0.86	0.387	-.4283053	1.104615
ln_Agrshare	-1.11385	.601567	-1.85	0.064	-2.2929	.0651996
Insquality	.0466617	.0744734	0.63	0.531	-.0993034	.1926268
ln_Etnicfrac	-.3977483	.3077207	-1.29	0.196	-1.00087	.2053732
ln_Tradeopp	.5520859	.7260529	0.76	0.447	-.8709515	1.975123
_cons	25.55352	7.009275	3.65	0.000	11.81559	39.29145

```
Underidentification test (Anderson canon. corr. LM statistic):          30.340
                                                  Chi-sq(3) P-val =     0.0000
------------------------------------------------------------------------------
Weak identification test (Cragg-Donald Wald F statistic):                13.750
Stock-Yogo weak ID test critical values:  5% maximal IV relative bias    13.91
                                         10% maximal IV relative bias     9.08
                                         20% maximal IV relative bias     6.46
                                         30% maximal IV relative bias     5.39
                                         10% maximal IV size             22.30
                                         15% maximal IV size             12.83
                                         20% maximal IV size              9.54
                                         25% maximal IV size              7.80
Source: Stock-Yogo (2005).  Reproduced by permission.
------------------------------------------------------------------------------
Sargan statistic (overidentification test of all instruments):           0.916
                                                  Chi-sq(2) P-val =     0.6325
------------------------------------------------------------------------------
Instrumented:         ln_ODA
Included instruments: ln_GDP ln_inflation ln_Capinves Rurpop popgrowth
                      ln_Domcredit ln_schoolenr ln_Agrshare Insquality
                      ln_Etnicfrac ln_Tradeopp
Excluded instruments: ln_totpop ln_landarea temperature
------------------------------------------------------------------------------
```

```
Tests of endogeneity of: ln_ODA
H0: Regressor is exogenous
    Wu-Hausman F test:                  3.87367  F(1,59)     P-value = 0.05375
    Durbin-Wu-Hausman chi-sq test:      4.49756  Chi-sq(1)   P-value = 0.03394
```

squared ODA included

```
IV (2SLS) estimation
--------------------

Estimates efficient for homoskedasticity only
Statistics robust to heteroskedasticity

                                                      Number of obs =        73
                                                      F( 13,    59) =      3.64
                                                      Prob > F      =    0.0003
Total (centered) SS     =  391.2890487                Centered R2   =    0.3904
Total (uncentered) SS   =  967.6794053                Uncentered R2 =    0.7535
Residual SS             =  238.5193719                Root MSE      =     1.808

------------------------------------------------------------------------------
             |               Robust
      growth |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      ln_ODA |  -1.114795   .3924464    -2.84   0.005    -1.883975   -.3456136
      ln_GDP |  -3.014018   .7369776    -4.09   0.000    -4.458467   -1.569568
ln_inflation |   -.494275   .3117212    -1.59   0.113    -1.105237    .1166873
 ln_Capinves |   1.973812   .7446321     2.65   0.008     .5143602    3.433265
      Rurpop |  -.0216297    .020561    -1.05   0.293    -.0619284    .018669
   popgrowth |  -1.052414   .3161556    -3.33   0.001    -1.672067    -.43276
ln_Domcredit |  -.9081575   .4758143    -1.91   0.056    -1.840736   .0244215
ln_schoolenr |    .277733   .4139277     0.67   0.502    -.5335505    1.089016
 ln_Agrshare |  -1.096065   .6025604    -1.82   0.069    -2.277061   .0849321
  Insquality |   .0442748   .0831594     0.53   0.594    -.1187147   .2072642
ln_Etnicfrac |  -.3933168   .2342659    -1.68   0.093    -.8524695    .065836
 ln_Tradeopp |   .5455304   .7181369     0.76   0.447     -.861992    1.953053
     ln_ODA2 |  -.0292246   .0533595    -0.55   0.584    -.1338073   .0753582
       _cons |   25.90726   6.916635     3.75   0.000     12.35091    39.46362
------------------------------------------------------------------------------

Underidentification test (Kleibergen-Paap rk LM statistic):             17.148
                                                   Chi-sq(3) P-val =    0.0007
------------------------------------------------------------------------------

Weak identification test (Kleibergen-Paap rk Wald F statistic):         17.334
Stock-Yogo weak ID test critical values:  5% maximal IV relative bias    13.91
                                         10% maximal IV relative bias     9.08
                                         20% maximal IV relative bias     6.46
                                         30% maximal IV relative bias     5.39
                                         10% maximal IV size             22.30
                                         15% maximal IV size             12.83
                                         20% maximal IV size              9.54
                                         25% maximal IV size              7.80
Source: Stock-Yogo (2005).  Reproduced by permission.
NB: Critical values are for Cragg-Donald F statistic and i.i.d. errors.
------------------------------------------------------------------------------

Hansen J statistic (overidentification test of all instruments):         0.901
                                                   Chi-sq(2) P-val =    0.6374
------------------------------------------------------------------------------

Instrumented:         ln_ODA
Included instruments: ln_GDP ln_inflation ln_Capinves Rurpop popgrowth
                      ln_Domcredit ln_schoolenr ln_Agrshare Insquality
                      ln_Etnicfrac ln_Tradeopp ln_ODA2
Excluded instruments: ln_totpop ln_landarea temperature
------------------------------------------------------------------------------
```

Interacted with macroeconomic policy

```
IV (2SLS) estimation
--------------------

Estimates efficient for homoskedasticity only
Statistics robust to heteroskedasticity

                                                      Number of obs =        73
                                                      F( 14,    58) =      3.38
                                                      Prob > F      =    0.0005
Total (centered) SS     =  391.2890487                Centered R2   =    0.4582
Total (uncentered) SS   =  967.6794053                Uncentered R2 =    0.7809
Residual SS             =  211.9849172                Root MSE      =     1.704

------------------------------------------------------------------------------
             |               Robust
      growth |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      ln_ODA |   .9329009   2.499253     0.37   0.709    -3.965545    5.831347
      ln_GDP |  -2.117708   .6488484    -3.26   0.001    -3.389428   -.8459888
 ln_Capinves |   2.395249   .8636215     2.77   0.006     .7025817    4.087916
   ln_Rurpop |  -.6686677   1.103756    -0.61   0.545    -2.831989    1.494653
   popgrowth |  -1.016401   .3050456    -3.33   0.001    -1.614279   -.4185225
ln_Domcredit |  -.6030592   .4655494    -1.30   0.195    -1.515519    .3094008
ln_schoolenr |   .5759075   .3583152     1.61   0.108    -.1263775    1.278192
 ln_Agrshare |   -.942669   .5267909    -1.79   0.074     -1.97516    .0898222
ln_inflation |  -.3008637   .2453625    -1.23   0.220    -.7817653    .180038
  Insquality |    .032401   .0853934     0.38   0.704    -.134967     .199769
ln_Etnicfrac |   -.356134   .2708295    -1.31   0.189      -.88695    .1746819
 ln_Tradeopp |  -.2736007   .5323867    -0.51   0.607    -1.317059    .769858
intrODAtropp |  -.3698765   .5521698    -0.67   0.503    -1.452109    .7123564
intODAinfl~n |   .0336658   .1421379     0.24   0.813    -.2449194    .3122509
       _cons |   19.86997   6.716788     2.96   0.003     6.705305    33.03463
------------------------------------------------------------------------------

Underidentification test (Kleibergen-Paap rk LM statistic):              5.137
                                                   Chi-sq(3) P-val =    0.1620
------------------------------------------------------------------------------

Weak identification test (Kleibergen-Paap rk Wald F statistic):          1.801
Stock-Yogo weak ID test critical values:  5% maximal IV relative bias    13.91
                                         10% maximal IV relative bias     9.08
                                         20% maximal IV relative bias     6.46
                                         30% maximal IV relative bias     5.39
                                         10% maximal IV size             22.30
                                         15% maximal IV size             12.83
                                         20% maximal IV size              9.54
                                         25% maximal IV size              7.80
Source: Stock-Yogo (2005).  Reproduced by permission.
NB: Critical values are for Cragg-Donald F statistic and i.i.d. errors.
------------------------------------------------------------------------------

Hansen J statistic (overidentification test of all instruments):         3.015
                                                   Chi-sq(2) P-val =    0.2215
------------------------------------------------------------------------------

Instrumented:         ln_ODA
Included instruments: ln_GDP ln_Capinves ln_Rurpop popgrowth ln_Domcredit
                      ln_schoolenr ln_Agrshare ln_inflation Insquality
                      ln_Etnicfrac ln_Tradeopp intrODAtropp intODAinflation
Excluded instruments: ln_totpop ln_landarea temperature
------------------------------------------------------------------------------
```

Interacted with Institutions

```
IV (2SLS) estimation
------------------------------------------------------------------------------

Estimates efficient for homoskedasticity only
Statistics robust to heteroskedasticity

                                                      Number of obs =        73
                                                      F( 14,    58) =      2.35
                                                      Prob > F      =    0.0117
Total (centered) SS     =  391.2890487                Centered R2   =    0.2398
Total (uncentered) SS   =  967.6794053                Uncentered R2 =    0.6926
Residual SS             =  297.4714965                Root MSE      =     2.019

------------------------------------------------------------------------------
             |               Robust
      growth |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      ln_ODA |  -3.231783   3.163327    -1.02   0.307    -9.431791    2.968224
      ln_GDP |  -3.187787   1.078261    -2.96   0.003     -5.30114   -1.074434
  ln_Capinves |   1.408381   1.134301     1.24   0.214    -.8148078    3.631569
    ln_Rurpop |  -.6310371   .7767668    -0.81   0.417    -2.153472    .8913979
   popgrowth |  -.9870971   .3080684    -3.20   0.001      -1.5909   -.383294
ln_Domcredit |  -1.453698   1.136798    -1.28   0.201     -3.68178    .7743852
ln_schoolenr |   .3507322   .5035682     0.70   0.486    -.6362434    1.337708
  ln_Agrshare |  -1.128991    .596206    -1.89   0.058    -2.297534    .039551
ln_inflation |  -.7832886   .4550559    -1.72   0.085    -1.675182    .1086047
   Insquality |   .0680768   .1318362     0.52   0.606    -.1903174    .3264711
ln_Etnicfrac |   .5595302   .7376555     0.76   0.448     -.886248    2.005308
  ln_Tradeopp |   .5314147   .8770574     0.61   0.545    -1.187586    2.250416
intODAdemo~c |   .4603769   .7313744     0.63   0.529    -.9730906    1.893844
intODAethnic |  -.6444929   .4292181    -1.50   0.133    -1.485745    .1967591
       _cons |   33.41867   13.44222     2.49   0.013     7.072399    59.76494
------------------------------------------------------------------------------

Underidentification test (Kleibergen-Paap rk LM statistic):              4.048
                                                   Chi-sq(3) P-val =    0.2563
------------------------------------------------------------------------------

Weak identification test (Kleibergen-Paap rk Wald F statistic):          1.260
Stock-Yogo weak ID test critical values:  5% maximal IV relative bias    13.91
                                         10% maximal IV relative bias     9.08
                                         20% maximal IV relative bias     6.46
                                         30% maximal IV relative bias     5.39
                                         10% maximal IV size             22.30
                                         15% maximal IV size             12.83
                                         20% maximal IV size              9.54
                                         25% maximal IV size              7.80
Source: Stock-Yogo (2005).  Reproduced by permission.
NB: Critical values are for Cragg-Donald F statistic and i.i.d. errors.
------------------------------------------------------------------------------

Hansen J statistic (overidentification test of all instruments):         1.273
                                                   Chi-sq(2) P-val =    0.5290
------------------------------------------------------------------------------

Instrumented:         ln_ODA
Included instruments: ln_GDP ln_Capinves ln_Rurpop popgrowth ln_Domcredit
                      ln_schoolenr ln_Agrshare ln_inflation Insquality
                      ln_Etnicfrac ln_Tradeopp intODAdemocrac intODAethnic
Excluded instruments: ln_totpop ln_landarea temperature
------------------------------------------------------------------------------
```

Interacted with Regional dummies

```
IV (2SLS) estimation
------------------------------------------------------------------------------

Estimates efficient for homoskedasticity only
Statistics robust to heteroskedasticity

                                                      Number of obs =        73
                                                      F( 16,    56) =      3.83
                                                      Prob > F      =    0.0001
Total (centered) SS     =  391.2890487                Centered R2   =    0.4699
Total (uncentered) SS   =  967.6794053                Uncentered R2 =    0.7857
Residual SS             =  207.4195506                Root MSE      =     1.686

------------------------------------------------------------------------------
             |               Robust
      growth |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      ln_ODA |  -.6813209   .3909713    -1.74   0.081    -1.44761     .0849687
      ln_GDP |  -2.201858   .7735186    -2.85   0.004    -3.717926   -.6857894
  ln_Capinves |   1.793303    .616038     2.91   0.004      .585891    3.000716
    ln_Rurpop |  -.1259859   .8141574    -0.15   0.877    -1.721705    1.469733
   popgrowth |  -.9592419   .3383725    -2.83   0.005     -1.62244   -.296044
ln_Domcredit |  -.9736344    .471233    -2.07   0.039    -1.897234   -.0500347
ln_schoolenr |    .139996   .4332551     0.32   0.747    -.7091685    .9891604
  ln_Agrshare |  -1.205321   .4956528    -2.43   0.015    -2.176782   -.2338589
ln_inflation |  -.3514445   .2581785    -1.36   0.173     -.857465    .1545761
   Insquality |   .0117406   .0763552     0.15   0.878    -.1379128    .1613939
ln_Etnicfrac |  -.2680335    .227677    -1.18   0.239     -.7142722    .1782052
  ln_Tradeopp |   .0683068    .68733     0.10   0.921    -1.278835    1.415449
    subsahara |  -.9399169   .9123491    -1.03   0.303    -2.728088    .8482544
     eastasia |   .7844137   .6702572     1.17   0.242    -.5292662    2.098094
   intODAsubA |  -.0881819   .4202322    -0.21   0.834    -.9118218     .735458
   intODAasia |  -.1067474   .4018644    -0.27   0.791    -.8943871    .6808924
       _cons |   22.36934   7.943595     2.82   0.005     6.800184    37.93851
------------------------------------------------------------------------------

Underidentification test (Kleibergen-Paap rk LM statistic):             13.953
                                                   Chi-sq(3) P-val =    0.0030
------------------------------------------------------------------------------

Weak identification test (Kleibergen-Paap rk Wald F statistic):          8.122
Stock-Yogo weak ID test critical values:  5% maximal IV relative bias    13.91
                                         10% maximal IV relative bias     9.08
                                         20% maximal IV relative bias     6.46
                                         30% maximal IV relative bias     5.39
                                         10% maximal IV size             22.30
                                         15% maximal IV size             12.83
                                         20% maximal IV size              9.54
                                         25% maximal IV size              7.80
Source: Stock-Yogo (2005).  Reproduced by permission.
NB: Critical values are for Cragg-Donald F statistic and i.i.d. errors.
------------------------------------------------------------------------------

Hansen J statistic (overidentification test of all instruments):         0.650
                                                   Chi-sq(2) P-val =    0.7225
------------------------------------------------------------------------------

Instrumented:         ln_ODA
Included instruments: ln_GDP ln_Capinves ln_Rurpop popgrowth ln_Domcredit
                      ln_schoolenr ln_Agrshare ln_inflation Insquality
                      ln_Etnicfrac ln_Tradeopp subsahara eastasia intODAsubA
                      intODAasia
Excluded instruments: ln_totpop ln_landarea temperature
------------------------------------------------------------------------------
```

3.4.Comparing OLS and IV

```
. hausman ODAIVCROSS ODAOLSCROSS
```

	Coefficients (b) ODAIVCROSS	(B) ODAOLSCROSS	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
ln_ODA	-1.129496	-.5246598	-.6048364	.2828829
ln_GDP	-3.034166	-2.049847	-.9843196	.4071436
ln_inflation	-.4887981	-.3435763	-.1452218	.
ln_Capinves	1.99239	2.106072	-.1136815	.
Rurpop	-.0206273	-.015359	-.0052683	.
popgrowth	-1.022646	-1.054241	.0315944	.
ln_Domcredit	-.8972551	-.6659704	-.2312847	.
ln_schoolenr	.338155	.4081834	-.0700284	.
ln_Agrshare	-1.11385	-.9122991	-.2015509	.
Insquality	.0466617	.0139881	.0326736	.
ln_Etnicfrac	-.3977483	-.3060258	-.0917225	.0742918
ln_Tradeopp	.5520859	-.2046052	.7566912	.3744646

```
                b = consistent under Ho and Ha; obtained from ivreg2
     B = inconsistent under Ha, efficient under Ho; obtained from regress

    Test:  Ho:  difference in coefficients not systematic

                chi2(12) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                         =        5.15
              Prob>chi2 =      0.9527
              (V_b-V_B is not positive definite)
```

3.5.Humanitarain aid under OLS estimations

OHA under OLS

Source	SS	df	MS		
Model	178.987203	12	14.9156003	Number of obs	67
Residual	189.905023	54	3.51675968	F(12, 54)	4.24
				Prob > F	0.0001
Total	368.892226	66	5.58927615	R-squared	0.4852
				Adj R-squared	0.3708
				Root MSE	1.8753

growth	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ln_GDP	-.3453404	.6185221	-0.56	0.579	-1.585403	.8947217
ln_OHA	.6168525	.2146018	2.87	0.006	.1866019	1.047103
ln_inflation	-.334292	.2750971	-1.22	0.230	-.8858285	.2172445
ln_Capinves	1.941388	.7940594	2.44	0.018	.3493944	3.533381
ln_Rurpop	-1.233861	.9516818	-1.30	0.200	-3.141868	.6741464
popgrowth	-1.016487	.2892039	-3.51	0.001	-1.596306	-.436668
ln_Domcredit	-.5555543	.3822504	-1.45	0.152	-1.32192	.2108116
ln_schoolenr	.6410549	.3913678	1.64	0.107	-.1435903	1.4257
ln_Agrshare	-.3109712	.7661561	-0.41	0.686	-1.847022	1.225079
Insquality	.0014863	.0824799	0.02	0.986	-.1638759	.1668485
ln_Etnicfrac	-.2539113	.316849	-0.80	0.426	-.8891553	.3813326
ln_Tradeopp	-.2283242	.5969233	-0.38	0.704	-1.425083	.9684349
_cons	8.544166	7.767181	1.10	0.276	-7.028096	24.11643

```
. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of growth

         chi2(1)      =     1.09
         Prob > chi2  =   0.2973
```

squared OHA included

Source	SS	df	MS		
Model	186.53632	13	14.3489477	Number of obs	67
Residual	182.355906	53	3.44067747	F(13, 53)	4.17
				Prob > F	0.0001
Total	368.892226	66	5.58927615	R-squared	0.5057
				Adj R-squared	0.3844
				Root MSE	1.8549

growth	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ln_GDP	-.5711352	.6348137	-0.90	0.372	-1.84441	.7021398
ln_OHA	.6594681	.2156408	3.06	0.003	.2269473	1.091989
ln_inflation	-.3527327	.2723474	-1.30	0.201	-.8989923	.1935269
ln_Capinves	1.965568	.7853993	2.50	0.015	.390256	3.540879
Rurpop	-.0392262	.0212359	-1.85	0.070	-.0818201	.0033677
popgrowth	-1.054151	.2871683	-3.67	0.001	-1.630137	-.4781639
ln_Domcredit	-.4262335	.3984803	-1.07	0.290	-1.225484	.3730167
ln_schoolenr	.6248886	.3975543	1.57	0.122	-.1725043	1.422281
ln_Agrshare	-.2201612	.7644409	-0.29	0.774	-1.753435	1.313113
Insquality	.0104503	.0826366	0.13	0.900	-.1552978	.1761984
ln_Etnicfrac	-.2508169	.326375	-0.77	0.446	-.9054422	.4038084
ln_Tradeopp	-.1992897	.5740215	-0.35	0.730	-1.350631	.9520517
ln_OHA2	.0507621	.0483814	1.05	0.299	-.0462787	.1478029
_cons	6.531544	7.092684	0.92	0.361	-7.694579	20.75767

OHA interacted with macroeconomic policy

Source	SS	df	MS
Model	180.040197	14	12.860014
Residual	188.852029	52	3.6317698
Total	368.892226	66	5.58927615

Number of obs = 67
F(14, 52) = 3.54
Prob > F = 0.0004
R-squared = 0.4881
Adj R-squared = 0.3502
Root MSE = 1.9057

growth	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ln_GDP	-.3518052	.6392856	-0.55	0.584	-1.634626	.9310153
ln_OHA	.8794767	1.084696	0.81	0.421	-1.297125	3.056079
ln_inflation	-.3046136	.2853205	-1.07	0.291	-.8771511	.2679239
ln_Capinves	1.8624	.8217876	2.27	0.028	.2133628	3.511438
ln_Rurpop	-1.457972	1.141559	-1.28	0.207	-3.748678	.8327345
popgrowth	-1.000004	.2960115	-3.38	0.001	-1.593994	-.4060131
ln_Domcredit	-.5711959	.3953503	-1.44	0.155	-1.364524	.2221325
ln_schoolenr	.6040838	.403653	1.50	0.141	-.2059053	1.414073
ln_Agrshare	-.2988866	.7796211	-0.38	0.703	-1.863311	1.265538
Insquality	-.006907	.0855256	-0.08	0.936	-.1785267	.1647127
ln_Etnicfrac	-.2685974	.3250385	-0.83	0.412	-.9208348	.3836401
ln_Tradeopp	-.2010896	.6088306	-0.33	0.743	-1.422798	1.020618
intOHAtropp	-.0360413	.2351789	-0.15	0.879	-.5079624	.4358798
intOHAinfl~n	-.0599616	.1113777	-0.54	0.593	-.2834573	.1635341
_cons	9.662565	8.524748	1.13	0.262	-7.443594	26.76872

OHA interacted with institutions

Source	SS	df	MS
Model	181.975661	14	12.9982615
Residual	185.446831	51	3.63621238
Total	367.422492	65	5.65265373

Number of obs = 66
F(14, 51) = 3.57
Prob > F = 0.0004
R-squared = 0.4953
Adj R-squared = 0.3567
Root MSE = 1.9069

growth	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ln_GDP	-.4999585	.668217	-0.75	0.458	-1.84146	.8415431
ln_OHA	.8383114	.4179403	2.01	0.050	-.0007388	1.677362
ln_inflation	-.415075	.3072161	-1.35	0.183	-1.031837	.2016871
ln_Capinves	2.131871	.8428071	2.53	0.015	.4398654	3.823877
ln_Rurpop	-1.20681	.9857333	-1.22	0.226	-3.185753	.7721318
popgrowth	-1.05449	.3077247	-3.43	0.001	-1.672273	-.4367065
ln_Domcredit	-.6405814	.4017807	-1.59	0.117	-1.44719	.166027
ln_schoolenr	.7085961	.411695	1.72	0.091	-.117916	1.535108
ln_Agrshare	-.5320125	.8101484	-0.66	0.514	-2.158453	1.094428
Insquality	.0047757	.0848159	0.06	0.955	-.1654994	.1750507
ln_Etnicfrac	-.2582674	.3230493	-0.80	0.428	-.9068159	.3902811
ln_Tradeopp	-.2823928	.6219402	-0.45	0.652	-1.53099	.9662042
intOHAdemo~c	-.1102317	.1293436	-0.85	0.398	-.3698997	.1494363
intOHAethnic	-.0754741	.1691083	-0.45	0.657	-.4149733	.264025
_cons	10.03166	8.237674	1.22	0.229	-6.506162	26.56948

OHA interacted with regional dummies

Source	SS	df	MS
Model	207.90602	16	12.9941262
Residual	160.986207	50	3.21972413
Total	368.892226	66	5.58927615

Number of obs = 67
F(16, 50) = 4.04
Prob > F = 0.0001
R-squared = 0.5636
Adj R-squared = 0.4239
Root MSE = 1.7944

growth	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ln_GDP	-.3433353	.6400396	-0.54	0.594	-1.628893	.9422221
ln_OHA	.4978166	.2630739	1.89	0.064	-.0305829	1.026216
ln_inflation	-.2665389	.2773645	-0.96	0.341	-.8236418	.290564
ln_Capinves	1.690763	.7808505	2.17	0.035	.1223789	3.259148
ln_Rurpop	-1.489252	1.063038	-1.40	0.167	-3.624427	.6459228
popgrowth	-1.040897	.2924382	-3.56	0.001	-1.628277	-.4535181
ln_Domcredit	-.8272573	.3873938	-2.14	0.038	-1.605361	-.049154
ln_schoolenr	.2947481	.4331788	0.68	0.499	-.575317	1.164813
ln_Agrshare	-.6799839	.8247435	-0.82	0.414	-2.33653	.9765622
Insquality	-.0406555	.081368	-0.50	0.620	-.2040878	.1227769
ln_Etnicfrac	-.1321895	.3161912	-0.42	0.678	-.7672782	.5028992
ln_Tradeopp	.0122616	.6183952	0.02	0.984	-1.229822	1.254345
eastasia	1.87079	.7588287	2.47	0.017	.3466374	3.394942
subsahara	-.3789733	.8055798	-0.47	0.640	-1.997028	1.239081
intOHAsubA	.1523897	.2919117	0.52	0.604	-.4339321	.7387115
intOHAasia	.0303505	.3824524	0.08	0.937	-.7378277	.7985287
_cons	12.10377	7.843635	1.54	0.129	-3.650631	27.85818

3.6. Humanitarian aid under 2SLS

```
IV (2SLS) estimation
--------------------

Estimates efficient for homoskedasticity only
Statistics consistent for homoskedasticity only

                                                      Number of obs =        66
                                                      F( 12,    53) =      2.14
                                                      Prob > F      =    0.0290
Total (centered) SS     =  366.4586604                Centered R2   =    0.1225
Total (uncentered) SS   =  892.2195199                Uncentered R2 =    0.6396
Residual SS             =  321.5787274                Root MSE      =     2.207

------------------------------------------------------------------------------
      growth |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      ln_OHA |  -.7181223   .8219267    -0.87   0.382    -2.329069    .8928245
      ln_GDP |  -2.396428   1.310037    -1.83   0.067    -4.964053    .1711965
ln_inflation |  -.0032208   .3977218    -0.01   0.994    -.7827411    .7762996
 ln_Capinves |   2.439472   .9799324     2.49   0.013     .5188401    4.360105
      Rurpop |  -.0222487   .0258571    -0.86   0.390    -.0729276    .0284302
   popgrowth |  -.9546116   .3441985    -2.77   0.006    -1.629228   -.2799949
ln_Domcredit |  -.2036151   .4969083    -0.41   0.682    -1.177537    .7703073
ln_schoolenr |   .5125426   .4782724     1.07   0.284    -.4248541    1.449939
 ln_Agrshare |  -.4756746   .8992829    -0.53   0.597    -2.238237    1.286888
  Insquality |  -.0983357   .1138969    -0.86   0.388    -.3215696    .1248982
ln_Etnicfrac |  -.6099054   .4304406    -1.42   0.157    -1.453553    .2337427
 ln_Tradeopp |  -1.890285   1.159258    -1.63   0.103     -4.16239    .3818196
       _cons |   23.3688   12.34964     1.89   0.058    -.8360376    47.57364
------------------------------------------------------------------------------

Underidentification test (Anderson canon. corr. LM statistic):           6.192
                                                      Chi-sq(2) P-val =    0.0452

Weak identification test (Cragg-Donald Wald F statistic):                2.692
Stock-Yogo weak ID test critical values: 10% maximal IV size            19.93
                                         15% maximal IV size            11.59
                                         20% maximal IV size             8.75
                                         25% maximal IV size             7.25
Source: Stock-Yogo (2005).  Reproduced by permission.

Sargan statistic (overidentification test of all instruments):           0.190
                                                      Chi-sq(1) P-val =    0.6631

Instrumented:         ln_OHA
Included instruments: ln_GDP ln_inflation ln_Capinves Rurpop popgrowth
                      ln_Domcredit ln_schoolenr ln_Agrshare Insquality
                      ln_Etnicfrac ln_Tradeopp
Excluded instruments: templandsq preclandsq
```

ENDOGENITY TEST

```
Tests of endogeneity of: ln_OHA
H0: Regressor is exogenous
    Wu-Hausman F test:                 4.30687  F(1,52)     P-value = 0.04292
    Durbin-Wu-Hausman chi-sq test:     5.04829  Chi-sq(1)   P-value = 0.02465
```

OHA2 INCLUDED IN THE MODEL 4

```
IV (2SLS) estimation
--------------------

Estimates efficient for homoskedasticity only
Statistics consistent for homoskedasticity only

                                                      Number of obs =        66
                                                      F( 13,    52) =      1.87
                                                      Prob > F      =    0.0568
Total (centered) SS     =  366.4586604                Centered R2   =    0.1109
Total (uncentered) SS   =  892.2195199                Uncentered R2 =    0.6348
Residual SS             =  325.8059111                Root MSE      =     2.222

------------------------------------------------------------------------------
      growth |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      ln_OHA |  -.7249422   .9142992    -0.79   0.428    -2.516936    1.067051
      ln_GDP |  -2.195175   1.349876    -1.63   0.104    -4.840884    .4505336
ln_inflation |   .0061632   .4050154     0.02   0.988    -.7876523    .7999788
 ln_Capinves |   2.431018   .9915891     2.45   0.014      .487539    4.374497
   ln_Rurpop |  -.4320193   1.250224    -0.35   0.730    -2.882412    2.018374
   popgrowth |  -.9334777   .3479118    -2.68   0.007    -1.615372   -.2515832
ln_Domcredit |  -.2573733   .4937552    -0.52   0.602    -1.225116    .7103691
ln_schoolenr |    .559098   .4941826     1.13   0.258     -.409482    1.527678
 ln_Agrshare |  -.518736   .9493567    -0.55   0.585    -2.379441    1.341969
  Insquality |  -.0984848   .1240478    -0.79   0.427    -.3416139    .1446444
ln_Etnicfrac |   -.569088   .4596409    -1.24   0.216    -1.469968    .3317915
 ln_Tradeopp |  -1.946858   1.283325    -1.52   0.129    -4.462129    .5684132
     ln_OHA2 |  -.0144213   .0672898    -0.21   0.830    -.1463069    .1174642
       _cons |   22.84273   13.08904     1.75   0.081    -2.811312    48.49677
------------------------------------------------------------------------------

Underidentification test (Anderson canon. corr. LM statistic):           5.280
                                                      Chi-sq(2) P-val =    0.0713

Weak identification test (Cragg-Donald Wald F statistic):                2.218
Stock-Yogo weak ID test critical values: 10% maximal IV size            19.93
                                         15% maximal IV size            11.59
                                         20% maximal IV size             8.75
                                         25% maximal IV size             7.25
Source: Stock-Yogo (2005).  Reproduced by permission.

Sargan statistic (overidentification test of all instruments):           0.185
                                                      Chi-sq(1) P-val =    0.6672

Instrumented:         ln_OHA
Included instruments: ln_GDP ln_inflation ln_Capinves ln_Rurpop popgrowth
                      ln_Domcredit ln_schoolenr ln_Agrshare Insquality
                      ln_Etnicfrac ln_Tradeopp ln_OHA2
Excluded instruments: templandsq preclandsq
```

OHA interacted with macroeconomic policy

Instrumental variables (2SLS) regression

Source	SS	df	MS		
Model	55.6844522	14	3.97746087	Number of obs =	66
Residual	310.774208	51	6.09361192	F(14, 51) =	2.16
				Prob > F =	0.0236
				R-squared =	0.1520
				Adj R-squared =	-0.0808
Total	366.45866	65	5.63782554	Root MSE =	2.4685

growth	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ln_OHA	-5.417308	4.712619	-1.15	0.256	-14.87828	4.043669
ln_GDP	-.0307026	.8920239	-0.03	0.973	-1.821515	1.76011
ln_inflation	-.4340337	.3815946	-1.14	0.261	-1.200117	.3320494
ln_Capinves	2.607735	1.193004	2.19	0.033	.2126803	5.002791
ln_Rurpop	1.969891	2.832294	0.70	0.490	-3.716177	7.655958
popgrowth	-.984379	.3841608	-2.56	0.013	-1.755614	-.213144
ln_Domcredit	-.7676401	.5300969	-1.45	0.154	-1.831854	.2965738
ln_schoolenr	.7032681	.5330423	1.32	0.193	-.366859	1.773395
ln_Agrshare	-.1657147	1.031343	-0.16	0.873	-2.236221	1.904792
Insquality	-.0228424	.1123178	-0.20	0.840	-.2483299	.202645
ln_Etnicfrac	-.3653571	.457194	-0.80	0.428	-1.283212	.5524982
ln_Tradeopp	-.65374	.8511637	-0.77	0.446	-2.362522	1.055042
intOHAtropp	1.279159	.9894534	1.29	0.202	-.7072512	3.26557
intOHAinfl~n	.2184656	.244237	0.89	0.375	-.2718606	.7087918
_cons	-6.126029	16.30878	-0.38	0.709	-38.86728	26.61522

Instrumented: ln_OHA
Instruments: ln_GDP ln_inflation ln_Capinves ln_Rurpop popgrowth ln_Domcredit ln_schoolenr ln_Agrshare Insquality ln_Etnicfrac ln_Tradeopp intOHAtropp intOHAinflation templandsq preclandsq

Interactions with Institution

Instrumental variables (2SLS) regression

Source	SS	df	MS		
Model	118.800694	14	8.48576389	Number of obs =	65
Residual	246.244659	50	4.92489317	F(14, 50) =	2.51
				Prob > F =	0.0086
				R-squared =	0.3254
				Adj R-squared =	0.1366
Total	365.045353	64	5.70383364	Root MSE =	2.2192

growth	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ln_OHA	-1.045444	1.879048	-0.56	0.580	-4.819623	2.728736
ln_GDP	-.5106965	.7873682	-0.65	0.520	-2.092172	1.070779
ln_inflation	.1066843	.6562672	0.16	0.872	-1.211467	1.424836
ln_Capinves	1.375791	1.21151	1.14	0.262	-1.057598	3.80918
ln_Rurpop	-.2134481	1.439228	-0.15	0.883	-3.104223	2.677327
popgrowth	-.6261617	.5219654	-1.20	0.236	-1.67456	.4222366
ln_Domcredit	-.6224362	.4772567	-1.30	0.198	-1.581034	.336162
ln_schoolenr	.5361162	.5383114	1.00	0.324	-.5451142	1.617347
ln_Agrshare	-.4014451	1.002331	-0.40	0.690	-2.414686	1.611796
Insquality	-.0100695	.1020286	-0.10	0.922	-.2150001	.194861
ln_Etnicfrac	-.7205652	.5204869	-1.38	0.172	-1.765994	.3248636
ln_Tradeopp	-.755518	.8223842	-0.92	0.363	-2.407325	.8962893
intOHAdemo~c	.2924946	.4363084	0.67	0.506	-.5838566	1.168846
intOHAethnic	-.4957486	.3955481	-1.25	0.216	-1.29023	.2987331
_cons	8.394379	9.953076	0.84	0.403	-11.59696	28.38572

Instrumented: ln_OHA
Instruments: ln_GDP ln_inflation ln_Capinves ln_Rurpop popgrowth ln_Domcredit ln_schoolenr ln_Agrshare Insquality ln_Etnicfrac ln_Tradeopp intOHAdemocrac intOHAethnic templandsq preclandsq

Regional dummies

Instrumental variables (2SLS) regression

Source	SS	df	MS		
Model	174.186651	16	10.8866657	Number of obs =	66
Residual	192.272009	49	3.92391855	F(16, 49) =	3.15
				Prob > F =	0.0010
				R-squared =	0.4753
				Adj R-squared =	0.3040
Total	366.45866	65	5.63782554	Root MSE =	1.9809

growth	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ln_OHA	-.3691658	.887518	-0.42	0.679	-2.1527	1.414368
ln_GDP	-1.423567	1.202524	-1.18	0.242	-3.84013	.9929956
ln_inflation	-.2397953	.3140696	-0.76	0.449	-.8709417	.3913511
ln_Capinves	2.046956	.9400936	2.18	0.034	.1577677	3.936145
ln_Rurpop	-1.006638	1.263075	-0.80	0.429	-3.544882	1.531606
popgrowth	-.8283844	.3767182	-2.20	0.033	-1.585428	-.0713407
ln_Domcredit	-.75261	.4360742	-1.73	0.091	-1.628934	.1237138
ln_schoolenr	.4592659	.4956138	0.93	0.359	-.5367073	1.455239
ln_Agrshare	-1.093325	.9719493	-1.12	0.266	-3.046531	.8598798
Insquality	-.0863494	.10331	-0.84	0.407	-.2939586	.1212598
ln_Etnicfrac	-.2369508	.3728662	-0.64	0.528	-.9862536	.5123519
ln_Tradeopp	-.5717994	.8463615	-0.68	0.502	-2.272627	1.129028
eastasia	1.695588	.8750279	1.94	0.058	-.0628465	3.454022
subsahara	-.8914322	1.024689	-0.87	0.389	-2.950621	1.167757
intOHAsubA	.6533222	.5848327	1.12	0.269	-.521943	1.828588
intOHAasia	.5497955	.624742	0.88	0.383	-.7056705	1.805262
_cons	19.18509	10.5236	1.82	0.074	-1.962873	40.33305

Instrumented: ln_OHA
Instruments: ln_GDP ln_inflation ln_Capinves ln_Rurpop popgrowth ln_Domcredit ln_schoolenr ln_Agrshare Insquality ln_Etnicfrac ln_Tradeopp eastasia subsahara intOHAsubA intOHAasia templandsq preclandsq