THE EFFECTIVENESS AND THE GOALS OF FOREIGN AID: AN EMPIRICAL EXAMINATION OF SECTORAL AID'S INFLUENCE ON MITIGATING CONFLICTS AND VIOLENCE

A Thesis

by

YU ZHANG

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

August 2012

Major Subject: Agricultural Economics

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Approved by:

Chair of Committee,	David A. Bessler
Committee Members,	David J. Leatham
	Timothy J. Gronberg
Head of Department,	John P. Nichols

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ABSTRACT

The Effectiveness and The Goals of Foreign Aid: An Empirical Examination of Sectoral Aid's Influence on Mitigating Conflicts and Violence. (August 2012)

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Chair of Advisory Committee: Dr. David A. Bessler

The objectives of foreign aid are closely associated with the global political and economic issues during the last 60 years. In recent years foreign aid flows have been considerably influenced by international terrorism. In this paper I attempt to investigate whether and how sectoral aid has affected international conflicts and intra-country violence.

The analysis is initiated by case studies. I use graphical analysis to examine the rationale and disbursements of sectoral foreign aid to Iraq and Afghanistan from 2002 to 2010. It is discovered that aid for agriculture and food are extremely low in these conflict areas. Then I use a comprehensive panel data to show the relationships between conflicts/violence and sectoral foreign aid covering 123 developing countries from 2002 to 2010. It shows that agricultural aid can significantly reduce conflict, and aid for food security can significantly mitigate violence. Aid for some sectors will increase conflict/violence. Finally I use directed acyclic graphs (DAG) to present preliminary results on the structure of causality among conflicts/violence and sectoral aid, showing that aid to government is positively associated with both conflict and violence.

DEDICATION

This thesis is dedicated to:

my parents, Ping Zhang and Qinghua Zhao.

ACKNOWLEDGEMENTS

I would like to thank my committee chair, Dr. Bessler, and my committee members, Dr. Leatham, and Dr. Gronberg, for their inspiring guidance and support throughout the course of this research. I would also like to extend my grateful thanks for Dr. Price and Dr. Shahriar in the Borlaug Institute. They funded my research and gave me valuable feedback on my earlier draft.

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Finally, thanks to my mother and father for their encouragement and support to my graduate study in United States.

NOMENCLATURE

Educ	Foreign aid to education
Health	Foreign aid to health
Govern	Foreign aid to government administration and civil society
Infrast	Foreign aid to economic infrastructure
Agri	Foreign aid to agriculture
Food	Foreign aid to food security
Other	Foreign aid to other sectors
PLM	Linear panel model
Pooled OLS	Pooled ordinary least squares model
Lagged PLM	One year lagged linear panel model
Ordered Probit	Ordered probit model
Breusch-Pagan	Breusch–Pagan test
Durbin-Watson	Durbin-Watson test

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1. INTRODUCTION

1.1 Overview

Foreign aid, which is also called foreign assistance, development assistance, or international aid, is defined by the Columbia Electronic Encyclopedia as "economic, military, technical, and financial assistance given on an international, and usually intergovernmental level…Aid may be given as a grant, with no repayment obligation, or a loan, and often comes with conditions that require that the recipient nation purchase goods or services with the aid from the donor nation."(Columbia Electronic Encyclopedia, 6th Edition, 2011). While the Organization for Economic Co-operation and Development (OECD) presents another definition, saying that foreign aid includes "grants and loans to developing countries and territories which are: (i) undertaken by the official sector of the donor country, (ii) with the promotion of economic development and welfare in the recipient country as the main objective and (iii) at concessional financial terms" (Hjertholm and White, 2000). The main difference between these two definitions is whether to include military aid in foreign aid. In thesis I employ the second definition since it's accepted by more researchers.

From 1956 to 2006, the amount of foreign aid allocated is larger than $2.3 trillion dollars at the 2006 price (Easterly, 2006). Recently Shah (2012) reviewed foreign aid situation at the global level, stating that rich countries of the OECD have donated 0.2%-0.4% of their GNP (now GNI) as aid to developing countries since 1970, that is to say,

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This thesis follows the style of *Journal of Agricultural Economics.*

some &150 billion short per year. He also mentioned that the amount of foreign aid maintains an upward trend during the past 10 years, despite the economy loss in 2009 due to the financial crisis.

There exists evidence of foreign aid in antiquity. The modern issue of foreign aid was originated with Britain in the 19th and early 20th centuries, based on studies of Hjertholm and White (2000) and Kanbur (2003). At that time the Britain government provided development assistance to colonial governments, in order to improve bilateral relationships and stimulate the colonial economies and their demand for British exports. After World War II, aid doctrine was widely accepted and used by United States and other countries. The Marshall Plan, as well as the establishments of United Nations, the World Bank and the International Monetary Fund played important roles for the expansion of aid doctrine. During the Cold War, foreign aid was used by the western countries and the Soviet as a weapon in the ideological war, drawn plenty of critiques on its inefficiency. In 1970, rich countries of the OECD agreed at the United Nations (Resolution 2626) to give 0.7% of their gross national income (GNI) as aid to the developing countries. During the same period, Regional Development Banks were started in Asia, Africa and Latin America. These multilateral organizations along with World Bank expanded multilateral aid, with advantages of better handling the coordination of a multitude of individual aid programs. The aid doctrine was changed in 1980's, instead of "ideological weapon", development aid was provided to support the "import substitution" strategies of developing countries, often conditioned on policy reform that conformed to the objectives of the "Washington Consensus."Throughout the

1990's, foreign aid was mainly allocated for the transition to market economies of the formerly communist economies, as well as the poor countries whose populations suffered through the East Asian financial crisis in 1997.From 2001 the United States has been the largest donor of aid. No doubt that the September 11th terrorist attacks in 2001 created renewed interest in U.S. foreign aid. The U.S. operations in Iraq and Afghanistan have again brought attention to U.S. foreign aid policy. For example, reconstruction costs in Iraq now exceed all other U.S. foreign aid spending (Belasco, 2011).

1.2 Literature Review

As we discussed above, the objectives of foreign aid are not certain. Kanbur (2003) argued that the fundamental aid policy for rich countries is to trade for support from poor countries in the geopolitics, for example in the "war on terror" era, the rich countries such as U.S. need allies and may find them among poor countries by providing development aid. Contrast with Kanbur, Lumsdaine (1993) presented a relatively idealistic view of foreign aid aims, emphasizing that humanitarian concern in the rich countries formed the main basis of support for aid, instead of donor's political and economic interests. Kalyvitis and Vlachaki (2011) pointed out that foreign aid includes non-developmental goals related to democracy. But they found a negative relationship between aid and democracy, especially in unfavorable environments for democracy. A more comprehensive summary of the objectives of foreign was given by Shahriar (2011). He offered a broad survey of the literature from the 2000's onward. His conclusion reflects the recent opinions of researchers (Easterly, 2004, 2007; Moyo,

2009; Azam, 2004, 2006; Svensson, 2000; Sachs, 2006), claiming that there are five key objectives: eradicating poverty; enhancing livelihoods of the impoverished in developing countries so that they can achieve equal terms of trade; creating a political hegemony; maintaining a sound diplomatic relationship; and ensuring international peace and harmony. Regarding to poor countries, the last three objectives are directly or indirectly related to the mitigation of conflict and violence. Especially under the leadership of President George W. Bush, U.S. government presented the Millennium Challenge Account (MCA) after September 11 terrorist attacks, claiming that the threat of global poverty and international terrorism were considered as the greatest challenges facing humanity in the 21th century (Owusu, 2004).

As discussed above, donor countries deliver resources to recipient countries for some reasons. However, is the aid positive or negative for the recipients? Morgenthau (1962) was probably the first researcher to assess the effectiveness of foreign aid after the Marshall Plan. Morgenthau claimed that medical and agricultural aid may benefit recipient countries. He also cautioned policy makers about spending too many resources on government administration and civil society sector in an effort to promote Western political values in developing countries. Samuelson (1951) and Sachs (2005) suggested that people in poor countries are so poor that they cannot save for the capital formation, unless they obtain external assistance. On the contrary, Bauer (1972) described the dismal performance of foreign aid during cold war, criticizing inappropriate and inefficient aid destroys economic incentives and leads to misallocation of scarce resources in developing countries. Easterly (2006) mentioned that foreign aid had

brought about little improvement in the lot of the world's poor, due to the World Bank and the IMF's politically and institutionally dysfunctional.

A high-profile literature with empirical studies concerns foreign aid effectiveness in promoting economic growth and reducing poverty in recipient countries. Some researchers show that foreign aid has been conditionally effective in improving development. For example, Burnside and Dollar (2000) suggested that foreign aid is only successful in countries with good policies and governance. Bearce and Tirone (2010) presented another condition for aid to be effective on welfare promotion that is the other strategic benefits associated with the aid should be small. That is to say, it's very hard for donor countries to achieve and retain allies in the anti-terrorism war, while at the same time threaten the recipient countries to curtail aid if they are not able to use it effectively. Jenick and Krepl (2006) found foreign aid contributed in economies transformation and formulation of the development policy in many countries, such as Botswana and South Korea in the60s, Indonesia in the 70s, Bolivia and Ghana at the end of 80s, Uganda and Vietnam in the 90s.There is, however, just as much evidence to suggest that foreign aid is inefficient. Boone (1996) measured aid effectiveness by human development indicators, finding no significantly positive relationship. Boone explained that foreign aid is not economically effective because the politicians were more likely to conduct distortionary policies when receiving aid flows, which would cause or enhance poverty. Another interesting thing he found is that democracies and liberal regimes did not allocate aid any differently from other regimes.

Other critics on foreign aid include aid dependency and aid fungibility. According to Thomas (2001), a country is aid dependent when it cannot perform many of the core functions of government, such as delivering basic public services like schools and clinics, without foreign aid. Tandon (2008) and Brautigam (2000) summarized the negative effects of aid dependency, including the loss of policy autonomy, less transparent and accountable of budgets, and unpredictability of long-term planning due to the volatility of aid flows. Aid dependency used to be a very serious problem before 2000, but is has fallen sharply in the recent years (Thomas et al., 2001). In addition, Collier (1999) contested five propositions related to aid dependency; he contradicted all five propositions and hence cumulatively contradicted the central belief of aid dependency in theory. Aid fungibility is yet another problem. Foreign aid intended for socio-economic sectors might be used directly or indirectly to fund unproductive sectors, such as military sector. Feyzioglu, Swaroop and Zhu (1998) empirically examined the relationship between foreign aid and expenditures in public sectors, finding no fungibility in the aggregate level but sectoral fungibility (aid for agriculture, education, and energy) existed. Recently Sijpe (2010) pointed out evidence is meager to indicate that aid for education and health is fully fungible. Due to limited sample scopes in previous researches and contradictory discoveries, we cannot draw a firm conclusion with respect to the fungibility of sectoral aid.

The previous papers about foreign aid are mainly focused on the aggregate level and its effectiveness to reduce poverty; not many paid attention to aid on the sectoral level and its effectiveness to reduce conflict and violence. It's understandable because: (1)

only country-wise data of foreign aid by sector from 2002 is available by OECD, as a result, previous researchers must suffer the limitation of number of countries observed when studied this issue; (2) along with some other goals, the most important goal of foreign aid before 2000 is to improve welfare of humans in the poor countries, this situation has been changed after the September 11 attack, that keeping global peace has become as important as welfare improvement.

Among a few papers regarding aid by sector, Sachs (2005) emphasized aid for basic health care in order to fulfill the millennium development goals (MDGs). Morgenthau (1962) and Azam et al. (2003, 2010, 2007) argued aid for government administrations to adopt a Western philosophy of politics may not be very beneficial in blunting threats from radical and impoverished societies. They also argued that military intervention would not decrease the threat of terrorism, instead they advocated for increased foreign aid for education. Keen (1994) and Soysa et al. (1999) affirmed that foreign aid for agricultural development is the most important facet for development, as it can successfully reduce hunger, thereby reducing conflict and violence. Messer et al. (1998) agreed with them, and he mentioned particularly that agricultural aid may play an active role in those societies that are vulnerable to conflict. On the other hand, a great deal of literature illustrates the detrimental effects of agricultural aid and food aid on economic development (Moyo, 2009; Waal, 1989; Stewart, 1993; Barrett, 2001). But the critics are chiefly directed towards the implementation process, rather than to food and agricultural policies. The above representative analysis is not related to mitigating conflict and violence but to reducing poverty. However, plenty of conflicts and violence are caused

by extreme hunger or poverty. Their discussions do provide a start platform for the following analysis. As for the sector-by-sector analysis on aid's impacts of international peace, there are some non-academic reports written by researchers in political science (Young and Findley, 2011; Anderson and Spelten, 2000). Young and Findley suggested aid for education, health, governance and civil society, and agriculture have a negative influence on the count of international terrorist attacks, that is to say, intra-country violence. Still an examination of sectoral foreign aid in mitigating conflict and violence deserves more attention in the foreign development literature. Also, Shahriar (2011) took one key subcategory from every general sector, finding that aid for agriculture and food security could mitigate conflict and violence whereas aid health has a positive effect.

The remainder of this thesis is structured as follows. Section 2 describes the data and the variables; Section 3 discusses the intervention strategies in conflict zones; Section 4 presents the empirical results and policy implications; Section 5 discusses the error terms and the directions of causalities; and Section 6 offers conclusion and recommendations.

2. DATA AND VARIABLES

The primary variables of interest in this thesis are intra-country violence, inter-country conflict and sectoral foreign aid data. Data on international conflict from 2002 to 2010 has been made available through the Uppsala University database. This data is labeled as international conflict, because at least one government was involved in each of the conflict events. In order to reduce the impacts of large variance in the original data, the data was ordered by the Uppsala University database, considering the intensity of the conflicts. The intra-country violence data was collected from the Global Terrorism Database, University of Maryland. It includes violent events of assassination, hostage-taking, armed and unarmed assault, bombing, explosion, attack on infrastructure and hijacking in all countries from 1970 to 2010. The intensity of violence in each country is measured by the total number of incidents per year.

Sectoral foreign aid data for agricultural development, government administration and civil society, developmental food aid and food security programs, economic infrastructure and services, health and education was collected from the OECD database. Regrettably, the aggregate sectoral aid data at the country level is available only from 2002. It should be mentioned that aggregate data on sectoral assistance from 1971 is available through OECD database. Yearly data for each aid receiving country was recorded. The aggregate foreign assistance data that reflects the combination of loans, grants, foreign direct investment and assistance were also collected in the OECD database. To better understand the underlying meanings and scopes of foreign aid by sector, definitions of each sectoral aid are listed as follows:

Education: Development Co-operation Directorate (DAC) of OECD defines aid to education as including education policy and administrative management, education facilities, and educational training and research. The definition is ranged from basic education, secondary education to post-secondary education.

Health: The DAC definition of aid to health as including basic health care, infectious disease control, health education and health personnel development, health sector policy, and other medical health services.

Government administration and civil society: The DAC defines aid to government administration and civil society as including institution-building assistance to strengthen core public sector management systems and capacities, departments of regional and local government, anti-corruption commissions and monitoring bodies, justice sector systems and procedures, as well as support to the exercise of democracy and diverse forms of participation of citizens during and beyond elections, human rights, and women's equality.

Economic infrastructure and services: The DAC defines aid to economic infrastructure &services as including support to infrastructure, policy making and training of transportation, storage, communications, energy generation and supply. Also, aid to banking and financial services is a part of this sector.

Agriculture: In DAC's definition, "agriculture" has a broader sense, which consists of forestry and fishing. Aid to agriculture includes agricultural sector policy, agricultural land and water resources development, agricultural productions improvement, and agricultural training and research.

Food: The DAC defines aid to food security as supply of edible human food under national or international programs including transport costs. Cash payments made for food supplies are also regarded as food aid. But emergency food aid is excluded.

Other: Aid to water and sanitation, other social infrastructure and services, industry and mining, environmental protection, and non-food commodity assistance are included. However, aid to military is excluded.

Combined with conflict and violence data, we use the sectoral aid data for 123 developing countries from 2002 to 2010. In the following analysis, international conflict and intra-country violence are treated as the dependent variables. Conflict is measured by grades on the scale of death numbers, with higher grade indicating more intensive conflict events. The violence data comprises the count of terrorist events in a country over the period of a year. We report the cumulative max, min and average value of conflict and violence by country in Table 1.

Table 1: Summary Statistics of Dependent Variables

	Conflict	Violence
Cumulative Max	18	6,213
Cumulative Mean	2.4553	178.8374
Cumulative Min	0	0
CumulativeStd.dev	4.7809	700.0913
Number of observations	1,108	1,108

The sample size consists of 1,108 observations for each variable. Table 1 shows that from 2002 to 2010 the most conflict-prone country, which is India, has a cumulative maximum yearly conflict index of 18. The average cumulative grade for each developing

country is 2.4553, which means that at least 1,000 people died in battles in the given period. Iraq suffered the highest cumulative number of violent incidents caused by intra-country violence is 6,213, while the cumulative average amount of incidents is about 179 for each country.

The independent variables for the regression analysis (performed in section 4) consist of aid for Education, Health, Government and Civil Society, Economics Infrastructure and Service, Agriculture (including forestry and fishing), and Food Security along with an aggregate estimate for foreign assistance for all other sectors. Table 2 presents the summary statistics of the independent variables by country. We make three interesting observations from table 2. First, most of the variables display a wide variation across countries. Second, on average, economic infrastructure and government and civil society obtain most of the money, while agriculture and food aid/ food security draw less money. The third point is that the signs of minimum value of *Infrast* and *others* are negative. OECD rather vaguely claims that the negative value comes from over spending a country's development budget.

Table 2: Summary Statistics of Independent Variables

	Educ	Health	Govern	Infrast	Agri	Food	Other
Max	841.83	528.42	3,068.52	2,079.04	542.28	343.14	16,173.43
Mean	53.88	33.47	69.49	87.92	27.38	9.48	356.62
Min	0	0	0	-0.86	0	0	-0.57
Std.dev	97.00	62.42	172.73	190.26	52.49	22.28	879.23
Number of observations	1,108	1,108	1,108	1,108	1,108	1,108	1,108

Notes: The numbers inside the table are in millions of U.S. dollars.

3. CASE ANALYSIS

We initiate our quantitative analysis with graphical illustrations and discussions on the disbursement strategies of sectoral foreign aid. Figure 1 shows the total foreign aid allocated to education, health, government and civil society, economic infrastructure, agricultural development, and direct food security from 1971 to 2010. Aid to economic infrastructure has been consistently allocated the greatest amount of money. Although most of the developing countries have agrarian economies, from 1987 to 2006 the amount of agricultural aid has declined rapidly. Figure 2 depicts the percentages of sectoral foreign aid for 123 countries from 2002 to 2010, which will be further analyzed in the next section. Figure 2 is presented to give a first impression about the data to be examined.

Compared to the decrease of agricultural and food aid from the late 1980s through the early 2000s, both international conflicts and intra-country violence have markedly increased. Figure 1 shows that funds for government administration and civil society have been increasing since 1999. This shift can largely be attributed to the realization by policy makers that foreign aid can be effective on the condition of good governance. Hence, foreign aid officials began to spend significant amounts of money to build good governance in conflict-prone nations. Figure 1 also depicts that aid for education has also significantly increased over time. Academics (Azam et al. 2004, 2003) have also argued that aid for education would convey the anti-war opinions to the young civilians. Thus, increased aid for education can lead to more peaceful livelihoods for the poor. Compared to aid for government and economic infrastructure, aid for health is increasing

rather slowly in the recent decade. Economic infrastructure and services have obtained the greatest share of assistance. Shahriar (2011) mentioned that middle and upper income countries with "good governance," such as Brazil and the Philippines, receive most of their aid in the form of economic infrastructure and services. Aid for food security and food safety has been the lowest form of aid, because long term food programs are categorized in agricultural sector. Sectoral aid data for each developing country is not accessible until 2002.

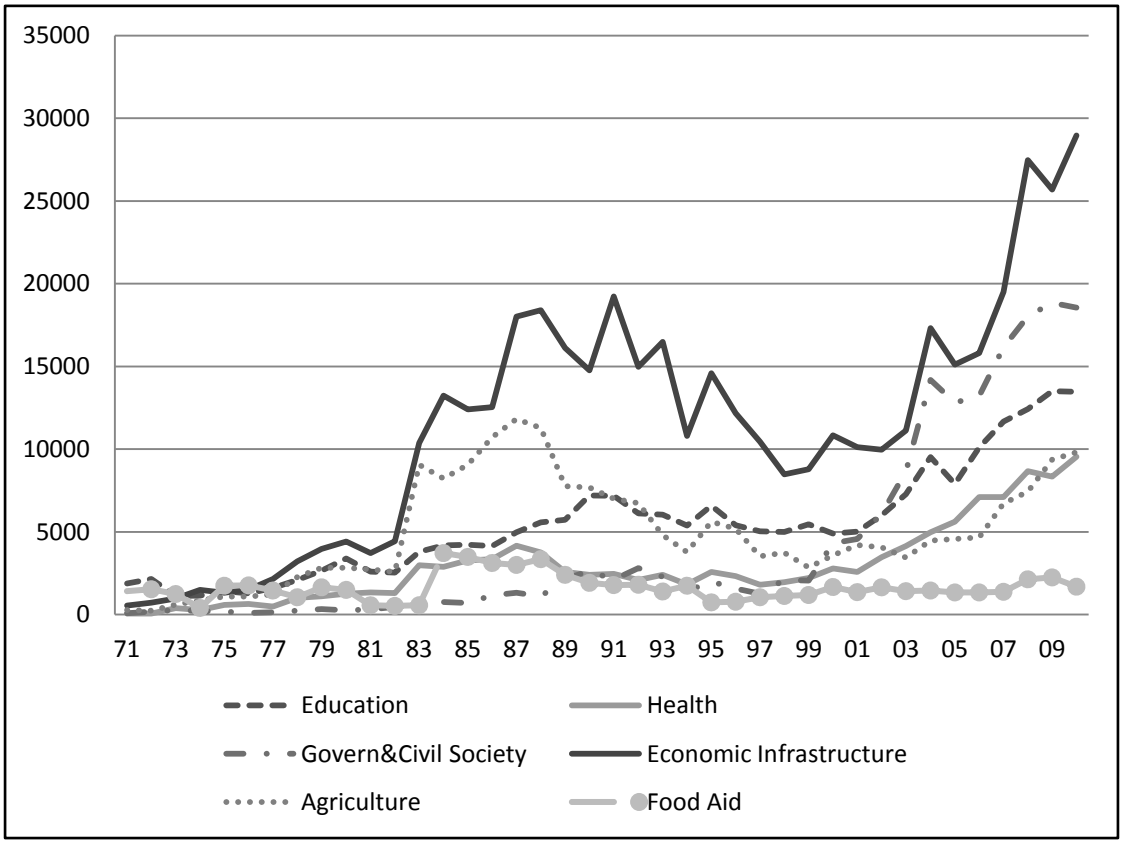

Figure 1: Time trends of assistance from all donors disbursed by sector, 1970-2010 (US$ millions)
Source: OECD.

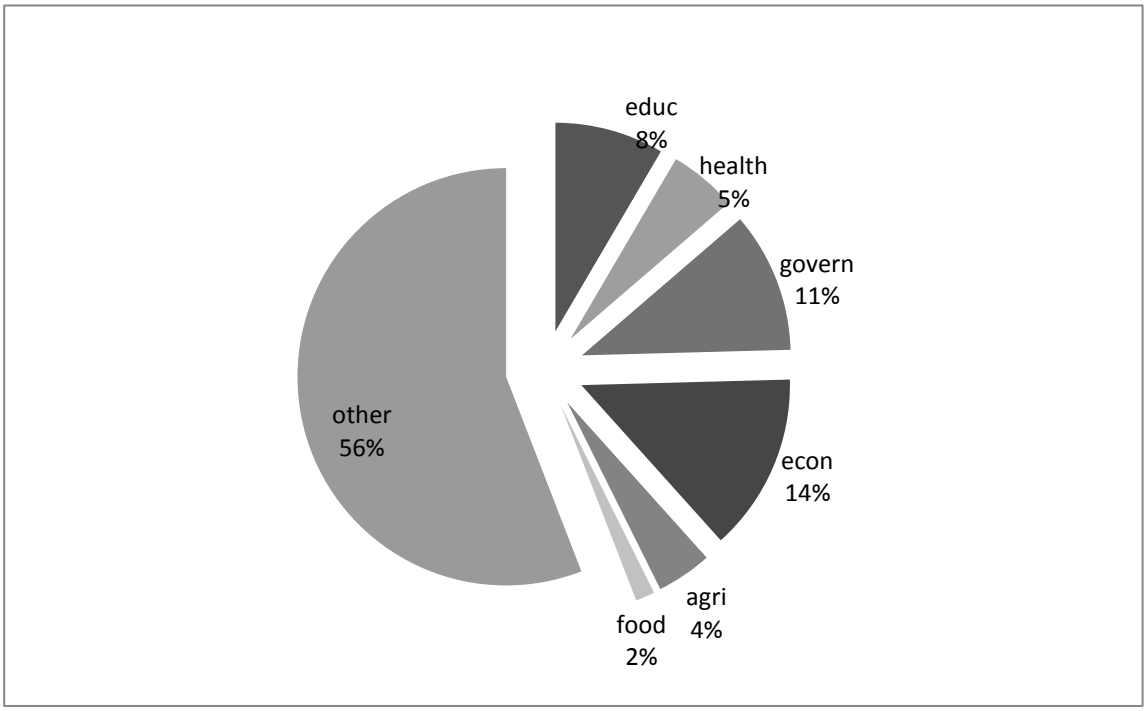

Figure 2: Percentage of foreign aid by sector for 123 countries, 2002-2010
Source: OECD.

3.1 Afghanistan Case

Foreign aid is usually regarded as development assistance, so that military aid is excluded. However, military operations and aid for military sector are often employed in most conflict-prone countries, such as Afghanistan and Iraq. Following figures are intended to compare the spending between military spending and non-military foreign aid spending in Afghanistan and Iraq. USA's Department of Defense (DOD) expenses in Afghanistan from 2002 to 2010 are shown in Figure 3. This figure shows that DOD spending is several hundred–folds greater than foreign aid spent in Afghanistan. Belasco (2011) pointed out that DOD has spent $336 billion in Afghanistan from 2001 to 2011, in other words, $92 million per day in Afghanistan. Yet, during the 10 years,

Afghanistan received $7.9 million per day on average. Moreover, Waldman (2008) reported that DOD spending comprises only one-third of the total U.S. military expense on Afghanistan. From figure 3, DOD spending was increasing exponentially; while foreign aid spending was increasing rather slowly and monotonically.

However, the DOD also made efforts to recover economy and reduce conflicts in the conflict-prone areas. For example, in 2006 the U.S. DOD Task Force for Business and Stability Operations (TFBSO) was formed to achieve economic stabilization in Afghanistan and Iraq. DOD (2008) stated it's equally significant to shape the civil situation with its mission of "winning battles" on foreign countries.

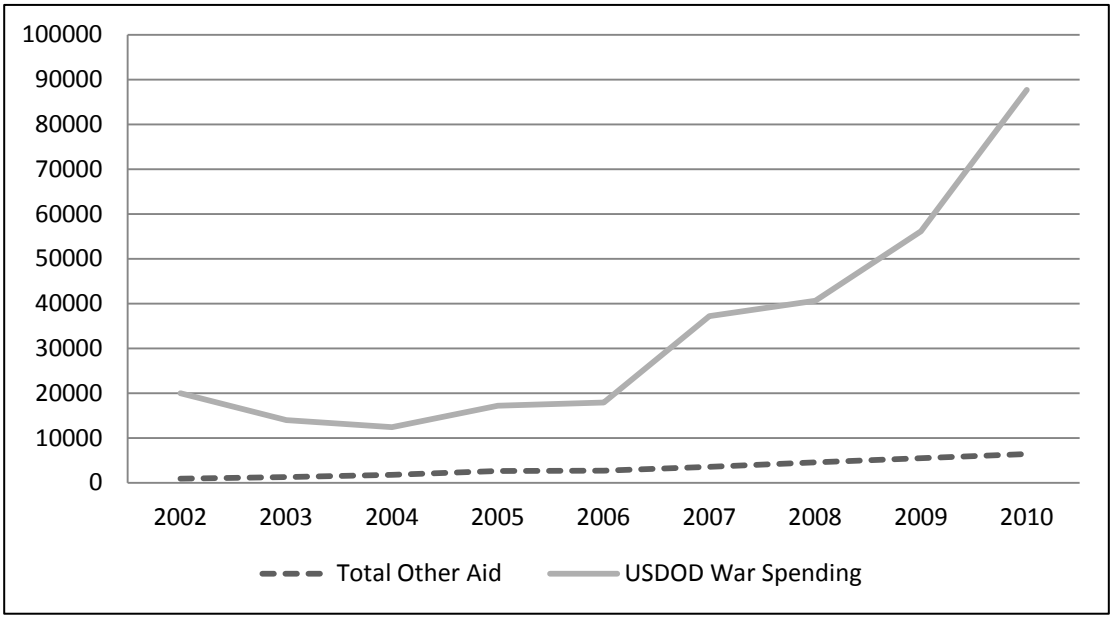

Figure 3: Time trend graph of foreign assistance and USDOD war spending in Afghanistan (US$ millions)
Source: OECD, Belasco (2011).

Figure 4 reveals that official development assistance (ODA) comprises only 3% of the total resources allocated to Afghanistan. ODA is a term coined by the OECD to measure foreign aid. Waldman (2008) reported that since 2001, Afghanistan received $57 per capita aid, while Bosnia and East Timor, after their intervention, received $679 and $233 per capita, respectively.

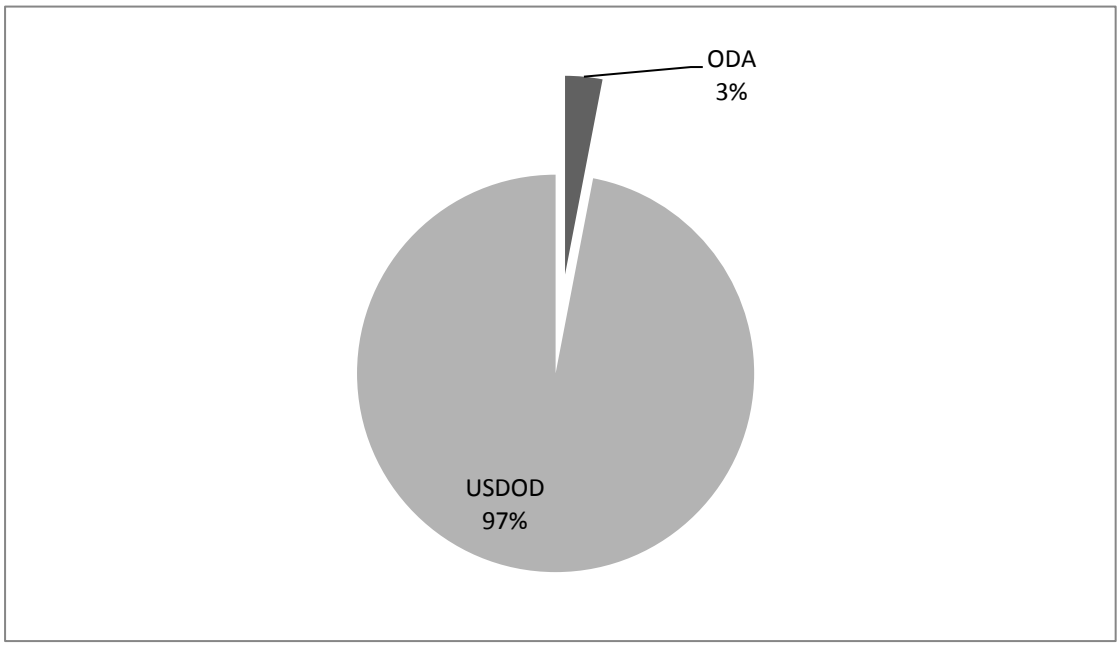

Figure 4: Percentage of DOD and ODA spending for development assistance in Afghanistan, 2001-2010.
Source: OECD, Belasco (2011).

Figure 5 demonstrates the trend of sectoral aid in Afghanistan from 2002 to 2010. Aid for government and civil society administration has consistently been increasing and receives most resources. Since governance and civil society have been identified as very weak in Afghanistan, donors are inclined to invest more funds to build democratic

government and strengthen civil society. Yet, Waldman (2008) criticized that aid for government did not work well because of inadequate government human capacity and widespread corruption in Afghanistan. Aid for economic infrastructure was increasing until 2009, but it has a sharp decline in 2010. Food aid seemed to be neglected, although 85% of the total household income in Afghanistan was spent on food (Chelala 2008). Aid for agriculture was increasing rapidly after 2008, which may be caused by a serious hunger happened in Afghanistan in the early 2000s. Aid for education and health has been marginal, too.

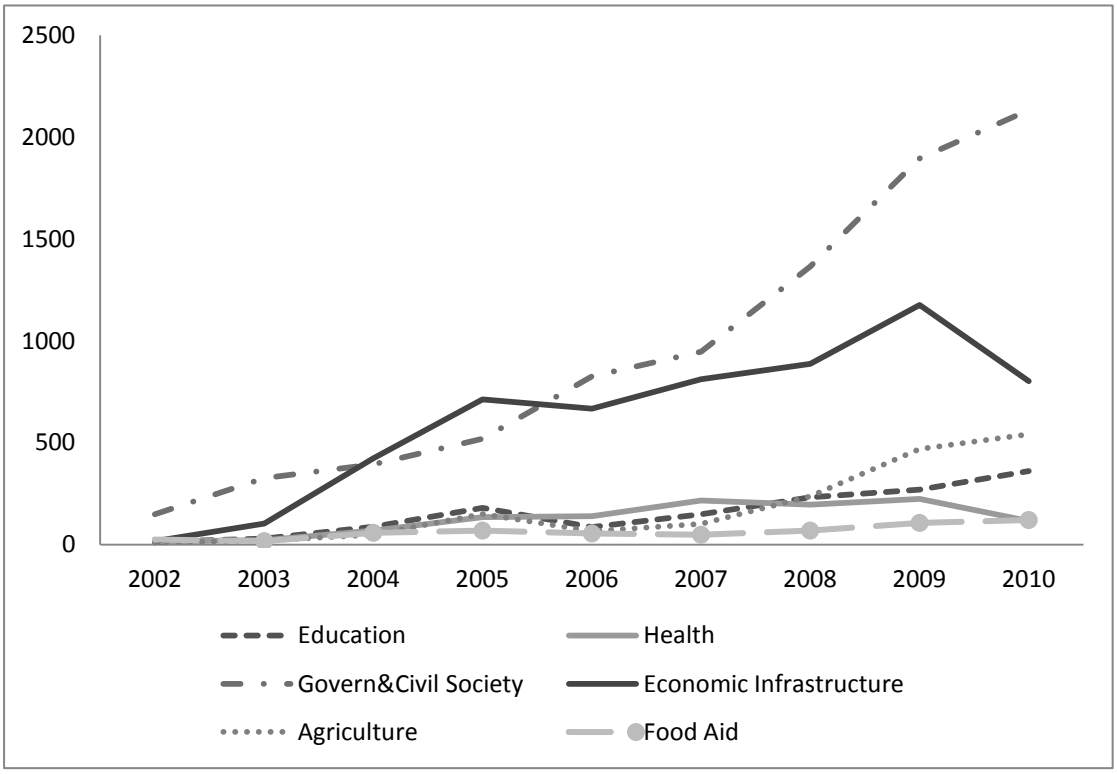

Figure 5: Sectoral aid trends in Afghanistan, 2002-2010 (US$ million)
Source: OECD, Belasco (2011).

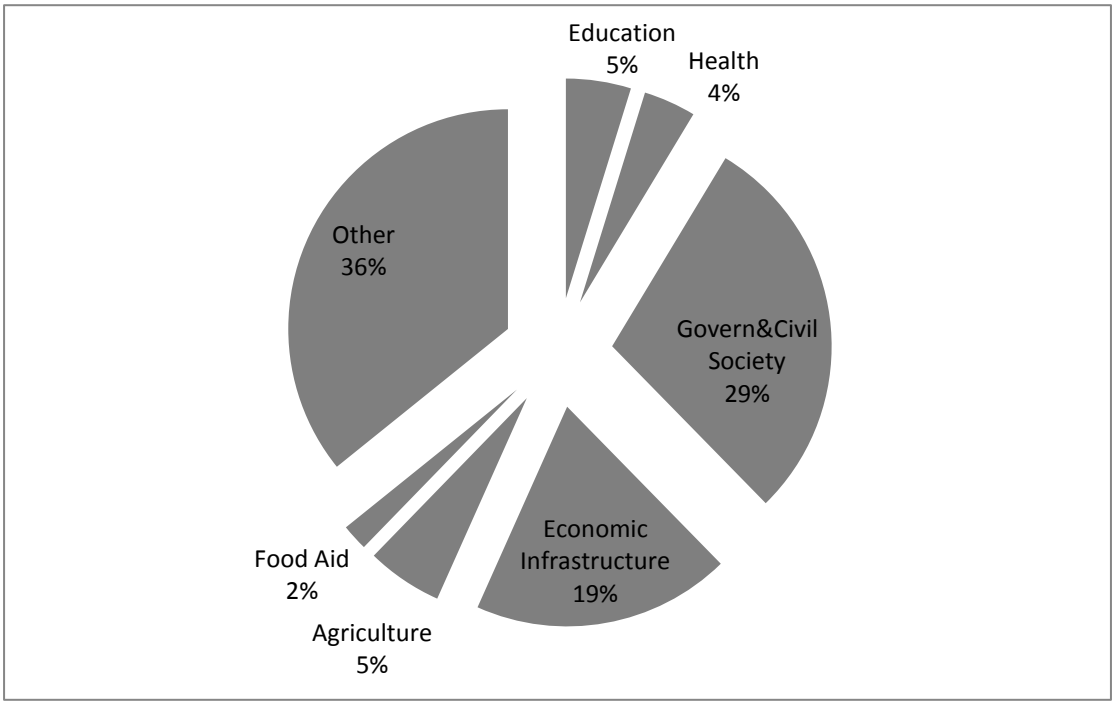

Figure 6: Aid to Afghanistan by sector, 2002-2010
Source: OECD.

Figure 6 illustrates that food for education, health, agriculture, and food security comprises less than 20% of the total foreign aid. On the other hand, aid for government and civil society and aid for economic infrastructure comprises about 50%. The rest one-third of foreign aid was allocated to the other sectors, such as energy, water and industry. We can reach the conclusion by figure 5 and figure 6 that aid for government and infrastructure drew far more attention than aid for agriculture, education, health, and food security during 2002-2010.

3.2 Iraq Case

The graphical analysis of Iraq provides a similar alarming picture. Belasco (2011) pointed out that DOD has spent more than $800 billion in Iraq from 2002 to 2010. Most of the DOD spending was allocated in building governance, infrastructure, and economic stabilization. Figure 7 shows that DOD expenditure was increasing since 2003, but has declined after 2008. The ODA, which is a convenient indicator of foreign aid, reflects a similar trend in this figure. However, the amount of foreign aid is miniscule compared to DOD spending. The poor in Iraq received $159 per year during this period, which is less than average level in developing countries. Furthermore, Iraq's per capita aid ranks 47th among all developing economies in 2000s. If we only consider countries with more than 2 million populations, Iraq ranked 12thin aid recipients.

Figure 8 shows the trends of selected sectoral aid in Iraq. Most of the resources were allocated to government and civil society in 2005. In 2006 and 2007, economic infrastructure received most funds of total aid. Compared to other sectors, these two sectors has led foreign aid from 2002 to 2010. However, there's a decreasing trend for every sectoral aid after 2006. Apart from government and economic infrastructure, aid for other sectors seemed to be neglected, especially for agriculture and food security. According to a report from United Nations, the malnutrition among children had doubled to 8% by 2005 (BBC, 2005). The report said that "The hungry in Iraq should be at the top of donors' lists; instead, they seem to be at the bottom".

Figure 9 shows that from 2002, food security and agricultural development comprise only 1% of the cumulative non-military aid disbursed in Iraq. Aid for education, health,

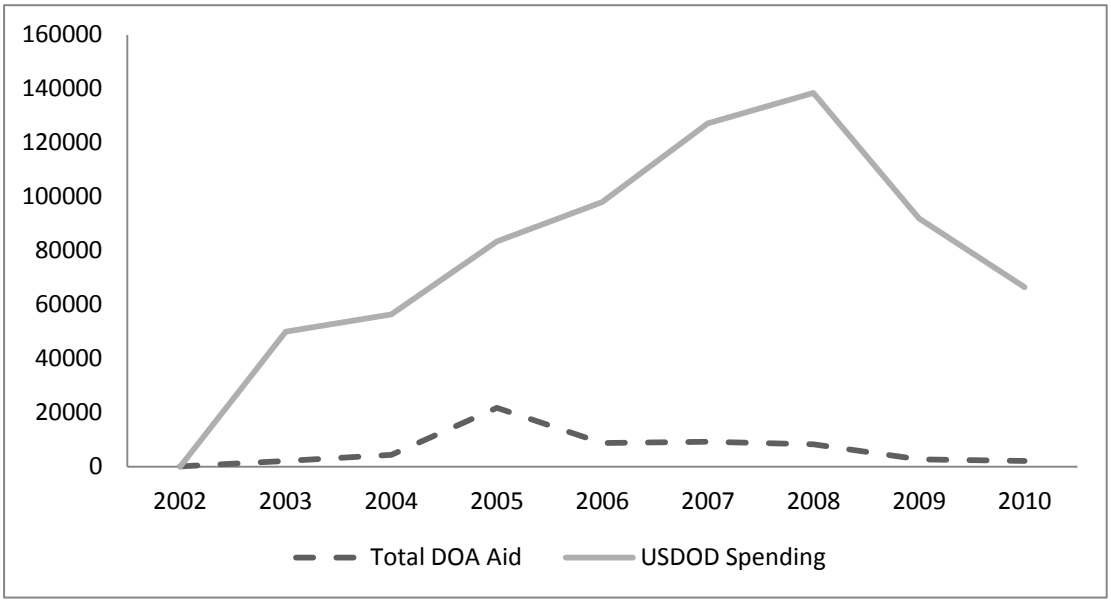

Figure 7: Time trend graph comparing aid and defense spending in Iraq, 2002-2010 (US$ millions)
Source: OECD, Belasco (2011).

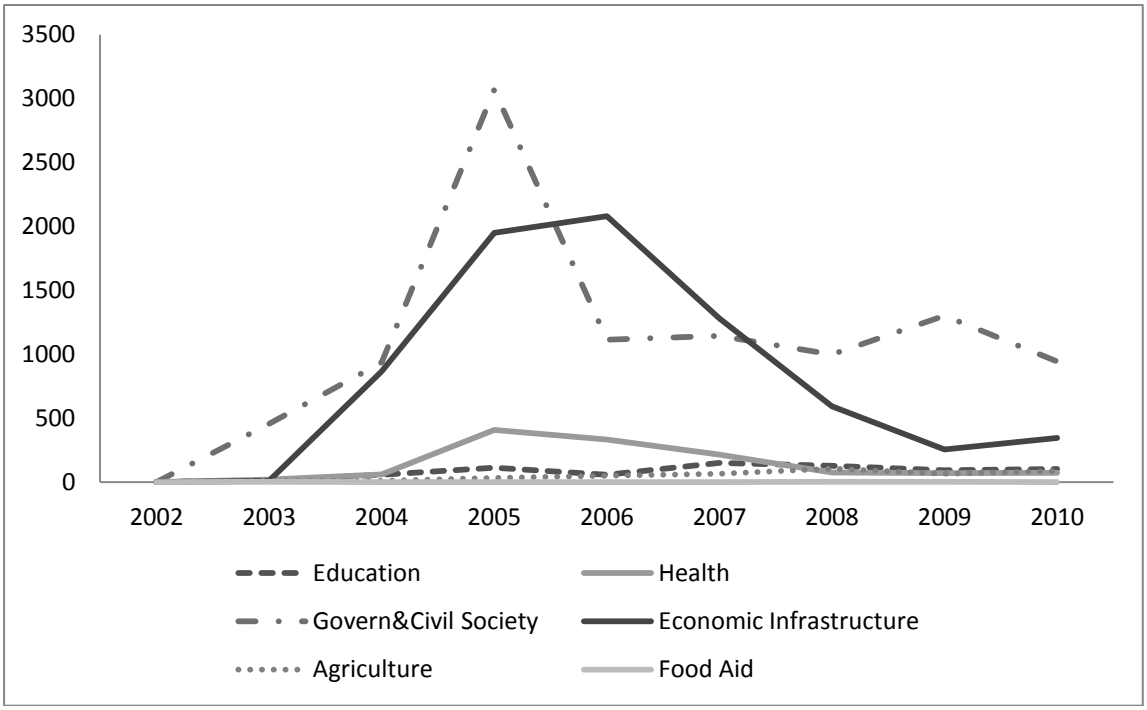

Figure 8: Sectorial aid trends in Iraq, 2002-2010 (US$ millions)
Source: OECD.

agriculture, and food security together received less than 5% of total aid; whereas aid for government and economic infrastructure obtained almost one-third of total aid. A special point of Iraq's case is that aid to other sectors comprises two-thirds of total aid. It's because a large amount of money was allocated in the energy sector to facilitate Iraq's oil production recovery.

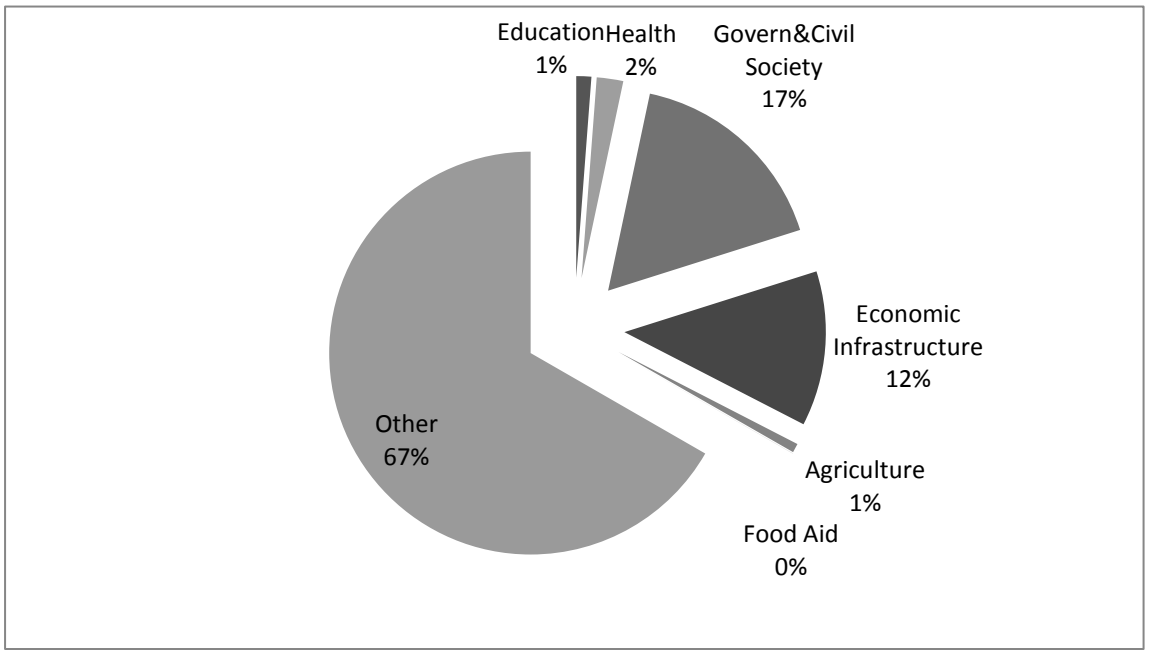

Figure 9: Foreign assistance by sector in Iraq, 2002-2010.
Source: OECD.

4. EMPIRICAL ANALYSIS

We estimate a linear panel model for each dependent variable:

$$F\ (Conflict/Violence) = \beta_1 Educe + \beta_2 Health + \beta_3 Govern + \beta_4 Infrast + \beta_5 Agri + \beta_6 Food + \beta_7 Other$$

4.1 Conflict Model

Table 3 shows the results of estimation results of sectoral foreign assistance on international conflict. We portray the results of fixed-effects linear panel model (PLM), pooled OLS model (Pooled OLS) and one year lagged linear panel model (Lagged PLM) respectively. Table 3 depicts the effect on international conflict while table 4 portrays the effects on intra-country violence. Our data set contains 123 developing countries, each of which includes nine observations measured for nine year period. Thus, our data are balanced, cross-sectional and time-series. It is necessary to employ linear panel model to investigate the coefficients of variables. As a simple gathering of data, Pooled OSL of course is subject to many types of errors. However, it can be used as a more basic means of analyzing the data compared with other more sophisticated approaches. It is of interest to check whether the fixed-effects are needed. This is done by comparing the fixed effects PLM and the Pooled OLS fits by means of F test. The F static is 18.15 and p-value is close to zero, so we can reject the null hypothesis at the 5% significance level, indicating there is substantial inter-country variation. Hence we do need the PLM fixed-effects regression.

We do not use random-effects method because the omitted variables are assumed to be correlated to the independent variables. The Hausman test compares the fixed versus

random effects under the null hypothesis that the individual effects are uncorrelated with the other regressors in the model. Based on Hausman test, the chisq = 32.3723, p-value = 0.000035. Since the p-value is smaller than 0.05, we can reject the null hypothesis and choose fixed-effects instead of random-effects.

It can be argued that to capture the real effect of sectoral assistance, one should study the lagged values of foreign assistance in different sectors. For example, agricultural programs and policies undertaken in 2002 may take a year to take effect and decrease conflict/violence in 2003. Therefore, a lagged PLM would permit us to construct the aid effectiveness analysis in a longer term.

Table 3: Regressions of Sectoral Foreign Aid on International Conflict

Model:	PLM	Pooled OLS	Lagged PLM
Variable			
Intercept		0.1205***	
Educ	-0.0001	-0.0003	-0.00007
Health	0.0008 *	0.0016***	0.00021
Govern	0.0005 ***	0.0007***	0.00039***
Infrast	0.0001*	0.0003*	0.000073
Agri	-0.0007*	0.0001	-0.00088 **
Food	-0.0002	0.0045 ***	-0.00059
Other	-0.00005***	-0.00003	-0.000029 *

Notes:*, ** and *** indicate significant at the 10% level, 5% level and 1% level, respectively.

Under the assumption that aid will affect conflict and violence in the recipient countries, we next discuss the estimated relationship between the explanatory variables and international conflict and inter-country violence.

Education: Controlling for all other types of major assistance, the estimated coefficient of education is negative but not statistically significant. One year lagged PLM model shows that the relationship between education and international conflict is positive but still insignificant. We will not discuss the lagged effects of each variable if it is not statistically significant in the following analysis.

Health: The estimated coefficient of health is positive and marginally significant at the 10% level for conflict. But the Pooled OLS shows that health is positive and significant at the 1% level. It's suggested that investment in health will increase international conflict among developing countries.

Government and Civil Society: Similar to health, aid for government and civil society is positively and significantly related to conflict at the 1% level. The positive association between government and civil society and international conflict is even stronger than that between health and international conflict. Moreover, the effect is positive and significant in the one year lagged estimation.

Economic Infrastructure and Service: The estimated coefficient of infrastructure is again positive and marginally significant at the 10% level. The results of aid for health, government and civil society, and economic infrastructure suggest that underlying implementation process and allocation policies for those three sectors need a complete review.

Agriculture: PLM shows that the estimated coefficient of agriculture is negative and marginally significant at the 10% level. According to one year lagged PLM, its negative

effect become stronger at the 5% level. It is concluded that agricultural assistance successfully mitigates international conflict.

Food Security: Aid for food is negative but insignificant related to international conflict. Yet the Pooled OLS shows that food is positive and statistically significant at the 1% level. We cannot determine the relationship between food aid and conflicts.

Other Sectors: Aid for other sectors has a negative and statistically significant effect on conflict in both PLM and lagged PLM.

4.2 Violence Model

Table 4 shows the effects of foreign aid on intra-country violence. Similar to table 3, column PLM shows the linear panel model estimation in fixed effects, column Pooled OLS shows the pooled linear estimation of foreign aid on violence, and column Lagged PLM shows the longer term (one year lagged) regression results. Again similar to the previous analysis, we show that the fixed-effects PLM model is better than Pooled OLS by comparing the fixed effects and the pooled OLS fits by means of F test. The F static is 8.4291 and p-value is close to zero. So the null hypothesis is rejected, indicating that the fixed-effects model is better than the pooled OLS model. To trade off fixed effects and random effects, I use the Hausman test with chisq = 18.0964, and p-value = 0.01154 which is smaller than 0.05. Therefore, we can reject the null hypothesis and choose fixed-effects instead of random-effects.

Education: Aid for education is found to be positive and significantly related with violence at a 1% level. However, the futility of education aid may be attributed to lag

time effects. Foreign aid may take time to take effects and achieve their intended results. Lagged PLM shows that education aid significantly decreases violence at the 10% level.

Table 4: Regressions of Sectoral Foreign Aid on Intra-country Violence

Model:	PLM	Pooled OLS	Lagged PLM
Variable			
Intercept		-6.111**	-5.678 **
Educ	0.212***	0.001	-0.072 *
Health	-0.022	0.180 ***	0.238***
Govern	0.138***	0.323***	0.340***
Infrast	0.020	0.076***	0.141***
Agri	0.381***	-0.008	-0.067
Food	-0.261 **	-0.546***	-0.656***
Other	-0.008***	-0.011 ***	-0.008 **

Notes:*, ** and *** indicate significant at the 10% level, 5% level and 1% level, respectively.

Health: The estimated coefficient of health is negative but not significant for violence. But the Pooled OLS and Lagged PLM show that health is positive and significant at the 1% level. Since aid for health will increase both international conflict and intra-country conflict, its aid policies need substantial revision.

Government and Civil Society: Similar to health, aid for government and civil society significantly increases conflict at the 1% level in both PLM and lagged PLM. From table 3 we find that aid for government would also increase international conflict. Thus, it's necessary to review aid policies in this sector.

Economic Infrastructure and Service: The estimated coefficient of infrastructure is positive but not significant. In the long term, however, infrastructure is positive and significantly related to violence at the 1% level.

Agriculture: The estimated coefficient of agriculture is positive and statistically significant at the 1% level. Yet Pooled OLS and Lagged PLM present an opposite and insignificant relationship between agricultural aid and violence. Aid for agriculture may decrease violence in the longer time, but at a relatively short period, it will not reduce violence.

Food Security: Aid for food is negative and statistically significant related to violence in both PLM and lagged PLM. It's interesting that the lagged negative effect of food aid on violence is stronger than that in the PLM model. Since food aid is intent on providing healthy food directly to the people in poverty and nothing to do with the long-run development strategy.

Other Sectors: Aid for other sectors has a negative and statistically significant effect on violence in both PLM and lagged PLM.

5. ERROR TERMS AND CAUSALITY DIRECTIONS

It is reasonable to expect the error terms to be correlated within variables, and we even cannot drop the possibility that different sectoral aid might affect each other. It is also difficult to determine the directions of causality between conflict/violence and the explanatory variables. One reason is that causality may run in both directions. Foreign aid might mitigate conflict and violence by decreasing hunger and poverty and increasing economic development. On the other hand, foreign aid provided in conflict-prone countries might alter existing power relationships by delivering resources, thus aid can become instruments of conflict.

5.1 Revised Conflict Model

Table 5 shows the tests for conflict models. I used Breusch-Pagan to test the heteroskedasticity. The null hypothesis in the Breusch-Pagan test of cross-sectional independence is that residuals across entities are not correlated. The static value of Chi Square at the 5% significance level is 14, which is smaller than our calculated Breusch-Pagan value. Therefore, we can reject the null hypothesis. There is cross-sectional dependence in conflicts models. Durbin-Watson is used to assess autocorrelation in regression relationships. Under the null hypothesis of no autocorrelation, the test statistic should be in the vicinity of 2. We see that for PLM model, DW=1.4145. If we choose a 5% significance level with n =100 and k = 7,dL= 1.508 and dU= 1.826. DW<dL, we reject the null of no serial correlation against the alternative of positive serial correlation

at the 5% level. However, for Lagged PLM model, DW=1.553, which is greater than dL but smaller than dU. Therefore, the test for Lagged PLM is inconclusive.

Table 5: Tests Analysis Models on Inter-country Conflicts

	PLM	Pooled OLS	Lagged PLM
Testing for heteroskedasticity			
Breusch-Pagan value	33.8892	33.8892	40.3936
p-value	0.00002	0.00002	0.000001
Testing for autocorrelation			
Durbin-Watson	1.4145	0.5803	1.553
p-value	< 2.2e-16	0.7606	1.295e-12

To obtain better unbiased estimators, I apply dummy variables to the original model to remove both country effects and time effects. The new model is:

$$F(\text{Conflict/}\textit{Violence})=\beta_0+\beta_1\textit{Educe}+\beta_2\textit{Health}+\beta_3\textit{Govern}+\beta_4\textit{Infrast}+\beta_5\textit{Agri}+\beta_6\textit{Food}+\beta_7\textit{Other}+\alpha_1C_1+\alpha_2C_2+\ldots\alpha_{121}C_{121}+\alpha_{122}C_{122}+\delta_1T_1+\delta_2T_2+\ldots\delta_7T_7+\delta_8T_8$$

The new variables C_i and T_i are dummy variables taking the values 0 or 1 to indicate the absence or presence of country-effect and time-effect that are expected to shift the outcome. Table 6 depicts the results of revised conflict models. A big difference between the revised table and table 3 is that I replace the Pooled OLS by an Ordered Probit Model. As a simple reference, Pooled OLS is no longer useful at this point. And the ordered probit model could be used as an examination of PLM because the dependent variable, conflict, is rankly graded by 0, 1, and 2.

After adjusting for endogeneity, aid for agriculture and other sectors are found to have a significantly negative association with international conflicts, while aid for health and government administration are significantly positively related to conflicts. Educational aid and food aid may reduce conflicts but the results are not statistically significant.

Table 6: Revised Conflict Models

Model:	PLM	Ordered Probit	Lagged PLM
Variable			
Intercept	-0.0641338		
Educ	-0.0000571	-0.0007579	-0.0000042
Health	0.0008561**	0.0041927*	-0.0000562
Govern	0.0005384***	0.0024117***	0.0004561***
Infrast	0.0001377	0.0003767	0.0000323
Agri	-0.0006728*	-0.0038881	-0.0009604**
Food	-0.0002026	-0.0010521	0.0006254
Other	-0.0000512**	-0.0002142	-0.0000317*

Notes:*, ** and *** indicate significant at the 10% level, 5% level and 1% level, respectively.

The causality directions can be investigated by using an error correction model (ECM) and directed acyclic graphs (DAG) (Bessler, 2003). Before applying the error correction model, figure 10 in appendix shows causality directions based on raw data at the 5% significance level. It shows that conflicts are directly caused by aid for government administration and maybe caused by aid for health. It's a little surprising that other sectoral aid cannot directly cause conflicts. Bessler explained the theories of ECM and DAG. Generally, the causal information between error terms across variables can be retrieved by the variance -covariance matrix of residuals. Then I use DAG to represent

the causal flows among variables by using arrows. Figure 11 illustrates the contemporaneous causality directions with both country-effect and time-effect removed. Figure 11 should be analyzed together with the results of revised fixed-effects PLM conflict models in table 6. The contemporaneous conflict –government aid and conflict-health aid relationships are statistically significant, but the causal directions are not as same as we suppose. While the sectoral foreign aid is interacting among each other, conflicts cause aid for health and government administration.

5.2 Revised Violence Model

Table 7 shows the tests for violence models. The static value of Chi Square at the 5% significance level is 14, which is smaller than our calculated Breusch-Pagan value. Therefore, we can reject the null hypothesis. There is cross-sectional dependence for violence models. I use Durbin-Watson test to assess autocorrelation in regression relationships. Under the null hypothesis of no autocorrelation, the test statistic should be in the vicinity of 2.If we choose a 5% significance level with n =100 and k = 7,dL= 1.508 and dU= 1.826. Our calculated DW statics are smaller than dL, indicating that we can reject the mull hypothesis that the residuals to be uncorrelated with the regressors in all time periods. Similarly, I add country dummy variables and time dummy variables to remove both country and time effects.

The revised results are shown in table 8. From table 8, we learn that aid for education, government administration and agriculture has a significantly positive association with

intra-country violence. Aid for food security and other sectors is significantly negative related to violence.

Table 7: Tests Analysis Models on Intra-country Violence

	PLM	Pooled OLS	Lagged PLM
Testing for heteroskedasticity			
Breusch-Pagan value	294.356	294.356	297.2022
p-value	< 2.2e-16	< 2.2e-16	< 2.2e-16
Testing for autocorrelation			
Durbin-Watson	0.6754	0.5957	0.8282
p-value	< 2.2e-16	0.7606	< 2.2e-16

Table 8: Revised Violence Models

Model:	PLM	Lagged PLM
Variable		
Intercept	-2.291	
Educ	0.2096577***	0.1005149***
Health	-0.0318893	0.0187554
Govern	0.1393153***	0.1552494***
Infrast	0.0182753	0.0898698***
Agri	0.3736233***	0.2980532***
Food	-0.2866563**	-0.2856768**
Other	-0.0082196***	-0.0051895**

Notes:*, ** and *** indicate significant at the 10% level, 5% level and 1% level, respectively.

As discussed above, it is well-known that the causal flows could be different before and after adjusting endogeneity. To obtain a more reliable contemporaneous causality direction, figure 12 shows the DAG after removing country and time effects at the 5%

level. Figure 12 shows that no sectoral aid can cause violence. On the contrary, violence will cause aid for government administration and agriculture. And the relationship between violence and educational aid is uncertain.

6. CONCLUSIONS

Empirical examinations of the relationship between conflict/violence and foreign aid by sector are important so that policymakers will know if and how to use foreign aid to achieve peace in developing countries. This sector-specified analysis is seldom made before due to data availability. So the author of this paper hopes to show some significant results at the sector-level about foreign aid for researchers and policy makers.

Before adjusting endogeneity, foreign aid for agriculture and food security have negative relationships with conflicts and violence, and aid for education, health, government administration and economic infrastructure is positively related to conflicts and violence.

Once accounting for endogeneity, aid for health and government administration is positively associated with international conflicts, and aid for education and government administration is positively related to intra-country violence. One reason for this result is the aid for those sectors is not properly directed and executed, thus, leading to "theft effects" and "distribution effects". By "Theft effects", resources are often transferred by (military) authorities to support their agenda for international conflict. By "distribution effects", aid is given to some people and not to others, for example, more aid is allocated into the urban area than rural area, reinforcing the economic inequalities and thus, reinforcing the intra-country violence.

After accounting for endogeneity, agricultural aid is found to have a negative relationship with conflicts, and food aid is negatively related to violence. It can be explained that most of the developing countries have agrarian economies with a plenty

of people suffering hungry problems. Aid for agriculture and food security is best fits the national conditions of recipient countries. Through the case study and regression analysis it was evident that agricultural development and food security assistance is much needed, under allocated and not valued. Of course, for some severe conflict-prone nations, such as Iraq and Afghanistan, all sectoral foreign aid is needed.

We end with the recommendation to promote agriculture and food security assistance through novel programs. In the appendix we present results on the graphical structure of conflicts, violence and foreign aid. There we have learned that conflict causes aid for government administration, and violence causes aid for government administration and agriculture. However, I did not explore the dynamic causal relationships behind these variables. Further dynamic causal structures need to be examined before a conclusive statement can be offered. Thus, I place the directed graphs in the appendix.

Another future work should explain and evaluate foreign aid for other sectors, such as aid for energy. Although no previous paper analyzed the relationship between conflict/violence and other sectoral aid, a more comprehensive result may strength our understandings on foreign aid.

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APPENDIX

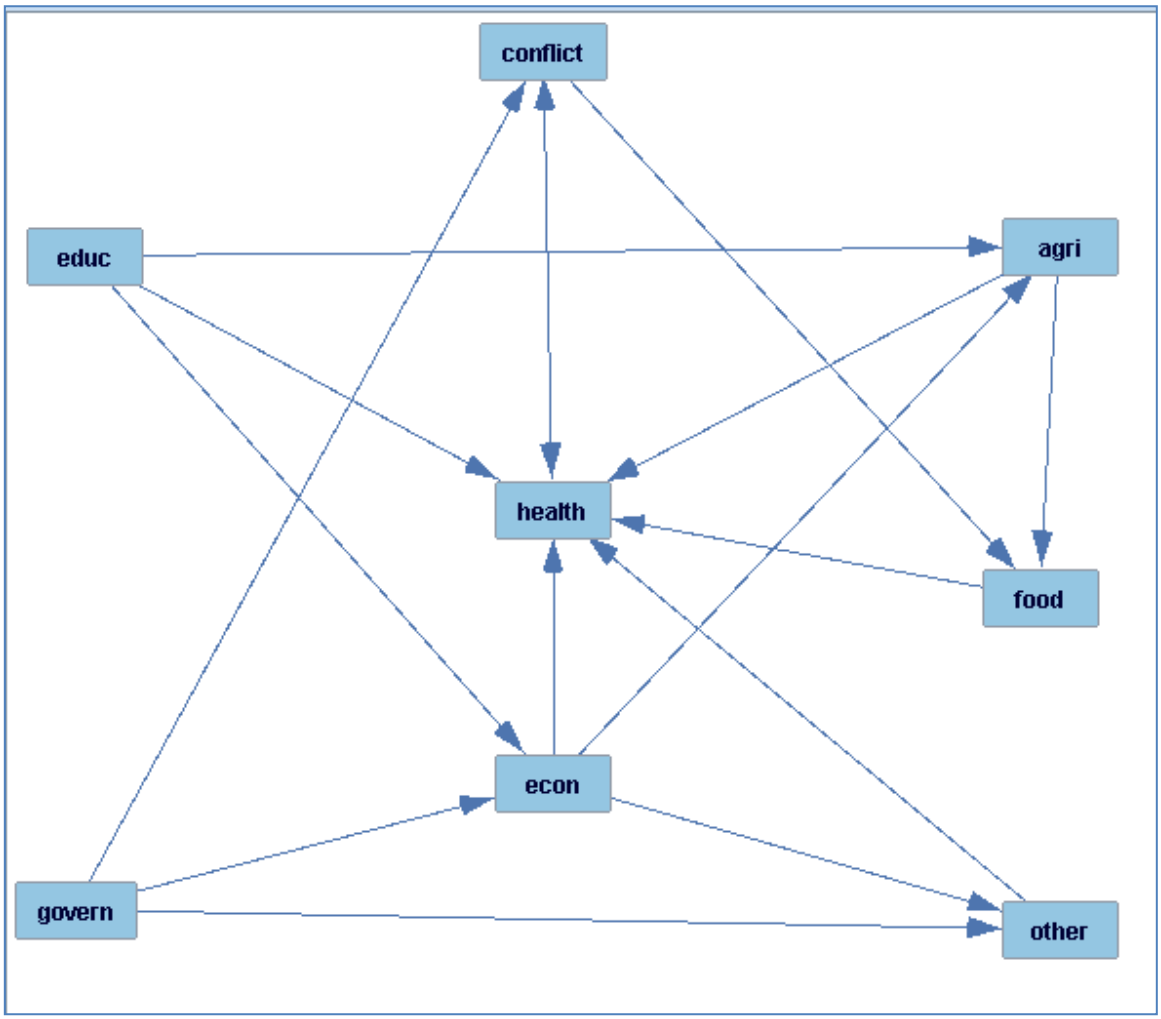

Figure 10: Causality directions of conflict and sectoral foreign aid based on original data

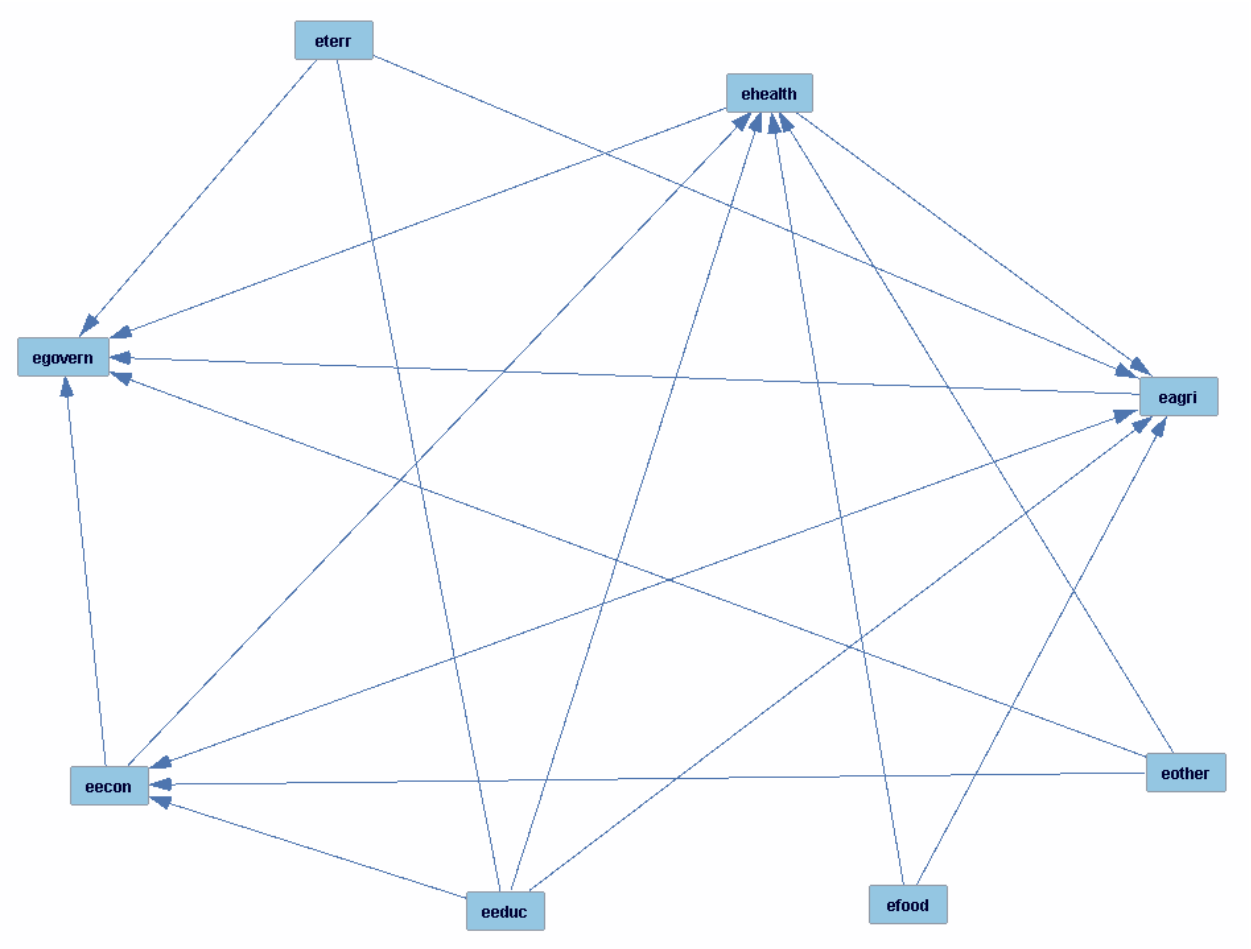

Figure 11: Causality directions of conflict and sectoral foreign aid
(Both country and time effects removed)

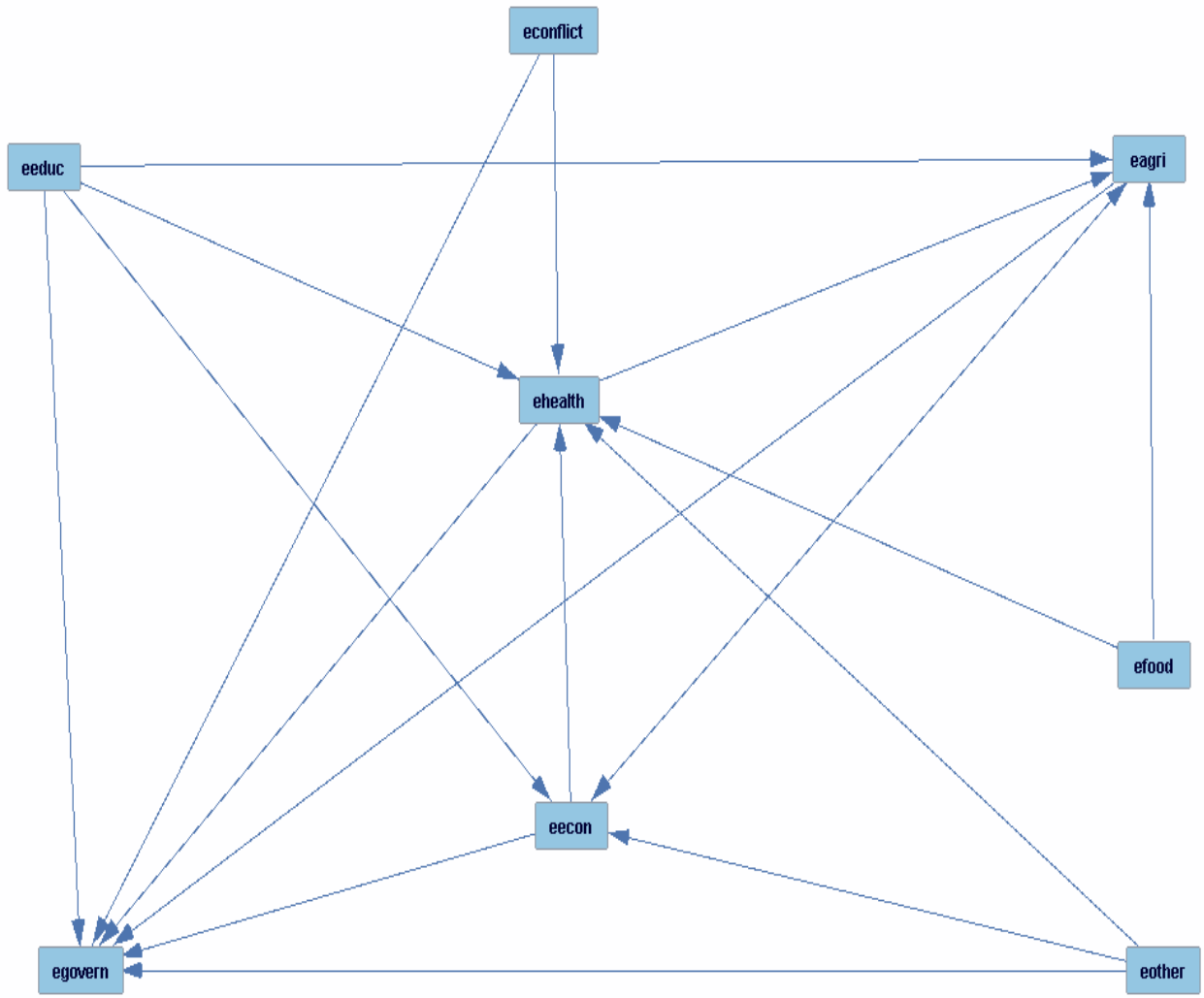

Figure 12: Causality directions of violence and sectoral foreign aid
(Both country and time effects removed)

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