EFFECTIVENESS OF FOREIGN AID TO HEALTH: CASE OF DEVELOPING COUNTRIES

by

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Abstract

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This paper considers effectiveness of health targeted aid and the role of corruption level in performance of health care system. The quality of the health care is measured by avoidable mortality, which refers to all deaths that can be prevented or cured given available knowledge and technology in health care. The sample contains data on 34 developing countries covering the period of 1995-2009. Fixed effect methodology is applied to estimate whether total aid and bilateral and multilateral aid separately has effect on avoidable mortality. Results show that health targeted aid does have positive effect on avoidable mortality elimination. Moreover, countries with high corruption level tend to distribute aid more effectively than those with low corruption level. Finally, it is bilateral aid that seems to influence avoidable mortality level.

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GLOSSARY

Foreign aid. The international transfer of capital, goods, or services from a country or international organization for the benefit of the recipient country or its population.

Corruption Perception Index. A ranking of countries according to the extent to which corruption is believed to exist. It ranks almost 200 countries on a scale of zero to 10, with zero indicating high levels of corruption and 10 indicating low levels.

Chapter 1

INTRODUCTION

Foreign aid becomes increasingly important for many countries. According to the 2010 Millennium Development Goals Report, only in 2008, total official development assistance to developing countries targeting on health care was more than US$18 billion. However, some experts believe that in reality very little was done to achieve the Millennium Development Goals. For example, despite the numerous programs of the Global Fund in Ukraine, according to the World Health Organization data, Ukraine has one of the highest prevalence rate of HIV in the region with almost 1.1% of Ukrainian adults living with HIV (compared to 0.5% in 1997). This raises the question of whether health assistance is effective in improving health condition of the population and whether other factors, such as the level of transparency of the institutions, for example, are important determinants of health programs' effectiveness.

The issue of foreign health assistance comes along with the great amount of literature on foreign aid. While the link between foreign aid and economic growth has received significant attention on the part of researchers, there is little done on effectiveness of foreign aid in specific areas. Only several studies concentrated on the influence of foreign aid on education (Michaelowa and Weber, 2007); the relationship between foreign aid and environment (Arvin, Dabir-Alai and Lew, 2006); the effectiveness of health aid in infant mortality reduction (Mishra and Newhouse, 2009). The latter paper and also Easterly (2006) reveals that foreign aid leads significantly to the decrease of infant mortality.

Unlike all previous research that concentrated on infant mortality, life expectancy or HIV prevalence rate, in this paper avoidable mortality is used as the main health

outcome. While earlier the health care system was believed to have little if any influence on decline of overall mortality (Nolte and McKee, 2003), nowadays the impact of health care system on health changed significantly not only because of the availability of the new pharmaceuticals and technologies but also due to more effective organization of the health care system (Vladescu, 2010). Multilateral organizations and individual countries played in this process crucial role, especially in developing countries, by providing funds for medical education, disease prevention, administrative management of health care system, etc. As long as main purposes of health targeted aid is to conduct aforementioned policies along with supply of technologies and knowledge in health care, avoidable mortality is the most appropriate measure of health outcomes.

Avoidable mortality refers to the deaths that could be prevented or cured given current level of medical development, both in terms of technology and knowledge (Castelli and Nizalova, 2011). It should be noted that previous research led to the false conclusion of no or little effect of health targeted aid on infant mortality, because the latter includes deaths that cannot be avoided given current knowledge and technology in the health care. Therefore, deaths from avoidable and non avoidable diseases should be separated to find effect of health targeted aid on health outcomes.

There is a wide range of channels via which foreign aid can lead to decrease in avoidable mortality in the recipient countries. The more medical personnel are trained and hospitals are provided with up-to-date technologies, the higher is the chance for illnesses to be diagnosed and cured. Moreover, the programs such as infectious disease control, STD control including HIV/AIDS and health education decrease chances of people becoming infected. Assistance programs bring new knowledge and technology in health sector. So we can stress that it is reduction in avoidable mortality which is the target of donors.

The main explanatory variable is the amount of foreign aid on health related programs. Two normalized measures as defined in Alesina and Weder (1999) are used: aid per capita and aid over GNI. The data for health programs is taken from the Aiddata website. It is database of development finance activities with activity and purpose codes, which is compound database of two existing programs: Project-Level Aid (PLAID) and Accessible Information on Development Activities (AiDA).

Since foreign aid is not the only factor that may affect avoidable mortality, a number of controls are used. In particular, government expenditures on education and health, welfare of a country, education attainments, access to sanitation and population size are used since these are standard determinants of mortality.

There is concern on what is the best way to allocate development assistance: multilaterally (from international organization or NGO) or bilaterally (from country to country). Multilateral aid may be less cost-efficient since many resources must be spent on management in the recipient countries. On the other hand, bilateral aid might be subject to political interests since it is mainly given to the former colonies. Therefore, this paper also investigates what type of aid is more effective in addressing health issues.

The previous aid effectiveness studies are based on the micro and macro data, and employ a range of econometric techniques such as OLS estimation, panel analysis, as well as difference-in-difference estimation.

Since there may be country-specific factors influencing avoidable mortality we need to control for them as these factors can influence allocation of foreign aid: countries with poorer initial conditions may get more financial aid. To control for them the fixed effect regression is used. Another potential problem is endogeneity

of foreign aid because countries with higher avoidable mortality get more health targeted aid.

To conclude, this paper establishes the link between avoidable mortality as a measure of quality of health system and foreign aid allocated to health care. Namely, I find that total aid to health sector leads to decrease in avoidable mortality. Moreover, only bilateral aid has effect on avoidable mortality. Finally, corrupt countries tend to allocate health aid more effectively. This finding is in line with previous works and can be explained by the fact that donors allocate aid in these countries usually through non-governmental organizations (Dietrich, 2010).

The rest of the paper proceeds as follows. Chapter 2 presents an overview of existing literature on aid effectiveness and avoidable mortality; Chapter 3 outlines the theoretical model and empirical methods applied; Chapter 4 includes data description; Chapter 5 presents results and Chapter 6 concludes.

Chapter 2

LITERATURE REVIEW

In the literature review that follows firstly the studies that focus on aid effectiveness for economic growth are examined. Next, I concentrate on effectiveness of aid for health outcomes, reviewing evidence from cross-sectional and panel studies. Finally, the previous research studying avoidable mortality and its determinants is discussed.

The issue of foreign health assistance comes along with the great amount of literature on foreign aid effectiveness. The link between foreign aid and economic development has received significant attention on the part of researchers and so far with mixed results. While some researchers, for example Ali and Isse (2005) and Brautigam and Knack (2004) doubt the beneficial effects of international aid, as it may lead to poor governance and may slow down growth and can be even destructive if it is allocated to the political allies (Bobba and Powell, 2007), others show that foreign aid has positive impact on economic growth in developing countries (Fayissa and El-Kaissy, 1999). The relationship between foreign aid and economic growth is complex and may not be direct. In addition, the problem of endogeneity may be present as long as aid effectiveness depends significantly on the level of development in the society: richer societies are likely to allocate aid more effectively (Svensson, 1999).

Fewer studies are devoted to the analysis of foreign aid to specific targeted sectors. The previous studies include the research on influence of foreign aid on education (Michaelowa and Weber, 2007); the relationship between foreign aid and environment (Arvin, Dabir-Alai and Lew, 2006); effectiveness of foreign aid on the democratization in developing countries (Boone, 2011). The literature on financial

assistance to improve health outcomes plays important role in the discussion concerning aid effectiveness.

According to Ravishankar et al. (2010), health assistance volumes increased from $5.6 billion in 1990 to $21.8 billion in 2007, which together with the adoption of the Millennium Development (MDG) goals and the Paris Declaration and Accra Agenda for Action aroused considerable interest in effectiveness of "health" aid among researchers.

Recently, a number of studies have incorporated cross-sectional dimension of the aid effectiveness on health outcomes.

In his book, Easterly (2006) reveals that foreign aid contributed significantly to the reduction of infant mortality despite his skepticism about the foreign aid in general. In her study for developing countries, Williamson (2008) finds that foreign aid to health is ineffective in addressing health issues. She employs fixed effect methodology and also corrects for possible endogeneity using lagged aid as an instrument. Both fixed effect and instrumental variable estimation show that health targeted aid is ineffective.

Two recent studies on impact of aid on infant mortality include Gebhard and Kitterman (2008) and Mishra and Newhouse (2009). The former study concentrates on 118 countries for the period from 1973 to 2004 and stresses that increase in per capita health aid by 100% is associated with a 2 percent reduction in the infant mortality rate. However, to achieve MDG targets, the 15 fold increase of current level of foreign aid is needed. The authors of the latter paper test the hypothesis about the relationship between health-targeted aid, infant mortality and life expectancy in recipient countries. Using data on non-OECD countries between 1975 and 2000, they find that, on average, aid does not lead to the improvements of the health outcomes and when it does improve health outcomes it happens

under conditions of good governance which includes democracy, sanitation and transparency.

Conventionally, literature suggests that good governance facilitates aid effectiveness in promoting economic growth (Burnside & Dollar, 2000; Bearce, 2009). However, Simone Dietrich in her study on role of corruption in efficient aid allocation to health sector came to a surprising result. She shows that health aid performs better in corrupt states. She suggests that each recipient country compares compliance costs with benefits of allocating aid effectively. Unlike industry, trade or infrastructure aid, health aid is associated with low compliance costs and hence rent-seeking is not so attractive as in other sectors. Moreover, since health aid is channeled usually through non-governmental organizations, it is less dependent on the institutional factors like corruption. Finally, the other factor that explains this finding is that donors seem to pay more attention not to the country-level institutional development but rather to the sector-specific progress (Dietrich, 2010).

Previous research was concentrated on infant mortality or life expectancy as the health outcome to measure influence of "health" aid on the quality of medical care. However, in this paper avoidable mortality is used. Avoidable mortality refers to the deaths that could be prevented or cured given current level of medical development, both in terms of technology and knowledge (Castelli and Nizalova, 2011). The advantage of this indicator is that it directly measures the overall quality of health system, not only the raw mortality. There is a wide range of channels via which foreign aid can lead to decrease in avoidable mortality in the recipient countries. The more medical personnel are trained and hospitals are provided with up-to-date technologies, the higher is the chance for illnesses to be diagnosed and cured. Moreover, the programs such as infectious disease control, STD control

including HIV/AIDS and health education decrease chances of people becoming infected.

The notion of avoidable mortality traces back to the Rutstein, Berenberg et al. (1976) who were members of the Working Group on Preventable and Manageable Diseases at Harvard Medical School. They were the first to define avoidable mortality as a relevant measure of the health performance of a country by introducing notion of 'unnecessary untimely deaths'. They proposed a list of conditions from which death should not occur in the presence of effective and timely health care. Afterwards, original list of diseases was modified several times taking into account advances in health care. In 2004 Nolte and McKee have generalized previous studies and come up with list of 33 conditions amenable to healthcare. Further studies were concentrated mainly on using the Nolte and McKee list, whereas others used either newly compiled lists of reviewed conditions (Page, Tobias et al., 2006) or one of the version of Holland's list (1986, 1988, 1991,1997, 2007).

As a main factor influencing level of avoidable mortality and health care in general the literature considers GDP per capita, since it allows controlling for structural divergences in economic development. Pritchet and Summers (1996) in their study on effect of income on health argue that income elasticity of infant mortality in developing countries lies between 0.2 and 0.4.

Another factor is education. There is a quite well established positive relationship between education and health indicators. For example, Lleras-Muney (2005) in his study find that for United States citizens born between 1914 and 1939, an additional year of schooling reduces the probability of dying in the next 10 years by 3.6 percentage points. In a more recent study, Fonseca and Zheng (2011) find that each additional year of schooling leads to a lower probability of having poor health and lower prevalence for diabetes, cancer and hypertension.

The citizens of societies where governments spend significant share of expenditures on health care are found to have access to better health services (Bhattacharya and Qiao, 2005). Moreover, expenditures on health-related purposes like environment and education are found to be positively associated with the health outcomes.

Multilateral and bilateral aid

Already in 1967 Balogh discussed issue of different ways of aid allocation and defined political, economic and psychological arguments in favor of each of these channels. Later Burnside and Dollar (2000) notice that aid can enhance GDP growth given right conditions and stresses that absence of correlation between growth and total aid is caused by its large bilateral component. However, they did not formally separate two types of aid and included only composite aid regressor in the model.

In 2011, Zornow challenged the findings of Burnside and Dollar (2000) by replicating their analysis with one modification – total aid was divided into bi- and multilateral components. His findings are just the opposite to the Burnside and Dollar (2000) proposition, indicating that multilateral aid leads to the slowdown of growth whereas bilateral aid is associated with higher levels of economic growth. Policy changes that are enforced by multilateral aid agencies actually constrict growth in the short to medium-term and multilateral aid is more efficient in the long run than in the short run.

In addition to the literature on aid effectiveness to promote growth, there are several papers on discrepancies in effectiveness of two types of aid in some specific areas. For example, Gabbert and Weikard (2000) test hypothesis of whether bi- or multilateral food aid is more effective in developing countries. They find no

evidence that multilateral donors perform better than bilateral ones in food aid allocation.

This paper makes contribution to the existing body of aid effectiveness literature concentrating on avoidable mortality as a measure of health performance. In addition, the separate effects of bi- and multilateral aid to health care are established.

Chapter 3

METHODOLOGY

In my paper I use **avoidable mortality** as an indicator of the performance of health care system. It consists of two main components: treatable and preventable disorders (Vladescu, 2010). The first includes causes of death that can be prevented by medical intervention while the latter includes causes "preventable by consistent policies outside medical services (legal actions, prevention of smoking and alcohol consumption etc)".

The measure of avoidable mortality is constructed using mortality data and the most recent list of diseases that are considered to be avoidable (Nolte, 2004). From the total mortality we exclude the age-deaths pairs that are not in aforementioned list. As a result, we get annual avoidable mortality rate for each country.

To show that it is avoidable mortality which is a target of foreign aid, non-avoidable mortality as dependent variable is used as well. Non-avoidable mortality is defined as the difference between total mortality and avoidable mortality. By this comparison we would show that since non-avoidable component of overall mortality cannot be prevented or cured, we should not expect to find an effect of aid on it.

I model avoidable mortality as a function of lagged health foreign aid and a set of controls:

$$AM=a+\beta\ Aid+\beta\ CPI+\beta\ CPI*Aid+\beta\ C+\ , \quad (1)$$

where *AM* is health outcome measured by avoidable mortality indicator, *Aid* is foreign aid to health in previous period, CPI is a Corruption Perception Index, *C* is vector of controls and ε is a disturbance term. Also, the interaction term between foreign aid and Corruption Perception Index is included to control for quality of institutions.

The variable of interest is **health-targeted foreign aid** (*Aid*). Following Alesina and Weder (1999) I will use two normalized measures of aid flows: aid per capita and aid-to-GNI ratio. In order to construct these measures I use AidData database which contains data on development assistance from 1945 to 2011. Since for the period from 1945 to 1994 there are many missing observations, I will use data for 1995-2009 period. In order to avoid possible endogeneity and to take into account the lagged effect of aid on the recipient country's health system and health outcomes, I regress current avoidable mortality indicator on the development assistance provided three years ago. In addition, stock of aid for three previous years will be used as a measure of foreign aid to health. Many authors have used aid flows aggregated over five-year period (Boone, 1996), however, in my case with 14 years in the sample it would decrease number of observations significantly.

The vector of controls includes wealth (Gross National Income per capita), education (gross completion rate of secondary education), population size, government expenditures on health and education and access to clean water and sanitation.

The estimation of the specified model by OLS may lead to biased results if aid is correlated with some unobserved determinants of avoidable mortality in each country. This source can be addressed by application of fixed effect regression to capture time-invariant country specific effect that might be correlated with foreign aid.

The most appropriate way to eliminate the time-variant effect and reverse causality would be to use instrumental variables approach. We need to find a variable that is correlated with aid while is not correlated with avoidable mortality either directly or indirectly except for through aid.

Boone (1996) proposed a set of instruments for aid which included size of population and different country-level dummies (for example, francophone West Africa) that were later used in numerous aid studies (Burnside and Dollar (2000), Guillamont and Chauvet (2001) etc). Further studies (Dalgaard et al, 2004) have shown that these instruments are weakly exogenous, so better instruments should be developed.

Tavares (2003) and Rajan and Subramanian (2008) have suggested a new set of instruments which are related to geographical and cultural proximity to the donor countries. These instruments include percentage of people who speak European language, size of the country, and distance from donor country to the recipient country.

Unfortunately, all these instruments are time-invariant, so they cannot be used in the fixed effect estimation. Absence of valid time-variant instruments limits my analysis to fixed effect technique. Since I use lagged values of aid this should mitigate the potential endogeneity problem.

As discussed in the literature review, several studies (e,g. Burnside and Dollar, 2000) examine the effect of the aid flows disaggregated by source. Multilateral and bilateral aid may have different effect on the health care system if donors have different preferences in aid allocation (Gebhard et al, 2008). Therefore, to test the hypothesis whether bilateral or multilateral development assistance on health care is more effective, we introduce another specification:

$$AM = a + \beta_1 Ba + \beta\ Ma + \beta\ CPI + \beta\ CPI*Ba + \beta\ CPI*Ma + \beta\ C + \quad , \tag{2}$$

where *Ma* is amount of **multilateral aid to health** and *Ba* is amount of **bilateral aid to health.** As total aid, both multilateral aid and bilateral aid are measured as aid to GNI ratio, aid per capita and stock of aid for three previous years.

Chapter 4

DATA DESCRIPTION

The data on mortality comes from World Health Organization database which contains the number of deaths classified by country, sex, age and cause of death. All causes of deaths are coded according to the 10th International Classification of Diseases. As indicated in Methodology section, the list of Nolte and McKee (2004) is used to construct avoidable mortality which is presented in Table 1. Avoidable mortality is corrected for population size, data on which comes from WDI.

The data on aid is taken from the Aiddata website. The data includes information on aid flows compiled from a range of sources, including "the OECD Creditor Reporting System (CRS) database, donor annual reports, project documents from both bilateral and multilateral aid agencies, data gathered directly from donor agency sources, and agency websites and databases". The advantage of this dataset is that it provides information on both multi- and bilateral aid flows separately and allows choosing specific aid purpose (health care, in our case).

Moreover, the dataset reports aid commitments and aid disbursement separately. Although we are interested more in disbursement amount since it measures the actual amount of money that the donor transferred, there are many missing values in disbursement data. Therefore, as a proxy for foreign aid to health sector I will have to use commitments data defined as "written obligation by a government or official agency to provide resources of a specified amount under

specified conditions and for specified purposes for the benefit of a recipient country" (Organisation for Economic Co-operation and Development). Commitments are measured in constant USD and the date of commitment is the date a loan or grant agreement is signed.

Further, I normalize aid flows with respect to recipient's income (GNI, both variables are measured in US dollars in 2000 prices) and use aid to GNI ratio as an indicator for foreign aid. Public spending on education and on health come from World Development Indicators database run by the World Bank and are measured as percent of Gross Domestic Product.

The education variable is constructed based on gross completion rate of secondary education that comes from the World Bank educational statistics database.

Access to clean water and sanitation is measured by fraction of population with access to improved clean water and sanitation, respectively. Both measures come from the database of the World's Water project of Pacific Institute which contains combined data from WHO and UNICEF statistics. This data has obvious advantage over the WDI measures since it contains extra two years comparing to the WDI data. However, it is still not complete enough because it contains data for 1994, 2000, 2002, 2004, 2005 and 2008 only. Therefore, we extrapolate these indicators for the missing years by conferring them the value of the nearest year available. If there are two nearest, we confer it the value with the higher of the two numbers.

The sample includes 34 developing countries and covers the period of 1995-2009. The detailed list of countries is presented in Table 2.

The summary statistics on avoidable and non-avoidable mortality are presented in Table 3. Although avoidable component of mortality is significantly lower than non-avoidable one, it is still considerable. From Figure 1, one can observe relationship between avoidable mortality in 2008 and avoidable mortality in 2000. It can be inferred that avoidable mortality as a share of total mortality decreased in 2008 compared with 2000. In addition, if we sort countries by regions, we can observe that for Latin American and CIS countries there is a decrease in avoidable mortality while in South Africa, avoidable mortality is higher in 2008 compared to 2000 level. One of the possible factors that lead to such decrease can be foreign aid.

The summary statistics of the three types of the normalized foreign aid (with respect to GNI) is presented in Table 4. Mean values of multilateral and bilateral aid seem to be quite the same, but bilateral aid is more volatile than the multilateral aid and has higher maximum value. This can be explained by the fact that majority of health targeted projects of international agencies are long-run, so that multilateral aid is more stable over time.

The general dynamics of total aid to GNI ratio is presented in Figure 2. One can observe a sharp rise in health targeted aid in 2000, which could be possibly explained by the implementation of the Millennium Development goals established at the Millennium Summit in 2000. The second jump in total aid received was in 2005. Similarly, in 2005 the World Summit took place where several agreements were signed with the aim to increase aid financing to achieve the Millennium Development Goals.

The summary statistics for the control variables are presented in Table 5. Large dispersion of GNI is caused mainly by welfare differences of the countries in the sample. The countries with the highest GNI are Mexico and Brazil. These countries became newly industrialized in 2011 and are no longer in the list of

developing countries. But since we consider 1995 to 2009, we include these countries in the sample. However, estimation without these countries in the sample is done as a robustness check. The poorest countries are Belize and Kyrgyz Republic, whose GNI is 1.11 and 1.13 billion USD respectively.

There are big differences among countries in the sample with respect to the population size as well and we will control for this in the regression

There is less pronounced difference across countries when one looks at public expenditures on health and education measured as a share of GDP. Overall, countries tend to spend more on education relative to health: average expenditures on education are 4.33%, while average expenditures on health are only 3.59% of GDP.

Countries on average have better access to sanitation than to water: average access rates are 82% and to 79% for water and sanitation, respectively. Moreover, correlation between these two variables is strong and positive, so only one of them could be included in further analysis.

The corruption perception index ranges from 1.7 (very corrupt) to 7.5 (very clean). For the sample countries, CPI was relatively persistent: the variance in the CPI index for the majority of countries is 1 point, but there were also some countries where corruption index increased (corruption fell) by 3 points in 2009 compared to 1995 level (Argentina and Chile).

As a preliminary step in examining relationship between aid and mortality I perform correlation analysis for avoidable mortality and different types of aid (Table 6). It can be inferred that both total and bilateral aid has almost no correlation with avoidable mortality. The strongest correlation between total aid and avoidable mortality is 0.12 (if we apply 1st lag of total aid) and 0.09 between

bilateral aid and avoidable mortality (if we apply 4th lag of bilateral aid). The situation with multilateral aid is similar: though the relationship is still weak it goes with the expected sign only at third lag.

Though the preliminary results do not show strong relationship between avoidable mortality and aid, there might be indirect effect of aid on avoidable mortality. As already mentioned in Literature review section, several studies showed that institutions matter in effective aid allocation: the benefits of aid increase with lower corruption.

If we correlate CPI alone with all types of aid, we observe a negative correlation, which is slightly higher for bilateral aid than for multilateral aid. Negative correlation means that more aid is associated with lower CPI (higher corruption). This result is consistent with Alesina et al. (1999) who find that the more corrupt government is the more aid it receives. The latter could be possibly explained by the fact that countries, which get large development assistance, are those who are not only least developed and healthy and most poor but poorly governed.

The preliminary analysis suggests that only multilateral aid is likely to have impact on avoidable mortality elimination.

Chapter 5

EMPIRICAL RESULTS

Empirical analysis starts with selection of appropriate specification. Pooled OLS is tested versus random effect using Breush-Pagan test. The results of the test recommend to use pooled OLS. Then random versus fixed effect is tested by the Hausman Test. Large Hausman statistics leads to rejection of random effects model in favor of fixed effect specification. Finally, we test pooled OLS versus fixed effect by F test: the results show that fixed effect specification should be preferred. Therefore, fixed effects will be used as an estimation technique.

Table 8 presents the results for fixed effect regression in two specifications: with avoidable mortality as dependent variable in first specification and with non-avoidable mortality in second specification. The results in Table 8 suggest that the hypothesis that health targeted aid affects avoidable mortality but not non-avoidable mortality seems to be valid.

The estimated coefficient on total aid (column 1 of Table 8) means that 1% increase in total aid to GNI ratio saves, on average, 59 lives per 100,000 people. Control variables also have significant impact on decrease in avoidable mortality: increase in public expenditures on education by 1% of GDP is associated with the decrease in avoidable mortality by 8 deaths per 100,000 people. Both access to sanitation and GNI have expected sign: increase in access to sanitation by 10%

leads to decrease in avoidable mortality by 10 deaths and increase of GNI by 10 billion leads to saving of 5 lives per 100,000. At the same time public expenditures on health are not significant. This result is consistent with Grytsiv (2010) who shows in her study on OECD countries that public expenditures on health have no effect on avoidable mortality. The latter can be explained by the fact that government spending may be not efficiently allocated. This fact is especially relevant for developing countries which have weak institutions and high level of corruption.

Moreover, interaction term between CPI and total aid has an unexpected sign, which means that for countries with high corruption level (low CPI), increase in total aid will lead to decrease in number of avoidable deaths. This means that in countries with bad institutional environment, total aid to health is effective. Preliminary analysis in Data description has shown that countries which have high corruption levels are also those with high level of avoidable mortality and high inflows of health targeted aid. Therefore, such phenomena may be explained by the fact that corrupt governments receive more aid and have more resources to tackle health-related issues. Moreover, these results are in line with Dietrich (2010) who has found that health targeted aid performs better in corrupt countries. This finding may be explained by the fact that in corrupt countries donors allocate more aid through non-governmental organizations and give aid non on the basis of quality of national institutions but rather on progress in aid sector.

Column 2 in Table 8 presents regression results with non-avoidable mortality as a dependent variable. Total foreign aid to health seems to have no significant effect on non avoidable mortality. While all control variables except for GNI become insignificant, completion rate of secondary education matters and the effect of income level effect (GNI) increases almost 4 times. The latter can be explained by

the fact that, on average, non-avoidable mortality is more than 8 times larger than avoidable mortality (see Table 3).

Column 3 in Table 8 presents estimation results on restricted sample. As has been already mentioned, there are notable disparities in welfare (GNI) among countries in the sample which can lead to wrong results. Therefore, to check whether our results are robust, the countries which became newly industrialized in 2011 are excluded. Results show that health targeted aid has even higher impact on avoidable mortality elimination compared to the initial specification. Moreover, corruption in year of aid commitment matters. Specifically, increase in CPI (decrease in corruption) by 1 index point leads to 13 lives saved per 100,000 of population.

According to Alesina and Weder (1999), it is appropriate to proxy foreign aid not only by aid to GNI ratio, but also by foreign aid per capita. The specification tests applied earlier show that using fixed effect regression would be appropriate in this model as well. The results are presented in Table 9.

Estimation using unrestricted sample produces insignificant coefficients on aid (Column 1). This result may be explained by big differences in country's population sizes in the sample. However, if we exclude countries which became newly industrialized in 2011 (they are also most populous), we get the expected results. Column 3 of Table 9 shows that foreign aid per capita has expected negative sign: increase in foreign aid per capita by 1$ per person leads to decrease in avoidable mortality by 3 deaths per 100,000 of population. GNI, CPI and access to sanitation also have positive effect on reduction in avoidable mortality and the magnitude of the coefficients is comparable to the first specification.

In case when we use non-avoidable mortality as dependent variable, results seem to be similar to the model with aid to GNI ratio. It can be viewed as additional

evidence that total aid has no influence on non-avoidable mortality regardless of how it is normalized.

Finally, previous research shows that stock of development assistance matters for its goal fulfilment (Gebhard et al, 2008). Therefore, Table 10 presents results on effect of sum of total aid in three previous years on avoidable mortality. From Column 1 we can observe that increase in total aid in three previous years (% of GDP) by 1% leads to 21 lives saved per 100,000 of population. Significance of other control variables is consistent with previous specifications.

Summarizing, comparison of empirical results using fixed effect specifications confirms hypothesis that since foreign aid to health is targeted mainly at prevention and control of avoidable diseases, it has effect on avoidable mortality and no effect on non-avoidable mortality.

Endogeneity problem

One can believe that the estimated model may be prone to endogeneity problem if countries that have higher mortality rates receive more health targeted aid. As a solution to this endogeneity problem it is common to instrument aid with exogenous variable that is correlated with aid but does not affect avoidable mortality directly.

Previous studies on aid effectiveness used mainly indicators of previous colonial status of the recipient country as an instrument for the foreign aid. Donor countries are more interested in giving money to their previous colonies since they have stronger political ties with them and can influence their actions. As instruments for colonial status authors used dummy for Egypt and Francophone Zone (Burnside and Dollar, 2000), distance from equator and percentage of people who speak European language (Hall and Jones, 1999). Unfortunately, all

these instruments cannot be used in fixed effect estimation suggested by previously conducted tests since they are time-invariant.

Boone (1996) suggested to use population size as an instrument for aid. The rationale behind this choice is the following: "larger countries get less aid per capita because the aid agencies allocate aid on a country basis, with less than full allowance for population size" (Deaton, 2010). Although this instrument seems to be exogenous in studies on effect of aid on economic growth, in this paper it might be not exogenous since population size can influence avoidable mortality directly via economies of scale making bigger countries to have more effective health systems.

In fact, all aforementioned instruments were used in studies on effectiveness of aggregate development assistance. There are no instruments for health-targeted aid separately, thus further research should address this issue to mitigate endogeneity problem.

Moreover, several studies suggested (Hansen and Tarp, 2001) that lagged aid should be used as an instrument for the current aid. Therefore, it is very likely that by including aid in third lag, the problem of reverse causality was mitigated at least partially.

Multilateral versus Bilateral aid to health sector

Following wide discussion of researchers of what type of aid performs better in achieving its goals, we test hypothesis whether bi- or multilateral aid to health sector has more influence of avoidable mortality elimination. Total aid used in previous specifications is divided into two separate components. Moreover, interactions terms of each type of aid and CPI are included. Results are presented in Tables 11 and 12.

In Table 11 each type of aid is treated as % of GDP. Coefficient of bilateral aid is significant and negative whereas multilateral aid is insignificant (see Column 1). In addition, interaction term between bilateral aid and CPI is significant and has positive sign as in previous specifications. All control variables has the same signs and magnitude as in previous specifications. Column 3 reports results for the restricted sample. We can observe that results are in line with unrestricted sample and coefficient of bilateral aid has again higher magnitude than in unrestricted sample. For comparison, Column 2 reports results with non-avoidable mortality as dependent variable. We can observe that none aid type has effect on non-avoidable mortality.

Table 12 reports results of estimation with per capita aids as main explanatory variables. As in basic specification, we can see that using unrestricted sample shows no effect of both bilateral and multilateral aid. But if we exclude countries which became newly industrialized in 2011 from the sample, we get results as in Column 1 of Table 12. Positive sign of interaction term between bilateral aid and CPI means that given low CPI (high corruption), increase in health targeted aid leads to decrease in avoidable mortality. Negative sign of bilateral aid means that the latter has positive effect on decrease in avoidable mortality. Multilateral aid has positive sign and is insignificant. Therefore, we may conclude that bilateral aid not only outperforms multilateral, but also multilateral aid has negative impact by decreasing effect of total aid. This result is consistent with Zornow (2011), who shows that development assistance from bilateral donors facilitates economic growth whereas multilateral aid may be even detrimental to it.

Therefore, estimation results show that health targeted aid has effect on avoidable mortality elimination. Moreover, only bilateral component has significant effect and multilateral aid seem to be ineffective in addressing its goals.

Chapter 6

CONCLUSIONS

This paper is first to use avoidable mortality as dependent variable in development assistance effectiveness studies. In general, I find that health targeted aid seems to have positive effect for avoidable mortality elimination in all specifications: with third lag of aid to GNI ratio, third lag of aid per capita and stock of aid for three previous years. Moreover, effect is more pronounced if countries which became newly industrialized in 2011 are excluded. At the same time, government expenditures on health have no effect in all specifications, which may be explained by the poor system of health expenditures targeting in developing countries. Meanwhile, government expenditures on education have impact on decline of avoidable mortality. In addition, countries with bad institutional environment succeed to allocate health-targeted aid more effectively. This might appear as result of positive correlation between high corruption levels and high inflows of health targeted aid, so that corrupt governments receive more aid and have more resources to tackle health-related issues.

Analysis suggests that foreign aid to health distributed bilaterally outperforms that distributed multilaterally. Moreover, if lagged aid to GNI ratio is used, then bilateral aid leads to avoidable mortality decrease in countries with high level of corruption. Multilateral aid alone and interacted with corruption index has no effect on

avoidable mortality. These results are consistent with Zornow (2011) and might be explained by several factors. Firstly, multilateral aid may be less cost efficient since when assistance goes to multilateral aid organizations, some of these money could be spent by the agency for administrative goals. Those funds which reach the area are often seriously delayed. Secondly, multilateral aid may be more effective over longer periods of time since majority of projects are conducted on the long-term basis. Finally, bilateral aid is more transparent since giving aid on government-to-government basis makes government more accountable.

Findings indicate that health targeted aid does have an effect on performance of health systems in developing countries. Moreover, results suggest that policy makers should promote the situation when more health targeted aid is distributed bilaterally than multilaterally. Experts claim that majority of multilateral aid is distributed in the form of long-term programs aimed at promoting sound policy and implementing reforms while almost all bilateral aid is in the form of specific shorter-term projects. The latter is associated with delivering tangible outputs within established time, cost and quality framework. Therefore, for multilateral aid to be more effective donors should have clear targets and objectives for health aid projects in developing countries. This will allow for more effective monitoring of the projects activities and better control over foreign aid allocation.

Moreover, it seems that in countries with poor governance (higher corruption) bilateral aid is more appropriate and should be distributed through non-governmental organizations; while multilateral aid should be limited, since in those countries it does not seem to improve health outcomes (decrease avoidable mortality).

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Table 1: Causes of death amenable to health care (Nolte, 2004)

	Name of the group	Age	ICD 10
1.	Intestinal infections	0-14	A00-A-09
2.	Tuberculosis	0-74	A15-A19, B90
3.	Other infections (Diphtheria, Tetanus, Poliomyelitis)	0-74	A36, A35, A80
4.	Whooping cough	0-14	A37
5.	Septicaemia	0-74	A40-A41
6.	Measles	1-14	B05
7.	Malignant neoplasm of colon and rectum	0-74	C18-C21
8.	Malignant neoplasm of skin	0-74	C44
9.	Malignant neoplasm of breast	0-74	C50
10.	Malignant neoplasm of cervix uteri	0-74	C53
11.	Malignant neoplasm of cervix uteri and body of the uterus	0-44	C54, C55
12.	Malignant neoplasm of testis	0-74	C62
13.	Hodgkin's disease	0-74	C81
14.	Leukemia	0-44	C91-C95
15.	Diseases of the thyroid	0-74	E00-E07
16.	Diabetes mellitus	0-49	E10-E14
17.	Epilepsy	0-74	G40-G41
18.	Chronic rheumatic heart disease	0-74	I05-I09
19.	Hypertensive disease	0-74	I10-I13, I15
20.	Ischaemic heart disease	0-74	I20-I25
21.	Cerebrovascuvar disease	0-74	I60-I69
22.	All respiratory diseases (excl. pneumonia / influenza)	1-14	J00-J09
23.	Influenza	0-74	J20-J99
24.	Pneumonia	0-74	J10-J11
25.	Peptic ulcer	0-74	J12-J18
26.	Appendicitis	0-74	K25-K27
27.	Abdominal hernia	0-74	K35-K38
28.	Cholelithiasis & cholecystis	0-74	K40-K46
29.	Nephritis and nephrosis	0-74	K80-K81
30.	Benign prostatic hyperplasia	0-74	N00-N07, N17-N19, N25-N27
31.	Maternal deaths	All	N40

32.	Congenital cardiovascular anomalies	0-74	O00-O99
33.	Perinatal deaths, all causes	All	Q20-Q28
34.	Misadventures to patients during surgical and medical care	All	P00-P96, A33 A34

Table 2: List of developing countries in the sample

Argentina	Malaysia
Armenia	Mauritius
Belize	Mexico
Brazil	Moldova
Bulgaria	Morocco
Chile	Nicaragua
Colombia	Panama
Costa Rica	Paraguay
Cuba	Peru
Dominican Republic	Romania
Ecuador	Russia
Egypt	Serbia
El Salvador	South Africa
Guatemala	Thailand
Kazakhstan	Trinidad and Tobago
Kyrgyz Republic	Ukraine
Latvia	Uruguay

Table 3: Summary statistics of avoidable/non avoidable mortality, 1995-2009

Variable	Number of observations	Mean	Standard deviation	Minimum	Maximum
Avoidable mortality per 100,000 of population	199	195.27	129.64	31.48	506.74
Non avoidable mortality per 100,000 of population	199	1455.43	946.34	277.75	4418.19

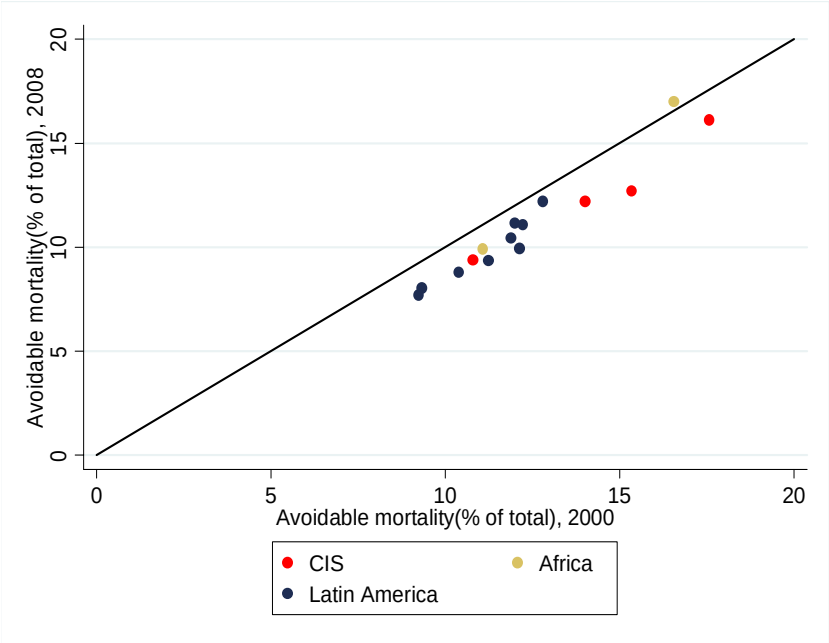

Figure 1. Avoidable mortality as percent of total mortality in 2000 and 2008

Table 4: Summary statistics of total, multilateral and bilateral aid, 1995-2009

Variable	Number of observations	Mean	Standard deviation	Minimum	Maximum
Total aid*	184	0.187	0.532	0	4.773
Multilateral aid*	184	0.100	0.308	0	3.383
Bilateral aid*	184	0.087	0.344	0	3.961

**Measured as % of GNI*

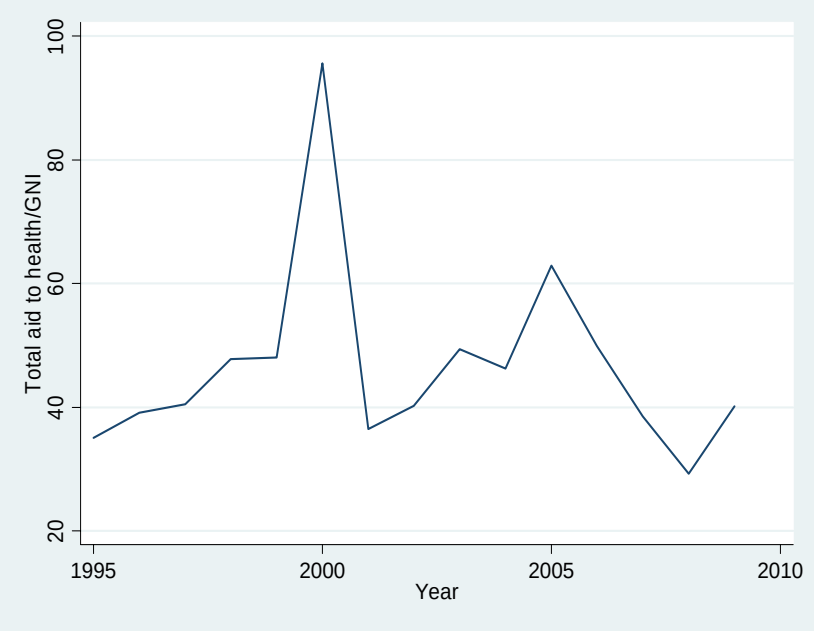

Figure 2. Dynamics of total aid to GNI ratio, 1995-2009

Table 5: Descriptive statistics of control variables, 1995-2009

Variable	Number of observations	Mean	Standard deviation	Minimum	Maximum
Public expenditures on health (% GDP)	199	3.59	1.45	1.53	11.46
Public expenditures on education (% GDP)	199	4.33	1.67	0.98	13.63
Access to water (%of country population)	188	78.88	18.43	28	100
Access to sanitation (%of country population)	199	82.3	12.84	47	100
Completion rate of secondary education	199	23.99	9.93	0.1	62.3
GNI(billions, USD, 2000)	198	140.53	198.17	1.11	831
Corruption Perception Index	199	3.60	1.23	1.7	7.5
Population(million of people)	199	40.49	49.67	0.29	191.54

Table 6: Correlations between avoidable mortality and total, bilateral and multilateral aid to health sector

Total aid	Avoidable mortality	Bilateral aid	Avoidable mortality	Multilateral aid	Avoidable mortality
L1	0.1105	L1	0.0691	L1	0.1119
L2	0.0745	L2	0.063	L2	0.0621
L3	0.0486	L3	0.0807	L3	-0.0143
L4	0.0599	L4	0.0899	L4	0.0125

Table 7: Correlations between CPI and total, bilateral and multilateral aid to health sector

Total aid	CPI	Bilateral aid	CPI	Multilateral aid	CPI
L1	-0.2423	L1	-0.2076	L1	-0.1829
L2	-0.2853	L2	-0.2374	L2	-0.2443
L3	-0.2669	L3	-0.2371	L3	-0.1824
L4	-0.263	L4	-0.2746	L4	-0.1548

Table 8: Estimation results of basic specification, Fixed effect

	AM	NAM	AM resticted sample
L3.Total aid	-59.33*	-200.9	-69.91**
	(-32.53)	(-166.5)	(-26.78)
L3.(Total aid*CPI)	22.13*	76.12	26.17***
	(-12.12)	(-62.04)	(-9.994)
l.GNI(billions, USD)	-0.486***	-1.845***	-0.250*
	(-0.122)	(-0.625)	(-0.127)
l.Expenditures on education	-8.090*	-24.03	-4.584
	(-4.67)	(-23.91)	(-4.044)
l.Expenditures on health	-0.806	-1.262	4.1
	(-6.483)	(-33.19)	(-5.57)
Completion rate of secondary education	-1.46	-9.693*	-0.206
	(-1.051)	(-5.384)	(-0.862)
Access to sanitation	-1.020**	-1.618	-1.287***
	(-0.406)	(-2.08)	(-0.337)
L3.CPI	-5.65	-0.24	-13.00**
	(-5.294)	(-27.11)	(-4.982)
CPI	-9.529	5.713	-6.976
	(-6.875)	(-35.2)	(-5.769)
Population	-0.754	-27.90***	6.971***
	(-1.359)	(-6.961)	(-1.792)
Constant	501.2***	3,333***	196.5**
	(-73.65)	(-377.1)	(-82.9)
Year dummy	YES	YES	YES
Observations	199	199	178
R-squared	0.311	0.323	0.409

Number of country	34	34	32
Standard errors in parentheses		*** p<0.01, ** p<0.05, * p<0.1	

Table 9: Estimation results of specification with total aid per capita

	AM	NAM	AM resticted sample
L3.Total aid per capita	-2.291	-7.433	-2.883*
	(-1.814)	(-9.192)	(-1.465)
L3.(Total aid per capita*CPI)	0.746	2.462	0.950**
	(-0.488)	(-2.475)	(-0.394)
l.GNI(billions, USD)	-0.470***	-1.781***	-0.209*
	(-0.124)	(-0.628)	(-0.126)
l.Expenditures on education	-6.913	-19.57	-4.159
	(-4.748)	(-24.07)	(-4.044)
l.Expenditures on health	-2.131	-7.119	5.409
	(-6.59)	(-33.4)	(-5.614)
Completion rate of secondary education	-1.224	-8.843	0.0474
	(-1.077)	(-5.457)	(-0.867)
Access to sanitation	-0.842**	-0.956	-1.122***
	(-0.402)	(-2.038)	(-0.325)
L3.CPI	-9.750*	-15.65	-13.05**
	(-5.198)	(-26.35)	(-5.026)
CPI	-9.325	6.432	-7.393
	(-7.032)	(-35.64)	(-5.758)
Population	-1.637	-31.25***	7.187***
	(-1.356)	(-6.872)	(-1.789)
Constant	530.4***	3,468***	160.2*
	(-72.79)	(-368.9)	(-81.17)

Year dummy	YES	YES	YES
Observations	199	199	178
R-squared	0.32	0.36	0.41
Number of country	34	34	32
Standard errors in parentheses		*** p<0.01, ** p<0.05, * p<0.1	

Table 10: Estimation results with total aid for 3 previous years

	AM	NAM	AM resticted sample
Total aid(3 years)	-20.74*	-90.91	-20.45**
	(-11.62)	(-59.19)	(-9.411)
Total aid(3 years)*CPI	8.411*	34.2	8.589**
	(-4.617)	(-23.52)	(-3.743)
l.GNI(billions, USD)	-0.219	-0.303	0.0235
	(-0.153)	(-0.778)	(-0.161)
l.Expenditures on education	-10.66*	-36.29	-6.26
	(-5.414)	(-27.58)	(-4.874)
l.Expenditures on health	-1.154	-4.89	4.751
	(-6.912)	(-35.21)	(-6.098)
Completion rate of secondary education	-1.126	-7.297	0.0579
	(-1.089)	(-5.548)	(-0.893)
Access to sanitation	-0.766*	-0.178	-1.013***
	(-0.408)	(-2.08)	(-0.337)
L3.CPI	-5.24	0.485	-8.956*
	(-5.314)	(-27.07)	(-5.357)
CPI	-9.961	-22.12	-9.698
	(-8.205)	(-41.8)	(-6.8)
Population	-4.224**	-46.00***	5.303***
	(-1.65)	(-8.405)	(-1.981)
Constant	588.0***	3,853***	194.4**
	(-77.86)	(-396.6)	(-76.16)
Year dummy	YES	YES	YES

Observations	186	186	164
R-squared	0.306	0.395	0.334
Number of country	34	34	32
Standard errors in parentheses		*** p<0.01, ** p<0.05, * p<0.1	

Table 11: Estimation results of multilateral vs bilateral aid

	AM	NAM	AM restricted sample
L3.Bilateral aid	-91.19*	-273.8	-108.8***
	(-46.31)	(-237.7)	(-38.31)
L3.Multilateral aid	-13.1	-38.38	-22.62
	(-59.48)	(-305.3)	(-48.23)
L3.(Bilateral aid*CPI)	34.11*	99.96	41.26***
	(-18.01)	(-92.43)	(-14.94)
L3.(Multilateral aid*CPI)	6.499	23.42	9.937
	(-20.29)	(-104.1)	(-16.46)
l.GNI(billions, USD)	-0.492***	-1.841***	-0.266**
	(-0.123)	(-0.633)	(-0.128)
l.Expenditures on education	-8.192*	-25.22	-4.468
	(-4.723)	(-24.24)	(-4.085)
l.Expenditures on health	-0.517	-0.602	4.175
	(-6.511)	(-33.41)	(-5.569)
Completion rate of secondary education	-1.582	-10.03*	-0.345
	(-1.062)	(-5.448)	(-0.867)
Access to sanitation	-1.035**	-1.62	-1.313***
	(-0.409)	(-2.097)	(-0.338)
L3.CPI	-6.202	-0.581	-14.18***
	(-5.396)	(-27.69)	(-5.106)
CPI	-9.733	5.193	-7.172
	(-6.9)	(-35.41)	(-5.769)
Population	-0.783	-28.04***	6.911***
	(-1.365)	(-7.004)	(-1.793)

Constant	509.6***	3,352***	209.4**
	(-74.4)	(-381.8)	(-83.37)
Year dummy	YES	YES	YES
Observations	199	199	178
R-squared	0.317	0.325	0.419
Number of country	34	34	32
Standard errors in parentheses		*** p<0.01, ** p<0.05, * p<0.1	

Table 12: Estimation results of multilateral vs bilateral aid per capita

	AM	NAM	AM resticted sample
L3.Multilateral aid	-0.853	-2.284	-1.567
	(-1.967)	(-10.04)	(-1.565)
L3.(Multilateral aid*CPI)	0.301	0.902	0.535
	(-0.538)	(-2.747)	(-0.427)
L3.Bilateral aid	-6.822*	-25.29	-7.112**
	(-4.116)	(-21.01)	(-3.284)
L3.(Bilateral aid*CPI)	2.236**	7.877	2.431***
	(-0.984)	(-5.026)	(-0.798)
l.GNI(billions, USD)	-0.491***	-1.850***	-0.250**
	(-0.124)	(-0.632)	(-0.125)
l.Expenditures on education	-7.542	-21.86	-4.484
	(-4.732)	(-24.16)	(-3.988)
l.Expenditures on health	-1.387	-4.88	5.345
	(-6.568)	(-33.53)	(-5.531)
Completion rate of secondary education	-1.368	-9.345*	-0.0752
	(-1.072)	(-5.475)	(-0.855)
Access to sanitation	-0.849**	-0.961	-1.131***
	(-0.4)	(-2.043)	(-0.321)
L3.CPI	-12.03**	-23.2	-16.80***
	(-5.3)	(-27.06)	(-5.173)
CPI	-10.74	0.921	-8.528
	(-7.071)	(-36.1)	(-5.728)
Population	-1.742	-31.64***	6.837***
	(-1.349)	(-6.886)	(-1.77)

Constant	556.7***	3,561***	198.0**
	(-73.71)	(-376.3)	(-81.71)
Year dummy	YES	YES	YES
Observations	200	200	178
R-squared	0.338	0.368	0.438
Number of country	34	34	32
Standard errors in parentheses		*** p<0.01, ** p<0.05, * p<0.1	