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Impact of Health Aid on Infant Mortality Rate

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12 October 2012

Online at https://mpra.ub.uni-muenchen.de/42945/
MPRA Paper No. 42945, posted 06 Dec 2012 13:52 UTC

University of Nottingham

L14100 Dissertation

2011-12

Impact of Health Aid on Infant Mortality Rate

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21/09/2012

Abstract:

This paper examines the relationship between health aid and infant mortality, using data from in total 135 countries, between 1975 and 2010. According to the findings, aid comes to have a statistically significant and positive effect on infant mortality rate, as doubling of aid leads to an approximately 1.3% reduction in infant mortality rates. Thus for an average aid recipient country, doubling per capita aid leads to a reduction of about 790 deaths per million live births in a particular year. This effect, in comparison to the set goals of the Millennium Development Goals, is small and may not be enough to ensure that the MDG targets are met by 2015.

Acknowledgements:

In drawing up this work I would like to extend my thanks to all my friends for extending assistance in every way possible; without their help, I wouldn't have been able to come along this far and complete this work. A special mention of thanks should go to my supervisor Professor Dr. David Kenneth Whynes, whose support and help was instrumental for me to finish this work.

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Introduction:

The last two decades have seen a prolific output of literature which has sought to delve into the effectiveness of official development assistance (ODA) on health outcomes. This can be seen in stark contrast to the turn of the century, when only a few acclaimed works had looked into this issue. However, despite this vast amount of literature, there still exists a substantial amount of disagreement as to the issue of effectiveness of aid on health outcomes. Prior to the turn of the century, most studies of aid effectiveness have tended to focus on economic development, and it was only recently that there has been a shift in focus to human development.

Accordingly, the United Nations' 2005 Human Development Report had defined human development to be major priority and focus of development assistance be directed towards human development and a common consensus seemed to have been reached by all parties in this regard. This may be partly reflected in the greatly increased aid volume over the last decade (Williamson, 2008). It was shortly after the end of the Cold War, that focus of development assistance moved steadily more towards poverty alleviation and development. With a growing recognition of the fact that many countries were in dire need of such assistance, it was against this background that international donar agencies and governments realized a need to harmonize their respective policies in order to make aid flows and its implementation more efficient. This movement picked up momentum at the 2002 International Conference on Financing for Development in Monterray, Mexico, which led to the establishment of the Monterrey Consensus. Here it was widely acknowledged that development assistance be channeled more effectively and efficiently to sectors in a manner so as to facilitate the meeting of the targets set by the Millenium Develoment Goals (MDGs), which were set in 2000. These MDGs, which were to be attained by 2015, numbered in total eight, and of these, the 4th MDG, whose premise was to reduce child mortality by two thirds of 1990 levels by 2015, is of central importance to us.

In keeping with this shift in development approach, there has subsequently been an increase in empirical works that looked into the effectiveness of development aid. As mentioned earlier, prior to 2000, there was relatively scant literature on the dynamics between aid and evolution of human development indicators (in the context of this work, health indicators), and the dominant academic view of development aid was as a vehicle to bridge the savings-investment gap in poor countries (Masud and Yontcheva, 2005). However some pioneering works, such as Boone (1995) and Burnside and Dollar (1998) amongst others were the first to incorporate health indicators in their analyses to assess impact of health aid. Since then, as mentioned, there has been a steadily increasing volume of literature covering this issue.

It must be mentioned though that in looking back the history of literature coverage of this issue, a crucial point must be made. Early works on this subject have reported nil to relatively insignificant interplay between health outcomes and aid, while in the past several years, there has been another growing body of literature that found that aid positively impacts health indicators. Such a lack of conformity regarding findings may be attributed to the underlying set of assumptions factored in individual publications, and importantly different methodologies adopted in the literature may also have played a part. Furthermore, what may significantly skew this apparent problem further is the issue of dual way causality between flow of aid and health outcomes, and while this is acknowledged as a problem, a great discord exists among academicians as to what suitable instrumental variables to utilize for instrumenting out aid flows. As such there may be issues regarding the proper identification of the instrumental variables in the literature (Deaton 2010).

Thus this study is an attempt to test the hypothesis that the impact of health oriented development aid on health outcomes is significant and positive and we essentially utilize an Instrumental Variable Approach as well as a dynamic panel method which had been derived from the voluminous development aid literature to help eliminate any scope of dual way causality between health outcomes and aid. In this exercise we have exclusively focused on the dynamics between health aid and Infant Mortality Rate and also further robustness exercises are provided where the model has been applied in the presence of certain policy environments. The findings in general conforms to the notion that aid positively affects infant mortality rate; however mention must be made of the fact that such findings may be in effect a function of different model specifications employed.

Literature Review & History of Development Assistance:

As stated earlier, the Monterrey Consensus helped set up a common platform for donor nations and agencies alike to adopt uniform policies with regards to aid effectiveness and more efficient channeling of aid.

The question on whether aid improves GDP growth can be traced back to the two-gap model (Chenery and Strout, 1966), which remains a central theoretical backbone in the aid effectiveness literature. According to this model, developing countries face budget constraints on its resource flows which subsequently hamper investment and economic growth. Hence aid flows are meant to fill this gap between investment needs and domestic savings. Since its advent, it has provided the underlying principles both for early aid policies and for model specifications of many early empirical papers, which focused on the relationships between aid and growth and aid and savings (Masud and Yontcheva, 2005; Easterly, 1999).

However, as has been mentioned previously, there is, as yet no proper consensus regarding effectiveness of foreign aid on health outcomes or economic development. In the last few decades, two competing hypotheses have emerged, with the first being the public interest hypothesis and the other being the public choice hypothesis (Williamson, 2008; Sachs, 2005). The first hypothesis posits that aid should be utilized for assisting in the development process while the second hypothesis posits that aid in fact may be counter-productive in promoting human development and may present a harmful influence on future growth prospects and competitiveness of developing nations (Rajan and Subramanian, 2005; Easterly, 2001). However reaching a uniform consensus becomes quite difficult especially with aid flows possessing endogenous components (courtesy of their influencing by growth/health outcomes), ie, aid flows are endogenously determined by economic growth and health outcomes improvement. Furthermore the channels via through which aid has come to impact aid are complex enough to an extent that it becomes difficult to detect any significant component in the relationship between aid and growth (Mishra and Newhouse, 2007). Perhaps this lack of meaningful dynamics between aid and development may stem from the fact that aid measures as utilized in these studies are not sufficiently segregated with regards to sector destination, and as such, leaves considerable room open for biased estimates. Furthermore, fungibility also plays a crucial role in factoring in the muted impact of development aid in these studies (Collier and Dollar, 2001; Gebhard et all, 2008). In fact Petterson (2007) had estimated approximately 70% of all development assistance targeted at specific sectors end up being diverted elsewhere. Some studies have pointed to the positive impact of aid only in the presence of certain ‘good policy’ (i.e. sound fiscal, monetary and trade policy) environments, with Burnside and Dollar (1998, 2000) providing the impetus behind this notion. However, not surprisingly other studies have tended to be critical of this view with Mosley and Hudson (2004) failing to find such similar outcomes, who instead have arrived at the conclusion that ‘good policies’ as defined earlier in the literature, have little in way of impact on aid effectiveness, despite stimulating growth. David Roodman (2004), have also offered a strong criticism of the notion, and have found that there exists strong evidence that Burnside and Dollar’s findings, in addition findings by other authors (Collier and Dehn (2001); Collier and Dollar (2002); Collier and Hoeffler (2004); Dalgaard et al (2001)l; and Guillaumont and Chauvet (2001)) that have reached similar conclusion of aid effectiveness being favorable only in certain policy environments, are not statistically robust. In a reassessment study Guillaumont and Chauvet (2009) conversely found, that while impact of aid to an extent do depend on conditions, they instead argued that the worse the conditions in a country the more amplified the aid effectiveness in that particular country becomes.

Similarly, Paldam and Doucouliagos (2009), after an extensive analysis of available literature on aid effectiveness, have detected a highly significant 'reluctance bias', which refers to the reluctance of a researcher when it comes to presenting negative data. Rather, the most significantly positive result is likely to be selected as the key finding for an aid effectiveness study. This is not surprising, but it is an impediment to uncovering the real effects of aid. Hence the distribution of results of the meta study of the available literature were found to be significantly symmetric. Thus when this tendency is factored in with the widespread practice of polishing up one's findings so that they appear impressive and statistically significant, the gap in research may fail to converge (Doucouliagos and Paldam, 2009).

There has also been some degree of disagreement with regards to 'need orientation' of donors, i.e. the degree to which humanitarian motives matter for aid allocation decisions made by bilateral and multilateral aid donors. Rich Nielson (2010) found that aid flows were most responsive to recipient needs in countries that donor nations find strategically important, thereby once again exposing the crucial role that certain factors, such as degree of strategic importance of nations to donor nations, may play in aid allocations.

Yet again there exists a different school of thought that posits that weak policies and institutions do not stand in the way of aid effectiveness but that aid helps to alleviate poverty irrespective of government or economic policies. Some of them (Dalgaard et all, 2004) have argued that such factors as per capita income, measure of poverty amongst others have no significant effect on aid effectiveness. In fact Croghan et all (2006) have posited that some countries such as Bangladesh have enormously benefited from an increased influx of health oriented development aid, despite the presence of inadequate medical infrastructure and relatively low levels of economic development.

In fact, there is a steadily growing school of thought that conforms to the first hypothesis, with a significant portion of available literature failing to lend evidence that aid promotes growth (Roodman 2004). This may occur to be consistent with the notion that aid has little in way of influence on promoting growth but greatly positively influences health outcomes. In fact, Cutler et all (2006) posits that economic growth need not be a prerequisite for improvements in health outcomes to happen. The existing literature suggests that a rather small portion of improvements in health outcomes can be explained by economic growth (Mishra and Newhouse, 2007). However there are also experts who strongly contest this view of aid failing to kick start growth. According to Hanssen and Tarp (2001), after a study of previous generations of aid literature they have concluded that in fact those published works that presented negative findings were in fact in the minority, with majority of the aid literature upholding the hypothesis that aid helps to bridge the gap between savings and investment (Hansen and Tarp, 2001). Importantly the authors have summed up the apparent rejection of this stated hypothesis in the aid literature, owing to tendency of negative findings to dominate the debate, despite being, in the words of the author, in the minority in aid literature. Similarly Gomanee, Girma and Morrissey

(2005) have found that foreign aid can significantly improve human welfare through increases in public health expenditures. However, the non-accounting of endogeneity of aid in the work may potentially lead to biased results (Williamson 2008). Moreira (2003), in an exhaustive cross country analysis from about 1970 to 1998, also found support for positive impact of foreign aid on development indicators on the aggregate level. However it must be mentioned that one possible drawback of the methodology which he employed, system GMM, may not turn out to be feasible in the presence of autocorrelation within the residuals in the system.

In light of these findings, and with the adoption of Millennium Development Goals initiative, there has been a renewed focus on studying aid effectiveness on health. However as mentioned earlier there still appears to be some degree of discord, as no consensus exists yet on this matter. One of the earlier works in this field was by Peter Boone (1995), who concluded that aid has no significant effect on health indicators. It has since been followed by other works that more or less arrived at the same finding (Yoncheva and Masud, 2005; Fieldng et all, 2006; Burnside and Dollar; 2000, Williamson 2008). In fact, Yontcheva and Masud (2005) estimated a statistically significant impact for aid originating from NGOs, whereas bilateral aid, which comprises a significant portion of all aid flows, was found to be statistically insignificant. This may imply the notion that aid has a far more amplified effect on health outcomes on the micro level, as improving health outcomes at the grassroots level maybe is more efficiently achieved at the grassroots level, and therein this points to the existence of the micro-macro paradox, which states aid is perceivably more effective only in specific cases but has relatively no merit in improving health outcomes at the aggregate level. This perceived disparity in performance standards of aid at the two levels may point to a culture of inadequate assessment practices, with the added disadvantage of econometric methodologies implemented in these various studies further clouding the issue. This have been further borne out by NGO and institutional reports regarding sector specific programs in particular countries that results of most measures are satisfying (Faust, 2009). Kosak and Tobin (2006) have also found a similar relationship, in that while foreign aid may have particularly distinguishably positive effects on countries with high levels of welfare and development indicators. However for poor countries with low levels of human capital, aid serves to negatively impact development.

As argued earlier, perhaps the fact in many of these studies the focus were on analyzing relationships between aggregate aid and development indicators, may lead to overlooking of impact of projects in specific sectors. For example if aggregate aid flows were to be studied with respect to its impact on life expectancy, where much of the aid have been instead allocated to different purposes and goals, wrong interpretation of results may ensue. Hence it is also imperative, when comes to analyzing aid effectiveness for a particular development or welfare indicator, only aid that has been specifically been earmarked for that sector be used for comparison (Gebhard et all, 2008). Thus evaluations of aggregate aid measured against performance of a particular development or welfare indicator may be missing the mark.

One of the first ground breaking works which utilized a specifically defined type of aid for their study was done by Clemens, Radlet and Bhavnani (2004) who distinguished short term aid (as defined with respect to their sectoral definitions being fixed on infrastructural, agricultural and other industrial sectors which promotes short term growth) from long run aid (which was posited as having little to no effect in the short term time span). Since then there have been several other works that have looked into the specific sector wise impact of sectorally defined and allocated aid. Mishra and Newhouse (2009), Claudia Williamson (2008), Burgeot and Soto (2011, 2012), amongst others in the last few years have extensively looked into the impact of sectorally allocated aid and not surprisingly most of them have come to report more appreciable findings.

In fact, Claudia Williamson was among the first to have comprehensively looked into the dynamics between development assistance for health (DAH) and mortality, and she reported no statistically or quantitatively significant effect of development aid. Other authors, such as Sven Wilson (2012), Burgeot and Soto (2011, 2012), Mishra and Newhouse (2009), Chauvet et all (2009) and Gebhard et all (2008) have subsequently greatly expanded on the methodology first developed by Williamson and used different model specifications in their respective works. Not surprisingly these have tended to report different conclusions with regards to effect of health oriented aid. It is perhaps noteworthy to mention that amongst this handful of works, only a few had managed to report a positive degree of interplay between health outcomes and health oriented aid. While Williamson (2008) should indeed be lauded for her ground breaking achievement, in hindsight certain issues crop up that threatens to be a point of controversy. Most importantly in her model specification she had attempted to factor in all 208 member countries of the World Bank. However, such a sample count may not make sense owing to the fact that not all 208 countries, which include both developing and developed nations, share the same suite of features so it warrants application of same econometric model to all the member nations. Williamson did not detect any statistically significant effect of health oriented aid on health outcomes, while Mishra and Newhouse (2009) reported statistically significant findings between health outcomes and aid. However the estimated reduction of infant mortality was found be rather small in comparison to the stiff targets set by the Millennium Development Goals. Burgeot and Soto (2011) found insignificant relationships between aggregate aid and infant mortality, which is not surprising; however following a sectoral breakdown of aid into disaggregate components, the effects show up to be statistically significant especially in areas with high mortality. According to them, although aid levels have significantly gone up in the last decade, the levels of child mortality cannot be expected to shrink enough in the near future and as such the Millenium Development Goals set for 2015 may be missed in high mortality countries mostly, especially in Sub Saharan Africa. Similarly both Gerbhard et all (2008) and Wilson (2011) found inconclusive evidence for any causal relationship between aid and health outcomes, although it may be pointed out that the former work failed to take into account potential endogeneity problems of aid flow which may potentially lead to biased outcomes. It may be mentioned that owing to non-addressing of the endogeneity issue of development aid. Chauvet et all (2009) tested a more extensive framework, where he investigated the likelihood of remittances helping aid to meet the Millenium Develoment Goals deadlines. He had found that while impact of aid on health outcomes only held significance in cross country models, and that too only if aid were to be interacted with income per capita, they reported no significant relationships in the event of quintile level data.

McGillivray, et all (2011) have also looked into the impact of aid on proxy indicators for well-being of population subgroups within 48 countries, and they found that while aid positively influences wellbeing, it is sadly the richest groups that get to benefit the most. According to them, poor groups in developing nations reaps the least amount of benefits from aid, and a probable implication may be that while aid might increase overall living standards in developing countries, this could be at the cost of living standards of the poor falling further behind that of the rich in these countries (McGillevrey et all, 2011).

It is perhaps important to mention that one issue regarding aid and development indicator dynamics, that of ensuring exogeneity of aid, has come to figure prominently in the literature. From a modeling and theoretical standpoint, the presence of endogenous determinants of health outcomes, in this case, aid, may lead to somewhat misleading outcomes when it comes to determining impact of aid on health outcomes, and thus it becomes crucial to adopt an approach that best sees to it that no incidence of two-way causality remains in the regression. Deaton (2010) has stressed that in such an event where donor agencies and parties may be more likely to channel aid where their interests happen to coincide (i.e. say, channeling a higher amount of aid to a country if it possesses high levels of infant mortality), it is imperative to address this form of simultaneous feedback from the dependent variable, which is a development indicator, to aid (Deaton 2010).

Data Description :

A general overview regarding all variables is given in Table 7 in Appendix II.

With regards to the number of countries, care was taken as much as possible to eliminate aid recipient nations but cannot be classified in the lower income spectrum. Hence in the final count for number of countries, the count was confined to 135. Names of the individual countries are given in Page 44.

Data regarding health oriented aid was derived from the development site AidData, which represents a collaborative effort between Brigham Young University, College of William and Mary, and Development Gateway. Unlike the OECD –CRS (Creditor Reporting System), the AidData database contains many large and significant donors not typically found in the former database. Worthy of mention among them perhaps can be the ever increasing clout of private donors, whose volume of aid-flows have gone up significantly but unfortunately a sector-wise breakdown of the private origin aid is not provided in the OECD -CRS database. Importantly, AidData complements the data from bilateral donors put up by the OECD's Creditor Reporting Service (CRS) with a large number of non-OECD bilateral donors and a diverse variety of multilateral financial institutions including regional development banks, many of which are not accounted for by the Creditor Reporting Service as well as the World Bank. Importantly it also includes health-related funding from the Bill and Melinda Gates Foundation (BMGF) and from the Global Alliance for Aids and Vaccinations (GAVI). Much research on development in the past utilized data consisting largely of Official Development Assistance but AidData includes projects that include both ODA and non-ODA grants and loans. However it must be stated that data sourced from AidData may be biased by the aid donors who may potentially choose to inflate their reports of their foreign aid programs. Furthermore we also assume that for the purposes of this study, loans will have the same approximate effects as grants.

It must also be mentioned that the health data sourced are in the form of commitments, instead of disbursements, owing to the fact that figures for disbursement are largely missing, and so despite the theoretical appeal of including aid disbursements, we have included aid commitments. Importantly, it has been shown that there is no substantial evidence to prove that disbursed amounts differ significantly from commitment amounts (Wilson, 2011). Thus, despite the fact that it is more likely that project disbursements typically tend to last a couple of years, and do not actually reach a particular country in the year of commitment, the acute paucity of data regarding disbursements essentially forced us to resort to aid commitment totals.

If the overriding purpose of aid is to primarily relax government budget constraints, then they should have similar effects on health indicators. Thus in order to assess whether characteristics unique to health oriented aid can explain its positive impact on infant mortality, we also examine the effect of aggregate aid. Data regarding aggregate aid were sourced from the World Development Indicators (WDI) 2012, as an additional control variable. Furthermore, also included is GDP per capita in 2000 constant terms, as it is a generally held notion that wealthier nations tend to have more improved health conditions. Wealthier nations should have in general better living conditions, and affordability for better quality healthcare should also be higher. In fact Gerbhard et all (2008) found that GDP alone tend to predict almost 50% of all patterns within aid recipient countries. A majority of aid effectiveness studies previously have looked at GDP growth as the dependent variable, but when other outcomes are being studied, it becomes important to include income as a control variable, especially when it comes to analyzing changes over time. Aggregate aid and health oriented aid have been converted into per capita terms so that inclusion of population as an additional control variable itself is not quite mandatory. However as mentioned previously, when it comes to aggregate aid, the question of fungibility may come into force (Rajan and Subramanium, 2005a; Mishra and Newhouse, 2009), owing to a lack of a defined sense of direction of the aid to a particular sector. Hence in keeping in theory, where other types of sectorally oriented development aid are not specifically tied to particular purposes and primarily relax governments' budget constraints (and thus have similar effects on social and economic outcomes), we also look to analyze impact of 4 other categories of sectorally defined development aid, being, i) Population Policies and Reproductive Health Policies Aid; ii) Education Aid; iii) Water and Sanitation Aid; and iv) Humanitarian Aid, to establish if there is some element specific to health oriented aid that affects health. Data regarding these categories of development aid are sourced from AidData as well.

In our analysis, we augment health oriented aid with aid channeled to the population policies and reproductive health sector and later onwards also with aid channeled to the water and sanitation sector, owing to the fact that the population and reproductive health aid captures AIDS/HIV projects as well as family planning and reproductive health, and these are known to play an influential role in reining in Infant Mortality Rates. Furthermore, water and sanitation aid is added to our AID per capita variable owing to the fact that clean water is a crucial component for controlling health outcomes. In addition, improved sanitation access also translates into improved health outcomes, and thus we factor in water and sanitation aid in our AID variable as well.

As mentioned earlier, our data regarding health aid has been derived from AidData, which unlike OECD's database, happens to track aid-flows from more multi-lateral agencies, and importantly private agencies like Bill & Melinda Gates Foundation (BGFI). Importantly there has also been the emergence of other private agencies like the Global Fund for AIDS, Tuberculosis and Malaria (GFATM) and the Global Alliance for Vaccines and Immunizations (GAVI). These agencies, along with the more traditional players, (developed countries, World bank and other development banks, like the Asian Development Bank) have helped to sustain a massive increase in volume of aid directed towards the health sector since 1990 (Wilson, 2011; Ravi-Shankar et al., 2009). Aid-flows from these private agencies are not covered in OECD's aid-flow database. Data from multilateral institutions and non OECD member nations have been assigned purpose codes with a new coding scheme that builds on the system of purpose codes developed by the Creditor Reporting System (CRS), which keeps record of aid-flows under OECD's auspices. However it differs from CRS in the sense that the AidData classification scheme affords a substantially greater level of granularity in categorization of aid and importantly helps to eliminate the problem of projects being coalesced onto a singular purpose code if they have multiple activities within the same sector. Thus, all the projects in AidData database have been coded utilizing a uniform set of criteria unlike data reported by OECD donors to the CRS, where codes are assigned by individual donors who utilize shifting criteria (Wilson, 2011).

However, it must be mentioned that unlike the OECD database, AidData does not report a comprehensive sub-sectoral breakdown of all aid-flow projects in the health sector. Unfortunately for some of the donor agencies, especially the private agencies, there is no specific purpose codes assigned to the aid funds which makes an accurate sub-sectoral breakdown of health oriented aid quite unfeasible.

Regarding our main dependent variable of interest for focusing our analyses, we choose Infant Mortality Rate as the primary variable. The reasoning behind this is that not only is infant mortality data available for most of the countries of the world, but may also be considered to be unreliable owing to the fact that data for, example, life expectancy are based on predictive equations since most developing nations lack comprehensive vital registration systems (Mishra and Newhouse 2009). Importantly Infant Mortality may also be considered as a better response variable corresponding to changes in economic conditions, and may be suited a far more appropriate vehicle to capture the health conditions of the poor in general (Boon, 1995; Mishra and Newhouse, 2009). Finally, as previous studies have shown that infant mortality rates tend to depend on a variety of other factors or indicators, such as access to medicines, water and sanitation, fertility rates, female literacy rates amongst others, that infant mortality rate alone would suffice as a proxy for a very broad spectrum of human development indicators. Data regarding Infant Mortality rate is derived from World Development Indicators 2012 as well from 1975 to 2010.

Among other control variables, also included are indices which are meant to serve as proxies for specific situations for modeling response behavior of aid recipient countries in these conditions. These indices include indicators for corruption and bureaucracy. Data regarding these have been derived from the Political Risk Services (PRS) Group's International Country Risk Guide (ICRG) list of indices. The purpose of these former is intended to factor in fungibility, that is the speed or pace at which programs or decisions are implemented at the bureaucratic channels, and also to account for the question as to whether the development aid volume is correctly headed towards its intended destination; while the latter to an extent assess the institutional strength and quality of bureaucratic institutions in a country. According to the ICRG definition, a country's bureaucratic strength acts as a shock absorber that tends to minimize impacts of revisions of policy when governments change. The Corruption scores range from 0 (High level of corruption) to 6 (Low levels of corruption). Thus governments with higher levels of transparency (as represented by their corruption score) should be less likely to divert aid money from its intended purposes. Whereas the Bureaucracy score ranges from 0 (poor bureaucratic and institutional infrastructure) to 4 (highly developed bureaucratic and institutional infrastructure). Here the bureaucracy index would be utilized as a proxy for strength of institutions in a particular country. Lastly, we also include the Civil Rights index from Freedom House, as a control variable, as it has been shown that an increase in economic and political freedom may positively affect economic development (Williamson 2008), hence we include the Civil Liberty Index. The premise behind these set of variables is to see the incremental effects of development aid in presence of various types of environments. Here both the index variables have been transformed into dummy variables, with regards to Corruption, values of 0 to 3 (which are relatively high risk) being assigned a value of 1 while values of 4 to 6 (relatively low risk) are assigned a value of 0. Similarly with regards to Corruption variable, values of 0 to

2 (relatively higher risk) is assigned value of 1 while values of 3 to 4 are assigned a value of 0. Hence the purpose of these transformed dummy variables is to seek out aid effectiveness when there is heightened risk or incidence of corruption and bureaucracy. In addition, we also keep fertility rates and number of physicians per 1000 population as extra control variables.

In order to account for the notion that presence of more democratic institutions would be conducive to a better healthcare system (which would manifest itself into lessened Infant Mortality Rates), we also include the Polity Index from the Polity IV data series, whose scores reflect the strength of presence of democratic institutions in a particular country, on a scale of -10 to 10, with -10 representing absolute autocracy and 10 representing absolute democracy. Importantly, the Polity Index helps to factor in political competition, and also other factors like flexibility of executive and bureaucratic institutions, amongst other factors that gauge the political traits of a given nation's political system.

Also included is the incidence of HIV/AIDS so as to address the concern that countries with a higher incidence of AIDS may receive more aid. However, we can safely rule out the chances of health aid influencing the health outcome indirectly through exerting short term influence on AIDS. Hence since the prevalence of AIDS is being controlled for in the model, we can assume that the estimates for aid do not capture the effects of aid on health outcomes in question through any contemporaneous impact on AIDS.

It must be mentioned that in keeping with previous literature, where in order to cope with gaps in data and also to eliminate measurement bias, multiple year averages had been taken (and in the process reducing the timespan to a defined number of periods) we also implemented the same procedure, by taking four year averages for all variables (and furthermore testing the specification on 5 year averages as well). However it must be stated that such an approach is not without its drawbacks, as deriving averages for a single variable over a multiyear period may lead to a potential loss of information. However, as stated earlier, there also exists often substantial gaps in observations for particular years for particular countries, the reasons for which may be attributed to an underdeveloped system of accountability and records in many developing countries, and as such for these reasons we opt to take average all the variables entered in the specification over four year intervals. In the context of impact of development aid on health, especially in the light of the fact that we are utilizing aid commitment figures, rather than aid disbursement totals, the magnitude of aid's impact may only be discerned after a period of time, owing to issues relating to fungibility and bureaucratic processes. Thus because essentially the pace of aid money channeling and project implementation and the observation of the outcome takes a period of time, it makes sense to expand the unit of time format from a single year to individual 4 year periods. Furthermore, such an approach also helps to take care of business cycle fluctuations as well as measurement error. To ensure consistency and robustness, as mentioned earlier, we also run the same regression with five-year averages as well.

Hence for the final dataset we construct a panel data set comprising 135 nations, all of which happen to be aid recipient nations (as show by AidData) and the time-span lasts from 1975 to 2010. We also transform all the variables except for the index variables into log form so that their regression coefficients can be interpreted in terms of percentages.

A Short Look at Data:

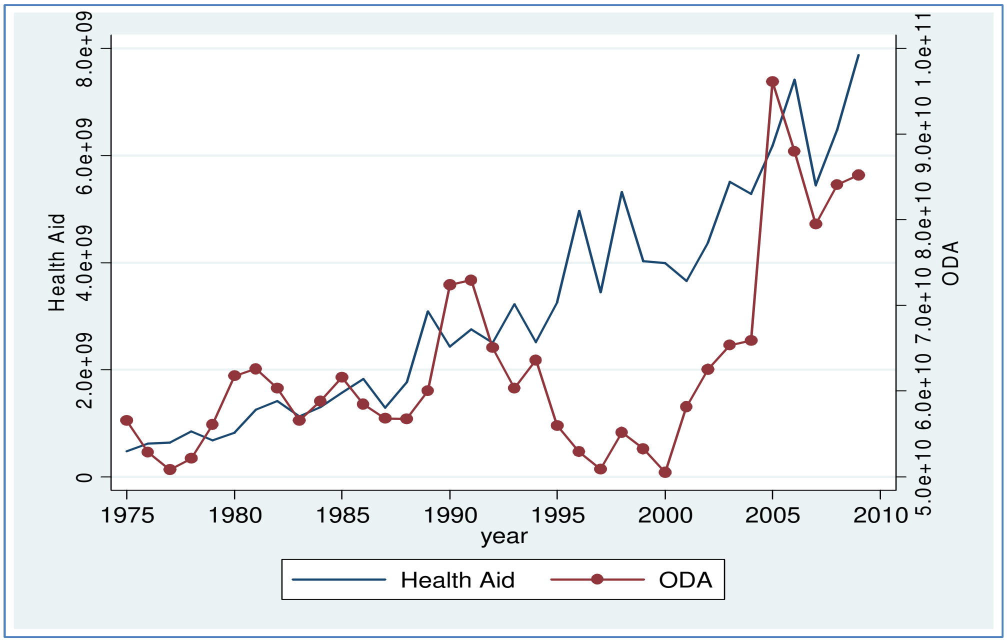

Figure 1: Health Aid and ODA plotted against time

A time plot of yearly totals of health aid for the sample count of countries in this paper and yearly averaged infant mortality rates shows that allocations specifically earmarked for the health sector as well as aggregate aid have witnessed an overall increasing trend since the start of the sample period, 1975. Since 2000, which was the year of advent of the Millennium Development Goals, a rise in health aid volume can be seen with only a major dip at around 2007, which curiously also coincided with the global US led recession. Thus this comes to signify heightened degree of awareness and commitment for implementation of the goals as set by the MDGs.

Significantly the yearly average infant mortality rate has also showing a tremendous decline, and this may come to imply a productive role of health oriented aid in improving the infant mortality rate situation. However as the figure for Infant Mortality Rate represent average figure for all countries for individual years, for greater perspective we can glean from a scatter plot of Infant Mortality Rate over time. Here we see that with passage of years, the country cluster of observations, which individually corresponds to individual year wise and country specific infant mortality rates, have grown narrower or tightened within a narrower band of values with the passage of time, which implies on average, falling levels of Infant Mortality Rate (Figure 2, Appendix I).

Moving to the Figure 2 in Appendix I we notice that although in total terms, health aid volume may have gone up significantly, when expressed as a percentage of total aid however, health aid had seldom broken the 7% mark of aggregate aid (and only noticeably so after around 2005).

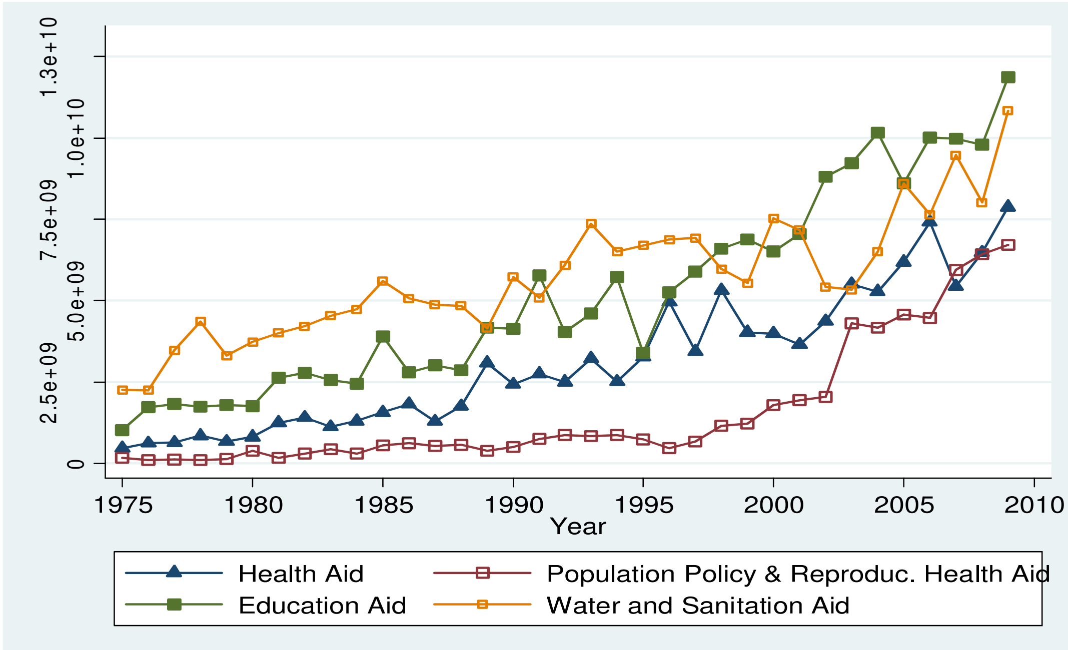

Figure 2 Various Types of Sectoral Aid Plotted against Time

It thus becomes apparent that reported aid only forms a rather insignificant percentage of aggregate aid totals since the start of the sample time-span. Given the fact that the MDGs present a rather stiff target for the international community to implement, perhaps a higher volume of health oriented aid may help to expedite this implementation process.

However, looking at the per capita trends for aggregate aid and health oriented aid (where aid per capita were averaged for each year for all countries), it can be seen that aggregate aid per capita has been witnessing in fact a downward spiral, whereas health oriented aid per capita has somewhat hovered around a consistent range for the whole length of the time-span (Figure 4, Appendix I).

From the chart above, in comparison to other types of aid which have been earmarked for sectors other than health (i.e. water and sanitation , population and reproductive health, education and emergency food assistance), over the specified time-span, it can be noted that aid earmarked for the education sector have witnessed the highest and fastest magnitude of increase, with health oriented aid, amongst the mentioned five categories of aid, coming at a distant third by the end of the time-span in terms of overall volume after water and sanitation aid and education aid. It can also be noticed that aid channeled to the population and reproductive health sector, have also noticeably picked up steam after 2000. Given its central role in improving the mortality situation in developing countries, it is thus not surprising that the volume of aid to the health sector and the population and reproductive health sector have seen a great degree of increase since 2000, since that year marked the advent of the MDG (Millennium Development Goals). However, in comparison, as can be seen, these two types of aid may be seen to lag behind other categories of sectoral aid, over the length of the time-span, and thus perhaps the volume of these two types of aid may need some degree of increase to ensure that the MDG goals and objectives are met by the stated deadline of 2015.

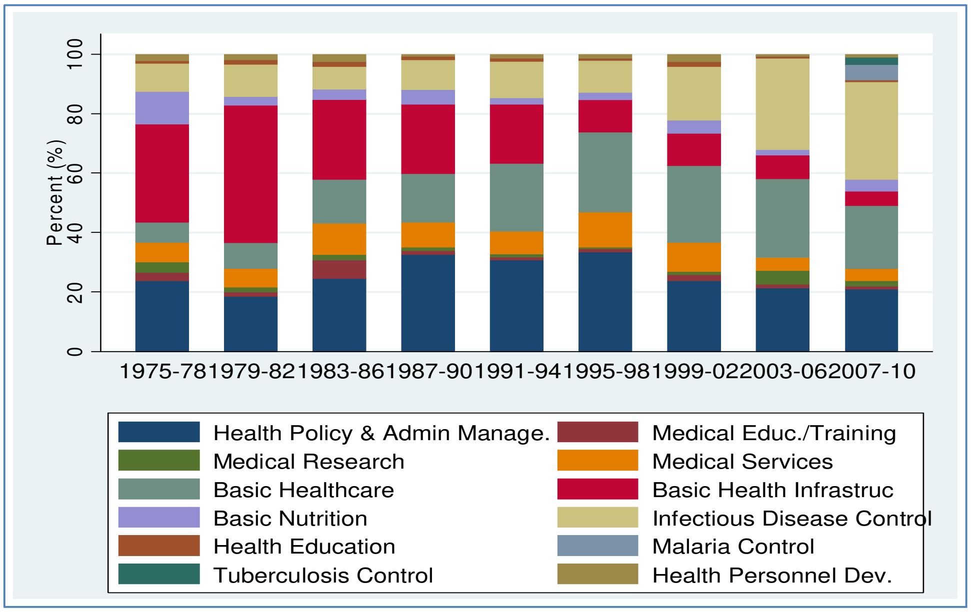

Figure 3: Percentage breakdown of Health Aid into subsectors

Thus the previous bar chart (Figure 3) depicts the percentage breakdown of sub-sectoral aid into 12 defined categories for each four year period (here for purpose of clarity and consistency, only aid that has been specifically defined in terms of direction towards a particular subsector has been named, while aid-flows unspecified in terms of sub-sectoral orientation within health have been left out). From Figure 5 in Appendix 1, for the mentioned sub-categories of health aid (as depicted in Figure 3 previously as well), their cumulative volume has shot up remarkably since 1975-78, when it was about the two and half billion dollar mark, and by the end of the time span, the figure can be seen to exceed thirty billion dollars (in 2007-10). From both Figure 5 in Appendix 1 as well as Figure 3 just above, it can be seen that the total volume as well as share of health infrastructure has been decreasing over time. Similarly the corresponding figures for the Infectious & Parasitic Disease Control subsector have seen a great increase over the time-span as well. From Figure 3 above, it can be seen that the Infectious Disease Control had the largest share of health aid funds among the mentioned 12 sub-categories, since 2003. This has also been reflected in the corresponding rise in volume of aid dollars as well (Figure 4, Appendix 1), where it can be seen that this sub-sector has also been occupying a dominant portion of health aid since 2003. Thus spending for reining in infectious diseases has commanded the highest inflow of aid funds since 2003. This can be partly attributed to an increasing awareness regarding the global AIDS pandemic, as well as other infectious diseases, prominent amongst which are malaria and tuberculosis. Other sub-sectors have also witnessed a great degree of change as well. Prior to 1990, it can be seen that for these 12 defined sub-categories, basic health infrastructure and health policy and administrative management had dominated the sub-sectoral totals for health aid.

In a similar sub-sectoral breakdown of development aid channeled to the Population Policies and Reproductive Health Sector (Figure 6, Appendix 1), which we have used to augment health aid in our model owing to its strong role in combatting Infant Mortality Rates, it can be seen that the volume of this category of aid has shot up dramatically as well in the last two periods (2003-06 and 2007-10). Importantly, accounting for much of this increase in population aid are funds channeled to the HIV/AIDS combating sector. Thus spending on STDs/HIV/AIDS has significantly shot up since 2003. This mirrors a similar trend in health oriented aid, as since 2003, the Infectious Disease Control sector has witnessed the largest share of health aid funds as well. While this change in sub-sectoral priorities may be attributed to a heightened sense of awareness regarding diseases; however Shiffman (2008) had argued that HIV/AIDS funding has supplanted a few traditional priorities from donors, despite other diseases also witnessing an increase in their share of aid funding as well. Furthermore, he also argued that disease specific allocations of aid funding are not specifically linked to burden of the diseases.

Overall, however, this massive increase in these mentioned categories of aid may be seen to closely correlate with the advent of the Millennium Development Goals (MDG) in 2000, which mentions, as one of its objectives, a significant reduction in child mortality rates, and thus correspondingly a higher volume of aid funding has been directed to combating child mortality rates.

Methodology:

With regards to methodology, we would first largely resort to the formulation as first devised by Claudia Williamson (2008), with a few significant alterations, and also look to analyze in more detail and depth the dynamics between infant mortality rate and aid per capita by employing a dynamic panel model, where we utilize the Generalized Method of Moments (GMM) technique for panel data first developed by Arrellano and Bond (1991) and later subsequently expanded by Blundell and Bond (1998) and Bond (2002). While it is imperative to take into cognizance the endogeneity issues of development aid, care must also be taken that other variables do not exhibit such issues as well. Thus our main system of equations will be composed of Fixed Effects 2 Stage Least Sqaure equations where our main variable of interest, health oriented aid, will have to be instrumented owing to endogeneity issues. In addition, we will also look forward to run a system GMM specification of the same model. However, firstly as a benchmark specification, we execute a normal fixed effects system to factor into account all country respective heterogeneities in the model as well as control for unobserved country specific and time invariant determinants of infant mortality.

Benchmark Specification:

$$log\left(IMR_{i,t}\right) = \beta_1 \log\left(AID_{i,t}\right) + \beta_2 \log\left(Z_{i,t}\right) + \beta_3 X_{i,t} + \beta_4 HIV_{i,t} + \beta_5 t + S_i + \varepsilon_{i,t} \qquad \text{(I)}$$

Where $IMR_{i,t}$ corresponds to Infant Mortality Rate , $AID_{i,t}$ corresponds to combined totals of health oriented aid and population and reproductive health aid while $Z_{i,t}$ corresponds to a vector of control variables (which includes variables such as number of doctors per 1000 of population, fertility rates, and importantly GDP per capita, as well as access to sanitation and water supplies). $X_{i,t}$ corresponds to a vector of index variables, and in this case they typically consist of the Polity Index and the Freedom Index (both of which have been detailed above). S_i refers to a vector of country fixed differences which denotes time invariant differences in infant mortality across countries. This term captures the myriad of unobserved economic, political and cultural determinants of mortality and also significantly reduces problems arising from omitted variable bias. However, we differ from traditional literature in that instead of adding a vector of time dummies to capture individual period specific effects, we add the country specific time trend variable (t). The addition of this variable is to model infant mortality rates' trajectory over time, while the addition of the other variables (control and index) serves to shift the mortality trajectory in upwards or downwards direction. Importantly the trend variable also helps to capture the natural progress of the health outcome in question, infant mortality rate, over time, owing to improvements in technology, knowledge, etc.

Since the presence of index proxy variables to control for the institutional environment is quite important, and at the same time, the presence of GDP per capita is also important for reasons stated earlier, it becomes imperative to rule out presence of multicollinearity between GDP per capita and the index variables in question (Williamson, 2008). Presence of such multicollinearity may lead to biased coefficients for the index variables and thus potentially misleading interpretations may result. Thus we ran pair-wise correlation tests to check for such multicollinearity, which enables us to rule out multicollinearity and thus proceed with the regressions.

This specification suggests that there are two distinct channels through which aid may come to affect infant mortality rates. Firstly an increase in per capita aid in a given period *t* may translate into a direct effect on infant mortality rate in the same period. However, there may be a second way through which aid can influence infant mortality rate, that is by influencing some of the other explanatory variables included in the specification and thus indirectly contributing to the improvement of infant mortality rates as well. For example, since *AID* is comprised of both health and population aid, an increase in health aid may lead to improvements in the HIV rates, which would inevitably translate into improved and lessened infant mortality rates. Here we look to analyze specifically the direct channel through which aid affects infant mortality as we assume here that aid may come to be a proxy for those factors or determinants not otherwise addressed or included in the model (apart from the explanatory variables). Essentially we are hoping to capture the pattern and mechanisms of aid effectiveness not accounted for by the explanatory variables (apart from aid per capita).

It must also be mentioned that under the heading of AID per capita, we construe the variable to be of two types. As mentioned in the first type we have aid comprising of health sector and population sector aid, and in the second type, we factor in water and sanitation aid to the aid variable in our specification as well, in addition to health and population aid, for reasons specified earlier.

Mention must also be made regarding the choice of fixed effects approach to account for the issue/problem of unobserved country specific factors present in the model, over a random effects approach, which treats such unobserved disturbances as random draws from a normal distribution, rather than fixed as in fixed approach. The random effects approach has two significant advantages in that it results in more efficient estimators (than fixed effects) and also enables the analysis of other time-invariant variables of interest, as al such variables are eliminated in the fixed effects approach. However, the random effects assume no correlation between the individual country effects and the regressors, and as a consequence, may suffer from inconsistency. Furthermore, in event of correlation between the country effects and the regressors, the coefficient estimates become biased. In view of this, we opted to proceed with fixed effects approach.

However, faults may arise if we fail to treat potential endogeneity problems that may arise within the system. That is, in the event that donors may be inclined to increase volume of development aid to a certain country in the event of a sharp spike or a consistently bad situation of infant mortality rate in that particular country, this would imply that there exists two way causality within the model. This thus invites endogeneity problems, as thus now the dependent variable in question, Infant Mortality Rates, is coming to influence aid allocation. This is symptomatic of reverse causality, which needs to be corrected using instrumental variable approach. If not corrected, then this may result in biased estimates of the regressors, and in the case of the example above, may lead to positive estimates for coefficient of aid per capita, which runs contrary to convention about aid having a negative effect on infant mortality rates. Thus the main problem when it comes to approximating the effect of development aid on a health outcome is the simultaneous feedback from the dependent variable in question (Deaton, 2010; Burgeot and Soto, 2011). As mentioned earlier in the Literature Review, there has been a variety of approaches when it comes to selecting instruments for the endogenous regressor in question, health aid per capita. Some of the earlier studies (Burnside and Dollar, 1998; Ovaska, 2003; Djankov et all, 2005) have used income (GDP per capita) population and infant mortality as instruments for aid. However in these studies mostly aid has mentioned in the aggregate form, rather than aid directed towards any specific sector. Other studies (Boone 1995; Masud and Yontcheva, 2005; Williamson, 2008) have tended to use lags of aid as instruments for current aid. Recent studies on health aid effectiveness that have used Instrumental Variable approach (Burgeot and Soto, 2011, 2012; Chauvet et all, 2008) have used innovative approaches for instrumenting of health aid. As mentioned earlier, Burgeot and Soto (2011, 2012) have used the predicted values derived from regression of health aid on country specific time trend, as instrument for health aid. While Chauvet, Gubert and Mesple-Somps (2008) used the aid totals of the five largest bilateral donors (US, Japan France, UK and Germany) weighted by cultural distance between receiving and donor countries, as instrument for health aid, a method which was also earlier used by Tavares (2003) as well as Rajan and Subramanium (2005a, 2005b).

Thus, as mentioned earlier, since we are largely using the same methodology as Williamson (2008), we use the same instrumenting strategy as devised by Williamson (2008). In order to ensure that current health in a country does not influence current aid allocations, we utilize the second and third lags of health aid per capita as instruments. This instrumentation strategy is also in keeping with Peter Boone (1995), who have shown that lagging aid totals by two periods or more may be used as a valid instrument for current aid as it comes to represent the strategic interests of donors (Williamson, 2008). Previous literature have also highlighted the notion of aid being given to developing countries primarily to suit particular non-development purposes on part of the donors (Mosley, 1985; Trumbull and Wall, 1994). Accordingly, foreign aid should be representative of the long term strategic interests of donors, while at the same time being uncorrelated with current conditions and status in developing nations (Boone, 1995; Williamson, 2008). This may address concern regarding the impact of lagged values of aid on the health outcome in question, infant mortality rate, through channels other than through exerting their influence on the current level of aid.

At the same time, it is also important to ensure that problems regarding endogeneity affect no other variables. To that end, we also introduce instruments for GDP per capita, which we thus treat as endogenous. This is because as income per capita is endogenous to health indicators (Chauvet et all, 2008; Pritchet and Summers, 1996). Thus, we largely follow Chauvet et all (2008) in implementing the same instrumentation strategy for income per capita. Hence for GDP per capita, we use two-period lagged GDP as instrument for current level of GDP per capita, in keeping with the convention developed by Chauvet et all (2008).

In order to ensure validity for using lagged values of aid and GDP as appropriate instruments for current aid and GDP per capita it is necessary for these mentioned variables to be over- identified at the first stage. Results from the first stage regressions, as given by the Shea's Partial R-Squared values, vouch for the validity of these values as appropriate instruments for the endogenous variables in question, aid and GDP per capita.

Dynamic Panel Specification:

$$log\ (IMR_{i,t}) = \beta_0 \log(IMR_{i,t-1}) + \beta_1 \log(AID_{i,t}) + \beta_2 \log(Z_{i,t}) + \beta_3\ X_{i,t} + \beta_4\ HIV_{i,t} + \beta_5\ t + S_i + \varepsilon_{i,t} \quad \text{(II)}$$

The addition of the one period lagged value of infant mortality rate to the model (as shown above) helps to capture the initial health conditions of a particular aid recipient country more accurately. However, addition of such a lagged term may invite its own set of problems prominent amongst which is inconsistency of the within-estimators of the lagged variable. This inconsistency is derived from the lagged error term in the residual, which stays behind despite subtracting the within-country mean (Mishra and Newhouse, 2009). Thus estimation of the specification as stated above is not practical in fixed effects, random effects, OLS (Ordinary Least Square form) or Instrumental Variable Approach, as the lagged value of the dependent variable itself is a function of the country specific effects.

Thus the general approach to this dynamic specification is to use the General Method of Moments (GMM) approach. The following regressions are estimated using a system GMM specification.

$$log\ (IMR_{i,t}) = \beta_0 (\log IMR_{i,t-1}) + \beta_1 \log(AID_{i,t}) + \beta_2 \log(Z_{i,t}) + \beta_3\ X_{i,t} + \beta_4\ HIV_{i,t} + \beta_5\ t + S_i + \varepsilon_{i,t} \quad \text{(III)}$$

$$\Delta log\ (IMR_{i,t}) = \beta_0\ \Delta \log(IMR_{i,t-1}) + \beta_1\ \Delta\log(AID_{i,t}) + \beta_2\ \Delta\log(Z_{i,t}) + \beta_3\ \Delta X_{i,t} + \beta_4\ \Delta HIV_{i,t} + \beta_5 \Delta t + \varepsilon_{i,t} \quad \text{(IV)}$$

Whereas the first difference GMM estimator (which estimates only equation IV) uses past levels of the dependent variable as well as other endogenous regressors fort the equation in first differences, the system GMM estimator is an extended version of the linear GMM estimator that also includes lagged levels of the dependent and endogenous variables as instruments for the equation in levels (Equation III).

Thus essentially lagged differences of the endogenous variables and the dependent variable are used as instruments in Equation (III), while lagged levels of the same variables are used as instruments in Equation (IV). Hence the system GMM estimator helps to identify the effect of aid in our model by comparing two similar countries, using the particular portion of aid attributable to their aid histories. System GMM is utilized rather than first difference GMM because the latter confers significant advantages when it comes to accuracy of the estimated coefficients of the variables, especially if the dependent variable in question is persistent. This happens if after a variable is regressed on its lagged term and the coefficient of the lagged term either approaches 1 or exceeds 1. This implies that the variable in question is a random walk, and if we use first difference GMM in this scenario, lagged levels of the dependent variable become weak instruments. Hence in this scenario, system GMM is the better alternative. These type of specifications become all the more attractive in the context of such datasets where the cross-sectional count is quite high while the number of periods is in relation, rather low.

For the specification above, we treat all variables, aside from the index and HIV/AIDS variable as endogenous, unlike in the first specification where only GDP per capita and aid per capita were treated as endogenous. Thus aside from these two, number of physicians and fertility rates are treated as endogenous as there may exist two-way causality between health outcome and the current levels of these variables mentioned.

One of the main drawbacks of this methodology however, is the large number of instruments generated, which can potentially weaken and invalidate the tests results of the Hansen J Test, which tests for validity of the instruments (Roodman, 2008; Mishra and Newhouse, 2009). Hence for our specification, we use one period lags of the endogenous variables as instruments so that the final instrument count is not excessive so as to render the Hansen J test valid. Furthermore, a larger number of instrument count in the form of lags of endogenous variables may also lead to loss of valuable information within the data, and this is another reason as well as to why the instrument count has been confined to just one period lags of the endogenous regressors.

Another potential drawback to look out for can be second order autocorrelation within the residuals of the system, which can also invalidate the instrument set used in the model and as such can render the model useless. Thus we made sure that the residuals generated displayed no signs of second order autocorrelation.

Results:

Table I: Estimated Impact of Aid on Infant Mortality Rate:

Dependent Variable	Log (Infant Mortality Rate)	
	Fixed Effects	**Fixed Effects with IV(1)**
Log(Aid per capita)	0.0087 (0.0080)	-0.021 (0.0504)
Log(GDP per capita)	-0.2556*** (0.077)	-0.3590*** (0.1322)
Log(No. of physicians)	-0.019 (0.0202)	-0.0198 (0.0168)
Log(Fertility rates)	0.3806*** (0.1312)	0.3840*** (0.1125)
Polity	0.0024 (0.0029)	-0.0002 (0.0032)
Freedom	0.0177 (0.0146)	-0.0018 (0.0184)
HIV	0.0274*** (0.0027)	0.025*** (0.0035)
Time Trend	-0.0844*** (0.0128)	-0.067*** (0.0147)
Constant	5.396*** (0.586)	
No. of Observations	443	357
No. of Groups/Countries	99	92
No. of Instruments		10
Hansen J Statistic (p-value)		0.6076

Note: Standard errors are indicated in parentheses, and are clustered at the country level. Aid per capita is summation of health aid and population aid per capita. All variables are averaged over 4 years. Country specific effects are included in the regressions. In the Instrumental Variable regression, second and third lags of aid per capita and second lag of GDP per capita are used as instruments for current aid per capita and current GDP per capita.
* Significance at 10%; ** Significance at 5%; *** Significance at 1%

Table I above shows the results from both the Fixed Effects specification as well as the Fixed Effects with Instrumental Variables specification. It must be mentioned that the coefficient for the constant term in the second specification has been suppressed. Despite correcting for potential endogeneity issues that may arise within aid per capita in the second specification, a clear pattern emerges: aid specific to the population and health sector do not appear to have a statistically significant contribution to improving infant mortality rate in recipient countries. It may be stated that in the Instrumental Variables (IV) regression, the coefficient for health aid per capita does display the correct sign but remains statistically insignificant, since the standard errors also have increased considerably in the IV estimation. Hence no safe or accurate inferences may be made regarding the impact of aid on infant mortality.

However in both specifications, GDP per capita shows a statistically significant contribution, and correcting for GDP per capita's potential endogeneity leads to a higher revised coefficient in the 2nd specification. This serves to affirm the notion from previous literature about income having a strong and significant effect on infant mortality rate, as higher levels of income will translate into improved public health infrastructure such as water and sanitation, better housing and nutrition and also improved health-care facilities. Furthermore, the Hansen J Statistic test for over-identifying restrictions (for ensuring validity of the instrumental variables) posted a p-value exceeding 10% significance level, which implies that the instrument set used is valid. It may be stated that the magnitude of coefficient of aid per capita in the second specification, despite being statistically insignificant, is higher than in the fixed effects specification owing to the fact that current aid per capita may affect infant mortality rates indirectly by influencing the other explanatory variables present. This may also be indicative of positive correlation between the unobserved components/factors of infant mortality rate and health aid and GDP per capita. The estimated coefficient for time trend shows up to be statistically significant and negative, in keeping with general convention. This reflects the overall improving status of infant mortality in the world in the last four decades owing to significant and positive technology shocks, etc. The index variables involved in the model are found to be statistically insignificant as well, rendering valid inferences regarding their impact on infant mortality unfeasible.

The one curious outcome though has to be the coefficient for fertility rates, which has shown up here as not only positive but also statistically significant as well. Other studies, for example Mishra and Newhouse (2009), have found a negative but statistically insignificant relationship between the two. In fact, the effect of fertility changes on infant mortality has been the subject of intense debate in the literature, with relatively little evidence about fertility having a positive impact on child/infant mortality (Mishra and Newhouse, 2009; LeGrand and Philips; 1996). Thus we may interpret our estimated coefficient as being positive owing to the non-accounting of other overriding factors that are in place and also influencing infant mortality as well, but as mentioned, not accounted for in the model. The coefficient for incidence of AIDS has found to be positive and statistically significant, and this suggests, not surprisingly, that a greater prevalence of AIDS is associated with a higher level of infant mortality rates.

If we further augment our AID per capita variable by including water and sanitation aid (owing to the positive influence of clean water access on health outcomes), then the results become quite altered from if water and sanitation aid were left out from the AID per capita variable. The important explanatory variables in question, AID per capita and GDP per capita both display increased magnitude of impact, which is shown in Table II below. However, unfortunately both of them are statistically insignificant, which makes appropriate inferences difficult and both variables also display comparatively large standard errors. In fact, in general in this specification, (with aid variable including water and sanitation aid), the standard errors of the regressors are all relatively large, and not surprisingly most of the regressors, apart from HIV/AIDS and the time trend variable, are statistically insignificant. Overall this implies that this specification is not fit for interpretation.

Table II :

Dependent Variable	Log (Infant Mortality Rate)
	System GMM
Lagged Log (Infant Mort. Rate)	1.0754 *** (0.038)
Log(Aid per capita)	-0.01329 ** (0.0064)
Log(GDP per capita)	-0.0515 *** (0.0102)
Log(No. of physicians)	-0.0004 (0.0114)
Log(Fertility rates)	0.0234 (0.0702)
Polity	-0.0008 (0.0016)
Freedom	-0.0204 ** (0.01)
HIV	0.002 (0.0026)
Time Trend	0.003 (0.004)
No. of Observations	447
No. of Groups/Countries	99
No. of Instruments	59
Hansen J Statistic (p-value)	0.37
AR(2) Test (p-value)	0.394

Note: Standard errors are included in parentheses, and are clustered at the country level. Aid per capita here is summation of health aid, population aid and water and sanitation aid. In the System GMM specification, we render as endogenous variables all the regessors apart from the index variables, the trend variable and the HIV/AIDS variable. One period lags of these endogenous variables are used as instruments in the System GMM approach

* Significance at 10%; ** Significance at 5%; *** Significance at 1%

As mentioned earlier, under the system GMM specification, we look to be analyzing the short run dynamics between aid and infant mortality rate. Here we construe AID per capita to be comprised of health, population and sanitation. One of the important things to note here is that the coefficient of lagged Infant Mortality Rate comes to be 1.07, thus showing a high level of persistence and this shows that Infant Mortality Rate here almost approximates a random walk, and this justifies our usage of the system GMM estimator. Importantly aid per capita and GDP per capita both show statically significant contributions to Infant Mortality Rate. Furthermore, the Hansen J test fails to reject the null hypothesis of validity of the instrument set, while we also fail to reject the null hypothesis for second order correlation within the residuals, which means our instruments are valid.

The results show that doubling of AID per capita in a given period leads to a decrease in Infant Mortality Rate by about 1.3 percent in the same period. From the coefficient of the lagged term of Infant Mortality rate, it can be inferred that during these 4 year intervals comprising each of the periods in our sample, in general, aid recipient countries have witnessed vicious (accelerating decrease in infant mortality) cycles which serves to further augment decreases in infant mortality. This is because since the coefficient of lagged infant mortality is approximately 1, then thus the long run impact of aid is potentially infinite. Like in the previous specification, GDP per capita shows a statistically significant and negative relationship with infant mortality, but unlike the previous models, the coefficient is smaller. This may be explained by the fact that owing to a more comprehensive instrumentation strategy, the regressors have come to gather more explanatory clout with regards to accounting for variation in infant mortality rates.

The other control variables involved in the specification all show statistically insignificant coefficients, with the exception of the Freedom Index, which shows a statistically significant and negative relationship with infant mortality, where an unit increase in the Freedom Index leads to a 2 % decrease in infant mortality rate. This implies that a higher level of freedom in a given country may come to be associated with lower levels of income mortality rate.

We can say that for the stated time-span of our sample, the average infant mortality in a country stands at about 61 per 1000 live births, while the average aid per capita for an average recipient country stood at almost 10 dollars in 2009 constant terms (aid here equaling health, population and water and sanitation aid). Thus a doubling of aid per capita (from 10 to 20 dollars approximately) is seen to be associated with a 1.3 percent reduction in infant mortality rate, that is a reduction by 0.79 deaths per 1000 live births. Since the number of live births in the world is approximately one million (Mishra and Newhouse, 2009), thus we can say that a doubling of aid can be associated with approximately 790 fewer infant deaths for any year for any country within the length of time-span of the sample.

The addition of extra control variables (corruption and bureaucracy) to the system GMM specification leads to a small degree of gain in explanatory power of development aid per capita (Table III, Appendix II). Both these variables were included as exogenous variables in the revised specification. In the new specification, both corruption and bureaucracy dummies exhibits positive but statistically insignificant coefficients. Given the progressive nature of these original index variables (as an increase in magnitude of these variables implies a lesser risk which the index variable represents), and the subsequent transformation into dummy variables (where 1 represents higher risk of both corruption and bureaucracy) this relationship is not surprising. With regards to bureaucracy, the coefficient estimate suggests that in presence of higher likelihood of ‘red tape’ or bureaucratic roadblocks, Infant Mortality rate unsurprisingly worsens. This highlights the tremendous concerns regarding the quality of bureaucracy in aid recipient nations, and essentially this shows that low levels of institutional quality/strength of bureaucracy is tied to higher levels of infant mortality in a given country. This highlights perhaps the importance of a good bureaucratic framework in order to facilitate smooth and effective implementation of development projects. Regarding corruption which proxies for fungibility in the model, although the coefficient is statistically insignificant, the relationship is still positive and pretty much the same conclusions can be drawn regarding impact of corruption. In fact, Gerbhard et all (2008) also found a similar relationship between infant mortality rate and corruption when they utilized corruption as a control variable in their aid effectiveness regressions. Furthermore, we see that the revised coefficient of aid per capita, while still statistically significant, is now slightly larger, as a doubling of aid, according to the revised specification, leads to a 1.8% decrease in infant mortality rate. This is higher than the earlier estimate of 1.3% which we gathered in the initial GMM estimation. This new, higher estimate for aid per capita can be attributed to the fact that we have successfully isolated and controlled for two separate factors that yields a great degree of influence on infant mortality rate, in the form of corruption and bureaucracy, hence we have derived a slightly larger estimate for aid per capita. However, it must be mentioned that the addition of the extra control variables also had helped to push up the final count of instruments relative to number of countries, as according to a rule of thumb, number of instruments should be significantly less than the number of identifying cross sectional groups, in this regard, countries. Thus while the Hansen Test fails to reject the null hypothesis of instrument validity, the relatively large instrument count (61, in relation to 86 countries in the specification; Appendix II, Table III) may present somewhat of a concern when it comes to interpreting the Hansen J Test.

In order to examine if characteristics unique to health oriented aid helps to explain its impact on infant mortality rate, we regress individually the various categories of development aid on infant mortality, results regarding which are available on Appendix II, Table I and II. Thus generally aid allocated for specific purposes may come to have a larger effect on infant mortality than aggregate aid, owing to a lack of defined direction and focus for aggregate aid. In addition, according to the literature, there is a strong element of fungibility present within aid allocations (Mishra and Newhouse, 2009, Rajan and Subramanium, 2005), and these may influence aid effectiveness. Thus, for the time being, assuming that different categories of aid are not explicitly and specifically tied to the donor assigned purposes, and therefore thus helps to augment the government's efforts into improving infant mortality rates, thus the individual categories of development aid, apart from aggregate aid, that is i) population aid ii) health sector aid iii) water and sanitation aid iv) education aid and v) emergency and food assistance aid, are used to analyze their respective impacts on infant mortality.

According to the system GMM specifications, although all categories of aid, excepting for population aid, display the expected negative sign, however, only emergency and food assistance aid shows a statistically significant relationship with infant mortality. For education aid and water and sanitation aid, however, the null hypothesis on instrument validity is rejected at 10% significance level (as inferred from the Hansen J test statistic), which renders these 2 specifications impractical for valid inferences. (Appendix II, Table 1). Perhaps the most curious finding is that ODA per capita possesses the largest coefficient, although statistically insignificant. The reason for this may be attributed to the fact that ODA per capita may come to channel its influence on infant mortality rate through a variety of indirect channels, and not through any specific or direct channel. Furthermore, in our main specifications our aid variable is itself a sum of 3 related categories of development aid, it still shows up with a statistically significant coefficient compared to aggregate aid, and this can be attributed to the fact that perhaps aggregate in not allocated wholly to improve infant mortality rates. However it has been shown in the literature that our count of 3 aid categories (which we have summed into our own aid variable) are all geared one way or the other towards combating or improving infant mortality rate. Essentially we can say that our aid variable, comprising of health, population and water and sanitation aid, is less fungible than aggregate aid.

With regards to the Instrumental Variables specifications (Appendix II, Table 2), it can be seen that none of the categories of aid comes to present statistically significant coefficients and importantly all of the coefficients presented are positive, whereas convention may dictate that the coefficients would be positive. The reasons for such figures for the Instrumental Variable specifications may have to do with the fact that perhaps a more comprehensive instrumentation strategy is required, so as to better isolate the positive contributions of development aid towards infant mortality.

It is not surprising, thus, when comparing the findings of Table 1 in Appendix II to Table II a few pages earlier, a few things stand out. In Table 2, as the aid variable in question is a summation of health, population and water and sanitation aid, and the aid variables in the various specifications in Table I, Appendix II, represent only individual categories of aid, thus it is perhaps not surprising that the AID variable depicted in Table 2 earlier in this section has a relatively larger coefficient and thus a relatively bigger impact on infant mortality. Such a finding may result from the notion that such sectorally oriented aid as health aid, population aid and water and sanitation aid, go well beyond meeting their intended objectives and go on to wield indirectly perhaps, a good amount of positive influence on infant mortality rates.

It may be mentioned that in comparison to previous studies on a similar field, our findings does not offer in the way of radical. If anything, the findings conform to a steady stream of recent literature which have also found a statistically significant and negative relationship between aid and infant mortality rate. As mentioned earlier, Claudia Williamson (2008) was the first to make a detailed and comprehensive study of impact of health specific aid on infant mortality rate. However, she could not find any statistically significant effects of health oriented aid on infant mortality rates. Since then there were a stream of other works on this particular subject, most of which have followed a Fixed effects with Instrumental Variables approach. Others such as Mishra and Newhouse (2009) have used the more complex system GMM specification, which we have also utilized, and they have drawn a similar conclusion as well, with regards to impact of health oriented aid on infant mortality rate. According to them, a doubling of health aid is associated with a 2% drop in infant mortality. However, one of the main drawbacks of that work was the fact that the authors (Mishra and Newhouse) have sourced their aid data from OECD's database, which is lacking in data from many large multilateral donor agencies as well as importantly private donor agencies which are fast becoming a vital player in the development scenario today. Amongst other such similar works, perhaps Wilson (2011) may approximate the closest when it comes to basic underlying model as well as summing up separate but closely related categories of aid for use in regression. He too implemented mortality trend model, but has implemented various specifications, including system GMM, random and fixed effects as well as random coefficients model (which allows for group/individual specific slope coefficients for trend in comparison to the notion of common trend coefficient as held in most models. He finds a negative but statistically insignificant relationship between mortality and aid, at least in his System GMM model. Similarly, Chauvet et all (2008), in analyzing the respective impact of remittances and health aid on a specific set of health outcomes, namely under five mortality rate and infant mortality rate, finds a positive and statistically significant impact for health aid only when aid is interacted with income per capita. Amongst other prominent works, Burgeot and Soto (2011, 2012) have also sought to analyze impact of health aid on child mortality. They have found statistically significant impact of some categories of aid to improving the child mortality situation. They have also looked into the impact of aid channeled to the infectious disease control sector on under five mortality and found a statistically significant relationship between aid and mortality rate, and according to their estimates, there is a country average reduction of 1.4 deaths per thousand under-five children and live-born babies attributable to aid at its average level in 2000-2010 (Burgeot and Soto, 2012). However, one potential drawback is perhaps the fact that the aid data utilized were sourced from OCED database, the disadvantages of which have been highlighted earlier. Gerbhard et all (2008) implemented a random coefficients model of health aid's impact on infant mortality, but did not find any statistically significant relationship. However, the one potential drawback in the work is that the endogeneity issues regarding aid, widely recognized in the literature, is not addressed and as such may be inaccurate.

When it comes to aggregate aid and infant mortality, Boone (1995), Masud and Yontcheva (2005) and Burnside and Dollar (1998) all have extensively written on this topic, with Boone finding a positive and statistically insignificant coefficient for aid, while Masud and Yontcheva (2005) also reports a similar finding, as does Burnside and Dollar (1998). One thing common to these three is that all of them have implemented an Instrumental Variable approach.

Robustness Checks:

To ensure robustness of the model we changed the length of the unit periods in our time –span to a minimum of five years. Under this new time-span, where we get a reduced number of periods (7) we test the robustness of the key equation the Dynamic Panel Approach using GMM method. From Table 5, Appendix 2, we can see that our main variables of interest aid per capita and GDP per capita both have retained the same signs, but aid now has become statistically insignificant, although it is negative. The coefficient is somewhat smaller than when the unit period was set to 4 years, while GDP's impact on infant mortality has gone up, implying for aid, that lengthening of the unit period has led to relative attenuation of impact of aid, while the change in GDP's coefficient can be explained by the fact that with more lengthened periods, perhaps GDP is gaining more influence on infant mortality.

Another check we must ensure is to implement a different count of lagged values as instruments in the baseline GMM system. So far, we have confined the number of instruments to just one lag of the endogenous variables, for reasons of parsimony as well as ensuring validity of the associated tests, importantly the Hansen's Test. Now if we confine the instruments of the system to just the second lags of the endogenous regressors, we notice some drastic changes in the coefficients (Table 6, Appendix II). While lagged term of infant mortality stays around 1, coefficient of aid per capita becomes positive but statistically insignificant, while GDP's coefficient is negative and statistically significant at -0.05, which is virtually unchanged if the lags were confined to one period values of the endogenous regressors. The change in aid per capita's value though may be hard to interpret, but perhaps can be explained by the fact that in the sample, using 2 period lagged values of aid as instruments for current value of aid may lead to a loss of any dynamics between aid and infant mortality, which would imply that aid effectiveness may start to wane away following more than two periods, or 8 years, after start of the commitment date. Nevertheless this points out the fact that the estimated coefficients in fact can vary between different specifications, and as such will need careful explaining. This has already been borne out by the fact that in the Instrumental Variable specifications, almost all them have shown positive and statistically insignificant coefficients for aid per capita.

Conclusion:

Like recent previous literature, we have found a statistically significant and positive degree of interplay between aid per capita and infant mortality rate. However, so far we have detected this type of relationship only in the Dynamic panel specification with GMM estimation and here too the number of lagged values of the endogenous variables as instruments had to be confined to the first period only. As shown earlier, using not one, but two period lags of the endogenous variables as instruments leads to the coefficient of aid per capita becoming positive and statistically insignificant, which would imply a positive relationship with infant mortality rate.

One of the main issues to watch out for is the issue of second order serial correlation within the GMM specification. This is one issue that has often consistently troubled researchers when it comes to deriving a valid instrument set. As mentioned earlier as well, our findings are not especially robust to different specifications, which may point the finger to some underlying weakness or perhaps a very feature of the data itself. Mention needs to be made importantly regarding the fact that the site from where we had sourced our aid data, AidData, does not extensively track aid-flows from medium to small non-governmental organizations to developing countries. This may not be a major setback, however, as such agencies forma relatively small component in the development aid sphere. Furthermore, as mentioned earlier, because we are utilizing 4 year averages of all variables, in the process we may have lost some information; however there was no way around it given the gaps in data. Another thing to be mindful of is the fact that aid data may likely suffer from under-reporting on part of the donors. However, since health is reported by donors, there is no reason to assume that the costs of accurately reporting aid commitments depend on the recipients (Mishra and Newhouse, 2009)

Thus from our sample count of 135 countries with a time-span of 1975-2010, we derived a statistically significant coefficient for aid per capita to be -0.0126, roughly translating into a 1.3 % decrease in infant mortality, which however is not quite adequate to meet the MDG goals, as in the sample period, a doubling of aid per capita has led to a decrease in infant mortality rate by 790 out of a million live births. Such a finding is in conformity with results from recent literature on similar topics who have also established the same outcome.

Thus for ensuring that the MDG targets are met, donor agencies worldwide as well as governments in aid recipient nations must undertake strong actions at every level so as to strengthen the aid delivery and implementation process as well as increase aid volume substantially as well.

References:

1. Mishra, P. and Newhouse, D. (2009), 'Does Health Aid Matter?' Journal of Health Economics, Vol 24, pp 855-872
2. Arrellano, M. and Bond, S. (1991), 'Some tests for specification of panel data: Monte Carlo evidence and application to employment equations,' Review of Economic Studies, Wiley Blackwell, Vol 58(2), pp 277-297
3. Arellano, M and Bover, O. (1995), 'Another look at the instrumental variable estimation of error-components models,' Journal of Econometrics, Elsevier, pp 29-51.
4. Blundell, R and Bond S. (1998), 'Initial Conditions and moment restrictions in dynamic panel data models,' Journal of Econometrics, Vol 87, pp 115-143.
5. Roodman, D. (2006), 'How to do xtabond2: An introduction to Difference and System GMM in Stata,' Center for Global Development.
6. Anon. (2009), 'Stata Longitudinal Data/Panel Data Reference Manual, Release 11,' StataCorp
7. Masud, N. and Yontcheva, B. (2005) 'Does foreign aid reduce poverty? Empirical Evidence from Nongovernmental and Bilateral Aid,' IMF Institute
8. Burnside, C and Dollar, D. (1998) 'Aid the Incentive Regime, and Poverty Reduction,' The World Development Research Group
9. Boone, P. (1995), 'Politics and Effectiveness of foreign Aid,' Centre for European Performance
10. Fielding, D., McGillivray, M. and Torres S. (2006), 'A Wider Approach to Aid Effectiveness: Correllated Impact on health, wealth, fertility and education,' United Nations University
11. McGillivray, M., Fielding, D., Torres, S. and Knowles, S. (2011), 'Does Aid work for the poor?' University of Otago, School of Business
12. Pettersson, J. (2007), Child Mortality: Is Aid Fungibility in Pro-poor Expenditure Decisive? Review of World Economics, Springer, Vol. 143, No. 4, pp 673-693
13. Gebhard, N., Kitterman, K., Mitchell, A. A., Nielson, D., Wilson, S. and Brigham University (2008), 'Healthy Aid? Preliminary results on Aid Effectiveness,'(online), AidData. Avaliable at http://plaid.byu.edu/Assets/Healthy%20Aid_%20Preliminary%20Results%20on%20Health%20Aid%20Effectiveness.pdf (Accessed 220 June, 2012)
14. Wilson, S. (2011), 'Chasing Success: Health Sector Aid and Mortality,' World Development, Elsevier, Vol. 39 (11), pp 2032-43
15. Deaton, A. (2010), 'Instruments, Randomization, and Learning about Development,' Journal of Economic Literature, American Economic Association, Vol. 48 (2) , pp 424-55
16. Burgeot, R and Soto, M. (2011), 'Seeds of Hope: Assessing the Effect of Development Aid on Reduction of Poverty,' Working Papers 591, Barcelona Graduate School of Economics.
17. Burgeot, R and Soto, M. (2012), 'Measuring the Child Mortality Impact of Official Aid for fighting Infectious Dieseases, 2000-2010,' Working Papers 616, Barcelona Graduate School of Economics.
18. LeGrand, T and Phillips, J. (1996), 'The Effect of Fertility Reductions on Infant and Child Mortality: Evidence from Matlab in Rural Bangladesh,' Population Studies, Vol. 50, pp 51-68
19. Williamson, C. (2008), 'Foreign Aid and Human Development: The Impact of Foreign Aid to the Health Sector,' Southern Economic Journal, Southern Economic Association, Vol. 75 (1), pp 188-207.

20. Chenery, H. B. and Strout, A. M. (1966), 'Foreign Assistance and Economic Development,' The American Economic Review, Vol. 46, No. 4
21. Roodman, D. (2004), 'The Anarchy of Numbers: Aid, Development and Cross Country Empirics,' Development and Comp Systems 0412003, EconWPA.
22. Sachs, J. D. (2005), 'The End of Poverty,' New York: The Penguin Press.
23. Rajan R. and Subramanium A. (2005), 'Aid and Growth: What does the Cross Country Evidence Really Show?,' IMF Working Papers, 05/127, International Monetary Fund.
24. Rajan R. and Subramanium A. (2005), 'What Undermines Aid's Impact on Growth,' NBER Working Papers 11657, National Bureau of Economic Research, Inc.
25. Easterly, W. (2002) 'The cartel of good intentions' Foreign Policy Vol. 131, pp 40-49.
26. Collier, P. and Dollar, D. (2001) 'Can the World Cut Poverty in Half? How Policy Reform and Effective Aid Can Meet International Development Goals,' World Development, Elsevier, Vol. 29 (11), pp 1787-1802.
27. Mosley, P. & Hudson, J. and Verschoor, A. 2004. 'Aid, Poverty Reduction and the 'New Conditionality,' Economic Journal, Royal Economic Society, Vol. 114(496), pp 217-43, 06.
28. Collier, P. & Hoeffler, A (2004). 'Greed and grievance in civil war,' Oxford Economic Papers, Oxford University Press, vol. 56(4), pp 563-595, October.
29. Collier, P. and Dehn, J. (2001) 'Aid, Shocks, and Growth'. World Bank Policy Research Working Paper No. 2688. Available at SSRN: http://ssrn.com/abstract=632756
30. Dalgaard, C. and H. Hansen (2001), 'On Aid, Growth and Good Policies', Journal of Development Studies, Vol.37, No.6, pp. 17-35.
31. Guillaumont, P. and Chauvet, L. (2001), 'Aid and Performance: A Reassessment', Journal of Development Studies, Vol.37, No.6, pp. 66-87.
32. Doucouliagos, H & Paldam, M, 2009. 'The Aid Effectiveness Literature: The Sad Results of 40 Years Of Research,' Journal of Economic Surveys, Wiley Blackwell, vol. 23(3), pp 433-461, 07.
33. Shiffman, J. (2004) 'Donor Funding Priorities for Communicable Disease Control in Developing Countries,' Unpublished working paper. Department of Public Administration, Maxwell School of Public Administration, Syracuse University, Syracuse, New York.
34. Croghan, T. W., Beatty, A. and Ron, A. (2006) 'Routes to better health for children in four developing countries,' Milbank Quarterly Vol 84, pp 333-358.
35. Cutler, D., Deaton, A., Lleras-Muney, A. (2006) ' The determinants of mortality,' NBER Working Paper No. 11963. National Bureau of Economic Research, Cambridge, MA.
36. Hanssen, H. and Tarp, F. (2001) 'Aid and growth regressions,' Journal of Development Economics, Elsevier, vol. 64(2), pp 547-570
37. Gomanee, Karuna, Girma, S. and Morrissey, O. (2005) 'Aid public spending and human welfare: Evidence from quantile regressions' Journal of International Development, Vol 17, pp 299-309.
38. Clemens, M., Radelet, S., Bavnani, R. (2004) 'Counting chickens when they hatch: the short-term effect of aid on growth' CGDWorking Paper No. 44. Center for Global Development,Washington, DC.
39. Organization for Economic Co-operation and Development (2012) Development database on aid activities: CRS online. At < www.oecd.org/dac/stats/idsonline>.
40. Political Risk Services Group, Inc. (2012) International Country Risk Guide. At <http://www.prsgroup.com/ICRG.aspx.> 15 June 2012

41. Trumbull, W., & Wall, H. (1994). 'Estimating aid-allocation criteria with panel data' The Economic Journal, Vol 104, pp 876-882.
42. Moreira, S.B., (2003). 'Evaluating the impact of foreign aid on economic growth: A cross-country study (1970-1998)'. WP for 15th Annual Meeting on Socio-Economics, Aix-en-Provence, France.
43. Kosak, S. and Tobin, J., (2006). 'Funding self-sustaining development: The role of aid, FDI and government in economic success'. International Organization, 60, 205-243.
44. Chauvet L. & Guillaumont P. (2009). 'Aid, Volatility, and Growth Again: When Aid Volatility Matters and When it Does Not,' Review of Development Economics, Wiley Blackwell, vol. 13(s1), pp 452-463, 08.
45. Collier, P. and Dollar, D. (2002), 'Aid Allocation and Poverty Reduction', European Economic Review, Vol.46 (8), pp. 1475-1500.
46. Burnside C. & Dollar D., (2000). 'Aid, Policies, and Growth,' American Economic Review, American Economic Association, Vol. 90(4), pp 847-868.
47. Easterly, W. (1999). 'The Ghost of Financing Gap: Testing the Growth Model Used in the International Financial Institutions,' Journal of Development Economics, Vol. 60(December), pp. 423–38.
48. Nielsen, Rich (2009). 'Does Aid Follow Need? Humanitarian Motives in Aid Allocation,' Working Papers, AidData.
49. Mosley, P. (1985). 'The Political Economy of Foreign Aid: A Model of the Market for a Public Good,' Economic Development and Cultural Change, University of Chicago Press, Vol. 33(2), pages 373-93, January.
50. Faust, J. (2010). 'Policy Experiments, Democratic Ownership and Development Assistance,' Development Policy Review, Vol 28, pp 515-534

APPENDIX I

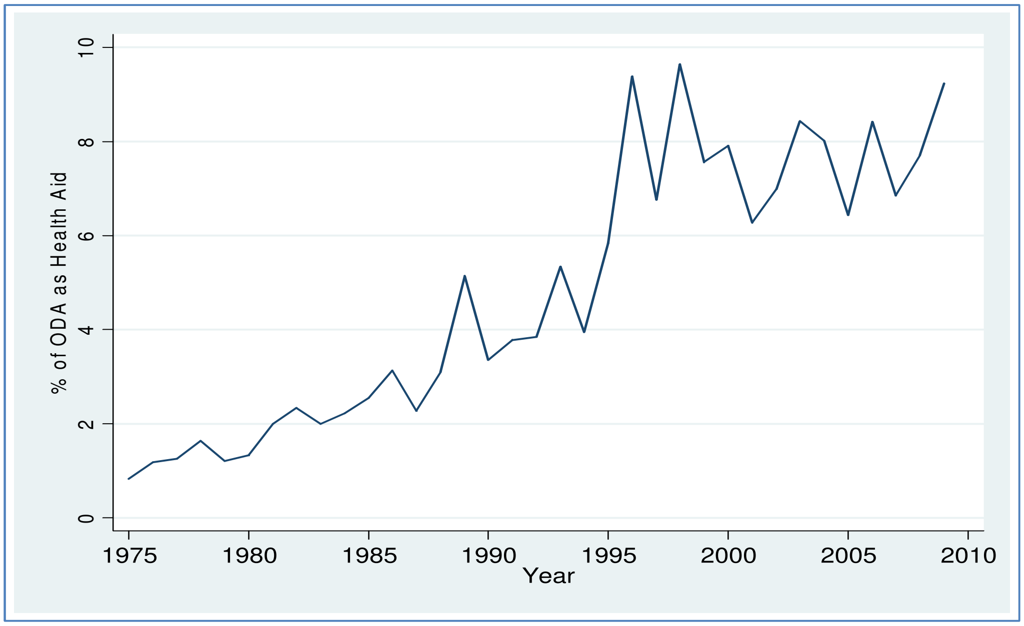

Figure 4: Percentage Share of Health Aid from total ODA plotted against time

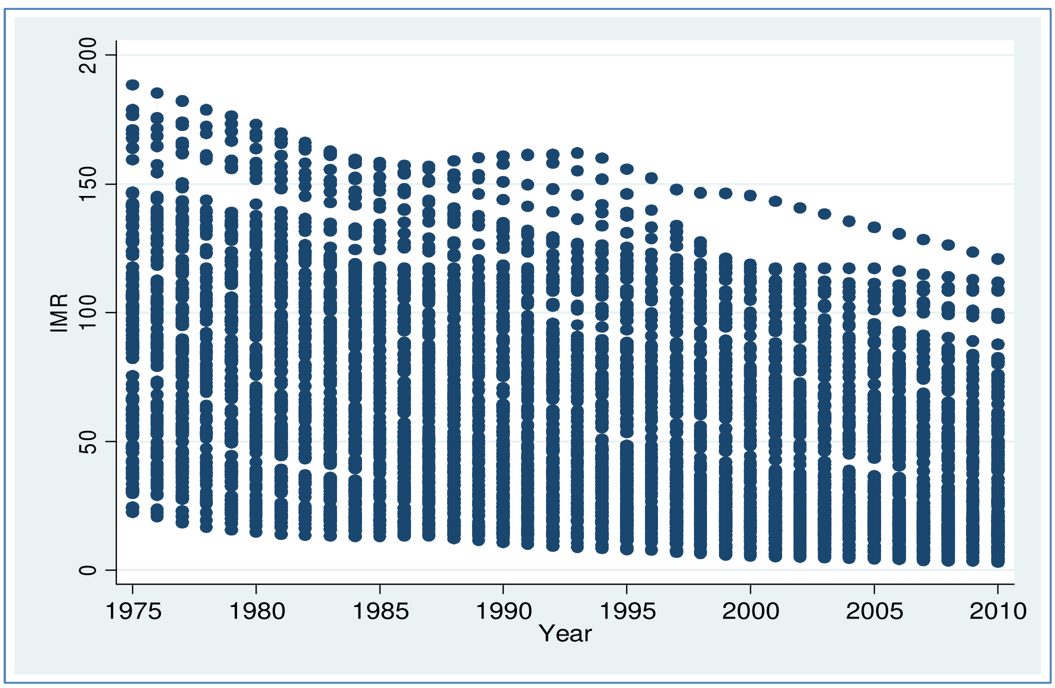

Figure 5 Scatter Plot of IMR against time

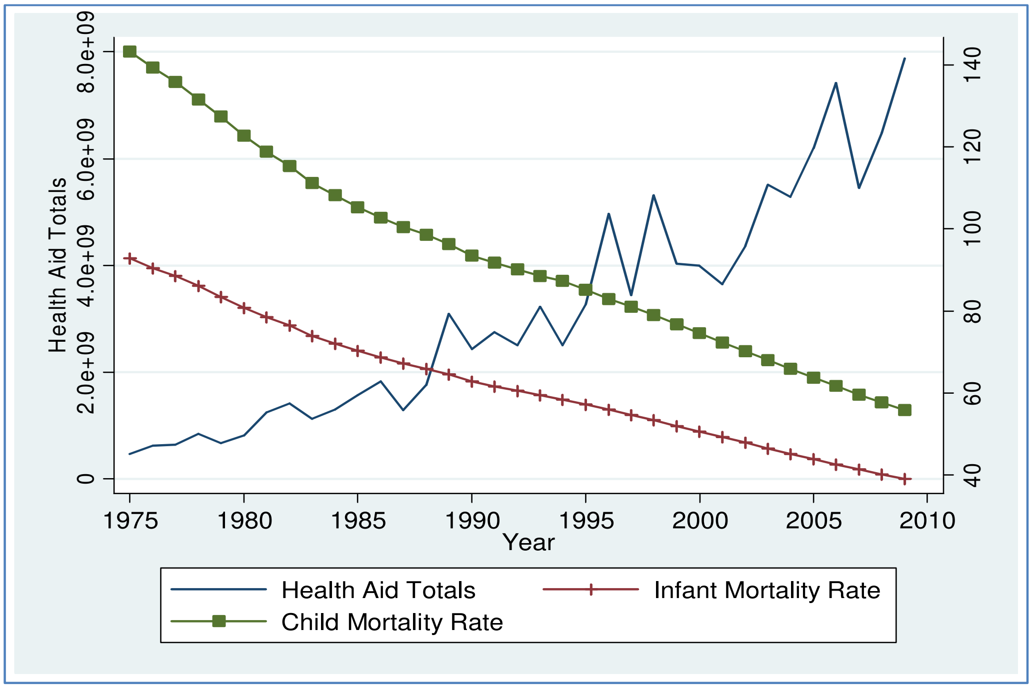

Figure 6 Child Mortality Rate & Infant Mortality Rate & Health Aid Totals plotted against time

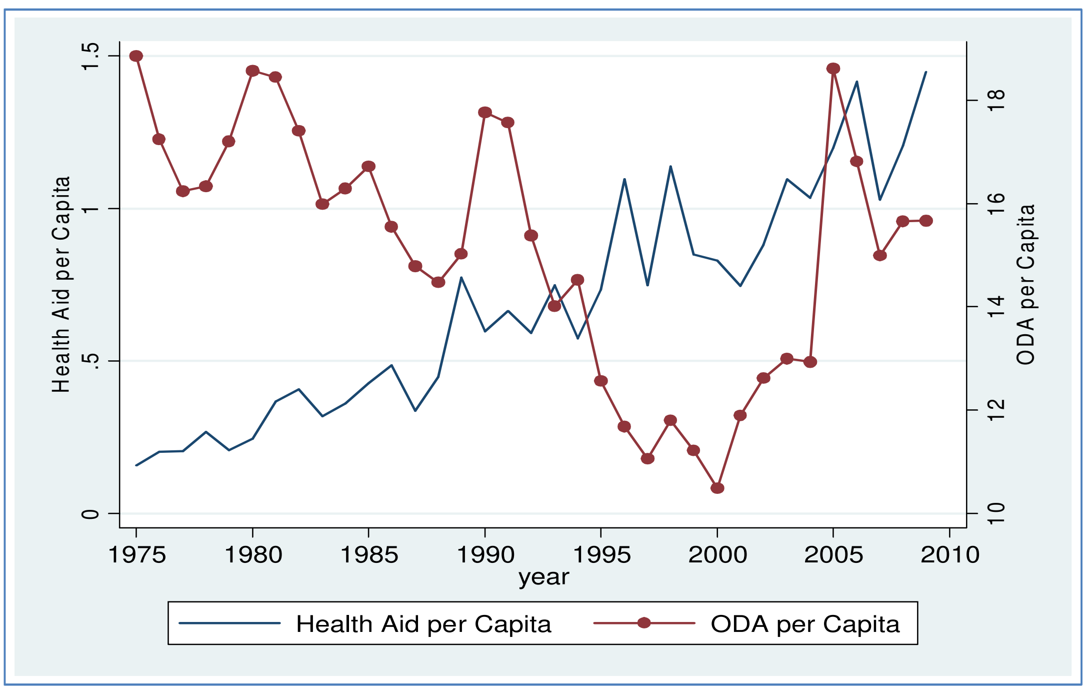

Figure 7: Health Aid per capita and ODA per capita plotted against time

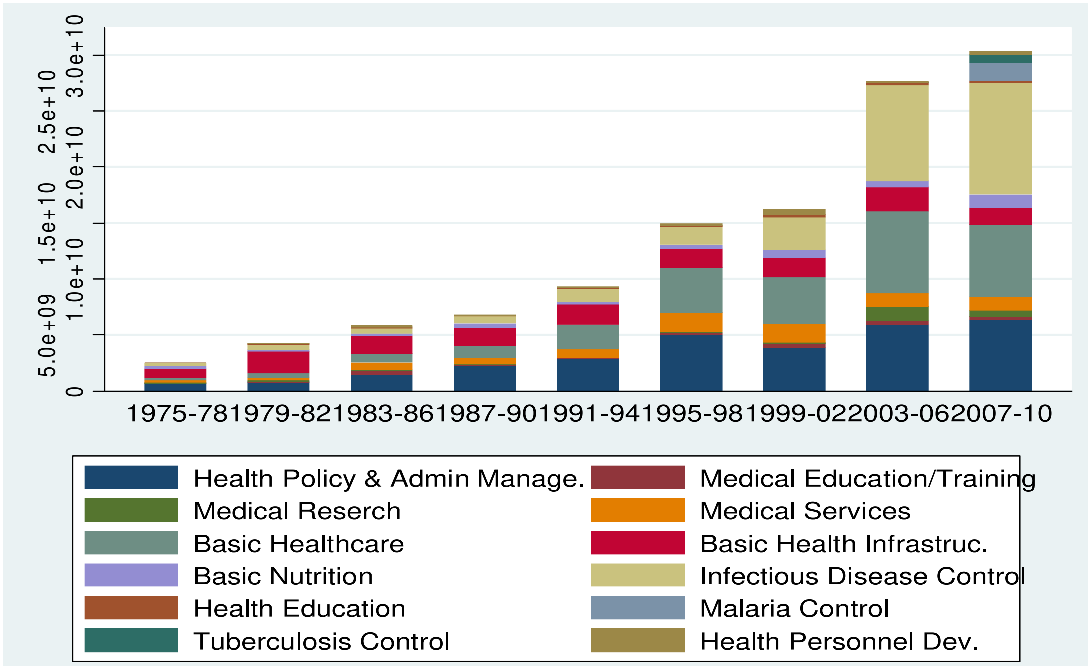

Figure 5: Sub-Sectoral Breakdown of Health Aid over time

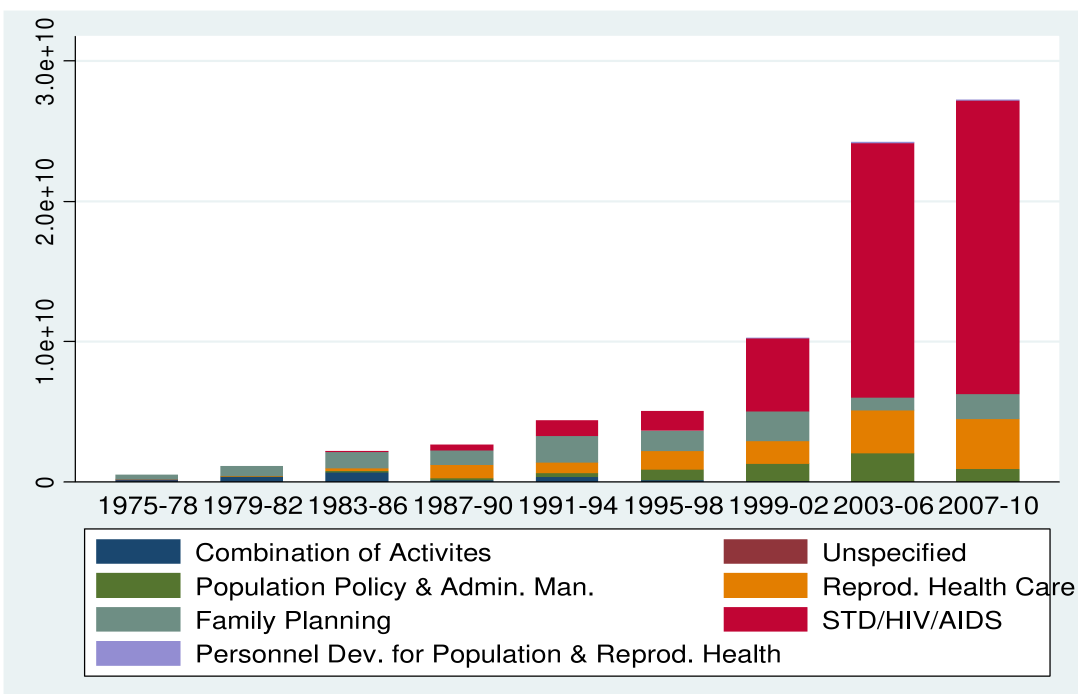

Figure 6: Sub-Sectoral Breakdown of Population Policies & Reproductive Health Aid over time

APPENDIX II:

Table I: GMM Specifications (With Different Categories of Aid)

Dependent Variable	**Log (Infant Mortality Rate)**					
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Log(ODA per capita)	-0.109 (0.02)					
Log(Education Aid per capita)		-0.005 (0.004)				
Log(Emergency/Food aid per cap.)			-0.052* (0.003)			
Log(Population Aid)				-0.006 (0.005)		
Log(Water and Sanitation Aid)					0.00003 (0.003)	
Log(Health Aid)						-0.0036 (0.004)
No. of Observations	423	448	432	394	435	441
No. of Groups/Countries	96	99	99	99	99	99
No. of Instruments	59	59	59	59	59	59
Hansen J Statistic (p-value)	0.408	0.362	0.283	0.242	0.333	0.319
AR(2) Test (p-value)	0.274	0.085	0.547	0.174	0.093	0.276

Note: Controls and instruments are the same as in Table II from main body.
* Significance at 10%; ** Significance at 5%; *** Significance at 1%

Table II: Fixed Effects with IV specifications (With Different Categories of Aid)

Dependent Variable	**Log (Infant Mortality Rate)**					
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Log(ODA per capita)	0.094 (0.256)					
Log(Education Aid per capita)		-0.008 (0.055)				
Log(Emergency/Food aid per cap.)			0.021 (0.022)			
Log(Population Aid)				0.012 (0.032)		
Log(Water and Sanitation Aid)					0.166 (0.227)	
Log(Health Aid)						0.02 (0.0576)
Constant						
No. of Observations	368	376	336	202	329	350
No. of Groups/Countries	89	93	87	62	83	90
No. of Instruments	9	9	9	9	9	9
Hansen J Statistic (p-value)	0.95	0.32	0.55	0.41	0.97	0.49

Note: Controls and instruments are the same as in Table I from main body. * Significance at 10%; ** Significance at 5%; *** Significance at 1%

Table 3: System GMM with additional controls

Dependent Variable	Log (Infant Mortality Rate)
	System GMM (2)
Lagged Log (Infant Mort. Rate)	1.035 *** (0.0704)
Log(Aid per capita)	-0.01817 ** (0.0079)
Log(GDP per capita)	-0.0701 ** (0.03)
Log(No. of physicians)	- 0.009 (0.0126)
Log(Fertility rates)	-0.0564 (0.0754)
Polity	-0.00007 (0.0022)
Freedom	-0.028 *** (0.0128)
HIV	0.0107 (0.0026)
Corruption	-0.0107 (0.0233)
Bureaucracy	0.2774 (0.4183)
Time Trend	0.005 (0.006)
No. of Observations	305
No. of Groups/Countries	86
No. of Instruments	61
Hansen J Statistic (p-value)	0.503
AR(2) Test (p-value)	0.927

Note: Instruments same as in Table II from main body.
* Significance at 10%; ** Significance at 5%; *** Significance at 1%

Table 4: Fixed Effects with IV Specification (Augmented Aid)

Dependent Variable	Log (Infant Mortality Rate)
	Fixed Effects with IV (2)
Log(Aid per capita)	-0.1157 (0.290)
Log(GDP per capita)	-0.5384 (0.4775)
Log(No. of physicians)	-0.1937 (0.1982)
Log(Fertility rates)	0.5221 (0.2721)
Polity	-0.0014 (0.0046)
Freedom	-0.0021 (0.0287)
HIV	0.026*** (0.0035)
Time Trend	-0.0391*** (0.068)
No. of Observations	380
No. of Groups/Countries	95
No. of Instruments	9
Hansen J Statistic (p-value)	0.6510

Note: Aid per capita here comprises of health aid, population aid and water and sanitation aid. Instruments are same as in Table I from main body.
* Significance at 10%; ** Significance at 5%; *** Significance at 1%

Table 5: System GMM (Revised Time-Span)

Dependent Variable	Log (Infant Mortality Rate)
	System GMM
Lagged Log (Infant Mort. Rate)	1.085 *** (0.044)
Log(Aid per capita)	-0.011 (0.008)
Log(GDP per capita)	-0.0634*** (0.0137)
No. of Observations	345
No. of Groups/Countries	99
No. of Instruments	39
Hansen J Statistic (p-value)	0.476
AR(2) Test (p-value)	0.14

Note: Instruments & Control variables same as in Table II from main body.

* Significance at 10%; ** Significance at 5%; *** Significance at 1%

Table 6: System GMM (Revised Lagged value count as Instruments)

Dependent Variable	Log (Infant Mortality Rate)
	System GMM
Lagged Log (Infant Mort. Rate)	1.0804 *** (0.02)
Log(Aid per capita)	0.002 (0.007)
Log(GDP per capita)	-0.05 *** (0.01)
No. of Observations	447
No. of Groups/Countries	99
No. of Instruments	59
Hansen J Statistic (p-value)	0.598
AR(2) Test (p-value)	0.119

Note: Instruments & Control variables same as in Table II from main body.

* Significance at 10%; ** Significance at 5%; *** Significance at 1%

Table 7: Summery of Variables:

Variable	Obs	Mean	Std. Dev.	Min	Max
No. of physicians	926	0.947769	1.211823	0.007	9.67305
Fertility Rate	1202	4.392582	1.806658	1.125	9.1875
Polity	977	-0.38033	6.608118	-10	10
Corruption (Index)	616	2.509289	0.975444	0	6
Bureaucracy (Index)	616	1.590319	0.897219	0	4
Freedom	1215	5.013032	1.903944	1	8
GDP	1049	1715.203	1937.899	84.90413	11319.37
Infant Mortality Rate	1179	61.0224	38.83147	3.65	183.725
HIV/AIDS	637	2.20484	4.478387	0.1	26.025
Time Trend	1215	5	2.583052	1	9
ODA per capita	1104	104.1513	148.3148	-6.0384	1437.956
Health Aid per cap	1050	5.484488	17.24624	0.000017	411.3333
Water Aid per cap	1037	9.773225	26.14941	0.001138	420.6901
Popn. Aid per cap	794	2.196227	7.535917	0.000703	110.3471
Educ. Aid per cap.	1100	10.1318	21.5629	0.000651	278.7383
Emer./Food Aid	1022	4.967273	14.16424	0.000824	150.6475

List of Countries				
Afghanistan	China	Guyana	Micronesia, Fed. Sts.	Sri Lanka
Albania	Colombia	Haiti	Moldova	St. Kitts and Nevis
Algeria	Comoros	Honduras	Mongolia	St. Lucia
Angola	Congo, Dem. Rep.	India	Morocco	St. Vincent and the Grenadines
Antigua & Barbuda	Congo, Rep.	Indonesia	Mozambique	Sudan
Argentina	Costa Rica	Iran	Myanmar	Suriname
Armenia	Cote d'Ivoire	Iraq	Namibia	Swaziland
Azerbaijan	Cuba	Jamaica	Nepal	Syrian Arab Republic
Bangladesh	Czech Republic	Jordan	Nicaragua	Tajikistan
Barbados	Djibouti	Kazakhstan	Niger	Tanzania
Belarus	Dominica	Kenya	Nigeria	Thailand
Belize	Dominican Republic	Kiribati	Oman	Togo
Benin	Ecuador	Korea, Dem. Rep.	Pakistan	Tonga
Bhutan	Egypt, Arab Rep.	Kyrgyz Republic	Panama	Trinidad and Tobago
Bolivia	El Salvador	Lao PDR	Papua New Guinea	Tunisia
Bosnia and Herzegovina	Equatorial Guinea	Lebanon	Paraguay	Turkey
Botswana	Eritrea	Lesotho	Peru	Turkmenistan
Brazil	Estonia	Liberia	Philippines	Uganda
Bulgaria	Ethiopia	Macedonia, FYR	Rwanda	Ukraine
Burkina Faso	Fiji	Madagascar	Samoa	Uruguay
Burundi	Gabon	Malawi	Sao Tome and Principe	Uzbekistan
Cambodia	Gambia	Malaysia	Senegal	Vanuatu
Cameroon	Georgia	Maldives	Seychelles	Venezuela, RB
Cape Verde	Ghana	Mali	Sierra Leone	Vietnam
Central African Republic	Guatemala	Mauritania	Solomon Islands	Yemen, Rep.
Chad	Guinea	Mauritius	Somalia	Zambia
Chile	Guinea-Bissau	Mexico	South Africa	Zimbabwe