

**DO COUNTRIES WITH MORE BUSINESS-FRIENDLY ENVIRONMENTS
RECEIVE MORE AID?: EVIDENCE FROM PANEL DATA OF 120 COUNTRIES**

By

HAN, AHREUM

THESIS

Submitted to
KDI School of Public Policy and Management
in partial fulfillment of the requirements
for the degree of

MASTER OF DEVELOPMENT POLICY

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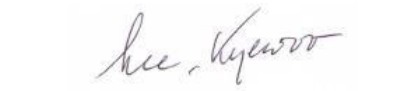
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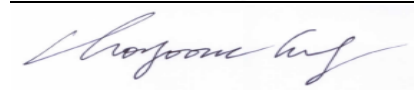
MASTER OF DEVELOPMENT POLICY

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ABSTRACT

DO COUNTRIES WITH MORE BUSINESS-FRIENDLY ENVIRONMENTS RECEIVE MORE AID?: EVIDENCE FROM PANEL DATA OF 120 COUNTRIES

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This study verifies whether the current aid allocation practice gives a priority to the business environment of aid receiving nations. Since traditional aid practice has registered many unsuccessful results over the last couple of decades, author believe that strengthening the private sector with aid in developing countries is one of good attempts to lift those countries from poverty. Econometric estimations with panel data of 120 developing countries from 2007 to 2012 indicate that the recent aid practice has not much changed from the past practice. Donors respond mainly to the recipients' economic and physical needs, represented by income level, infant mortality and population, rather than considering the aid's value for money. In addition, the finding regarding government effectiveness is inconsistent with the existing claim that aid should be allocated more to countries with sound policies and institutions. This paper suggests that donor states carefully consider the soundness of business polices of a recipient country as a prime determinant when selecting where to give aid. Furthermore, donor countries should deliberately design how to utilize their aid resources to strengthen the business policies and regulations for recipient countries.

DEDICATION

To those who share my belief that all real living is meeting.

ACKNOWLEDGEMENTS

I would like to extend my deepest gratitude to my advisor professor Kye Woo Lee, for his passion and understanding. His support made me have confidence that my research would be valuable for the academic world. I would like to thank Professor Yoon Cheong Cho, who provided me with great guidance to read statistical results and to conduct empirical tests. I have also benefited from many helpful comments from all my professors and peers in KDI School. They broaden and deepen my thinking not only on economic development but also life. Finally, special thanks to J&J who have always stood by my side.

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I. INTRODUCTION

1.1 Purpose of the Study

This study aims to verify whether the current aid allocation practice gives a priority to the business environment of aid receiving nations. The term “aid” for the purpose of this study, refers only to Official Development Assistance (ODA). According to the Organization for Economic Cooperation and Development (OECD), ODA is defined as official financing to the developing countries that includes at least a 25 percent of grant element to promote economic prosperity and welfare of developing world.¹

This study analyzes panel data of 120 developing countries from 2007 to 2012 to assess whether the current ODA is allocated efficiently by aid agencies including the members of the Development Assistance Committee (DAC), multilateral institutions, and non-DAC countries to foster a pro-business climate within recipient countries. It will also recommend that donor countries set the level of business-friendly environment as a significant criterion when they select recipients to distribute funds for better aid effectiveness. The outcome of the study can be instrumental in improving ODA policy design in aid allocation.

1.2 Defining the Problem

Traditional aid has been channeled primarily through projects that are concerned with education, health, and food but not necessarily aimed at strengthening the private sector in aid recipient countries as a means of economic development. This traditional aid practice has registered many unsuccessful results over the last couple of decades. Therefore, new attempts to find more efficient way to end poverty in economically lagging countries are necessary.

¹ "Official Development Assistance – Definition and Coverage." Aid Statistics - OECD. Accessed June 28, 2014.

Effective use of aid starts from efficient allocation of aid. One of the most efficient ways to distribute aid resources is giving it to the recipient countries which have a free doing-business climate because sound business regulations are crucial for a thriving private sector, and a thriving private sector is essential for overall prosperity. In the developing world, it is known that the private sector provides the largest employment, almost 90 percent of jobs.² In addition, there is a growing consensus that the quality of business regulation and institutions are critical determinants of a country's advancement. In this context, the World Bank Group developed a new strategy for tapping private initiatives to reduce poverty in 2002. Since then countries are annually ranked on their business environment status by the World Bank, through measuring countries' regulatory environment to start and operate of a firm. It was discovered that cumbersome regulation is related with inefficiency of public institutions, which generally results in lower productivity (Djankov et. al. 2004). Hubbard and Duggan (2009) also support this claim by highlighting the role of private sector. They argue that the aid should be allocated to the private sector which can put the aid resources to good use, just as we saw with the Marshall plan, a successful program because it put the aid resources directly to the private sector. Even though aid should flow into the aid-recipient government with good economic policies and institutions for better aid effectiveness, the donors do not seem to consider much about the beneficiaries' doing business conditions in the current aid giving practice.

1.3 Significance of Solving the Issue

The volume of aid given by DAC has been declining since 2010 in both nominal and real terms. What is more, many developed countries are reluctant to increase their aid amount due to the 2008 global crisis and subsequent recession. In this context, it is urgently needed to use the available total aid amount in an efficient way. The most efficient way is disbursing the funds

² World Bank. *IFC Jobs Study: Assessing Private Sector Contributions to Job Creation and Poverty Reduction*. Washington, DC: World Bank Group, 2013.

directly to the recipient countries' private sectors that drive economic growth, and invite investment to create employment and raise incomes. Hall and Jones (1999) and Acemoglu et al (2001) discover that institutions are important determinants of prosperity and growth in a long term. Furthermore, it is empirically proved that a 2.3 percentage point increase in annual growth can be achieved if business regulations are enhanced from the worst quartile to the best (Djankov et al. 2006). In this context, the business environment must not be overlooked when aid is allocated. Despite its significance, there have been little studies to analyze whether aid is made available to the countries where it is well used for the private sector, and where business environment is favorable to business activities. In this study, the important role of the private sector with regard to aid will be highlighted, and the current aid-giving practice in relation to the recipient states' business climate will be analyzed.

1.4 Hypothesis to Be Tested

The null hypothesis of this study is that the donor-states disburse more aid funds to the recipient countries which enact more business-friendly policies. Since it has been proved by Burnside and Dollar (2000) and many others that aid is more effective in counties which have good policies and institutions, this paper would suggest to donors that they distribute more aid funds to those which have better private sector economic conditions if the null hypothesis is rejected.

1.5 Methodology and Data

The empirical work of this study is based on the data of 120 countries from 2007 to 2012, mainly taken from the World Bank database and OECD statistics. Quantitative tests, including Least Squares Regression, Breusch-Pagan test, Hausman specification test, and fixed- and random-effects GLS regression, are carried out to seek relationships between the volume of ODA

inflow to economically lagging countries and private sector condition indicators, such as entry and exit to the business market, openness of the market, number of new businesses registered, and domestic credit to the private sector in aid receiving countries.

1.6 Structure of the Content

The background of the study was stated in chapter one in detail. The rest of the paper is structured as follows: Chapter two is a literature review on previous aid allocation related to both theoretical and empirical studies, including Burnside and Dollar (2000), Hubbard and Dugan (2009), and Degnbol-Martinussen and Engberg-Pedersen (2003), and many others. Chapter three introduces how hypotheses are developed, and chapter four elaborates on the methodology and various data used for the tests, and subsequently discusses the results of the regression analysis. The Conclusion is followed in chapter five.

II. LITERATURE REVIEW

It is still debatable whether the aid is making contributions to poverty reduction or not (Radelet 2006). There are many studies trying to answer the questions that aid is an effective means of alleviating poverty, and many people also make incessant efforts to suggest appropriate remedies for poverty eradication. Nevertheless, ODA often encounters criticisms for not having contributed to economic growth. There are many possible determinants that hamper aid effectiveness. Some consider that the aid effectiveness is largely dependent on recipient countries' conditions, while others reckon that donors should take responsibility for inefficient aid distribution. Among many reasons determining the effectiveness of aid, this paper is paying special attention to previous studies that have found the main cause for poor aid effectiveness as

being inefficient aid allocation by aid givers. Elements that hinder aid effectiveness are categorized into three parts: 1) Recipient Countries' Bad Conditions, 2) Donors' Interests, and 3) Wrong Sector Distributions.

2.1 Recipient Countries' Bad Conditions

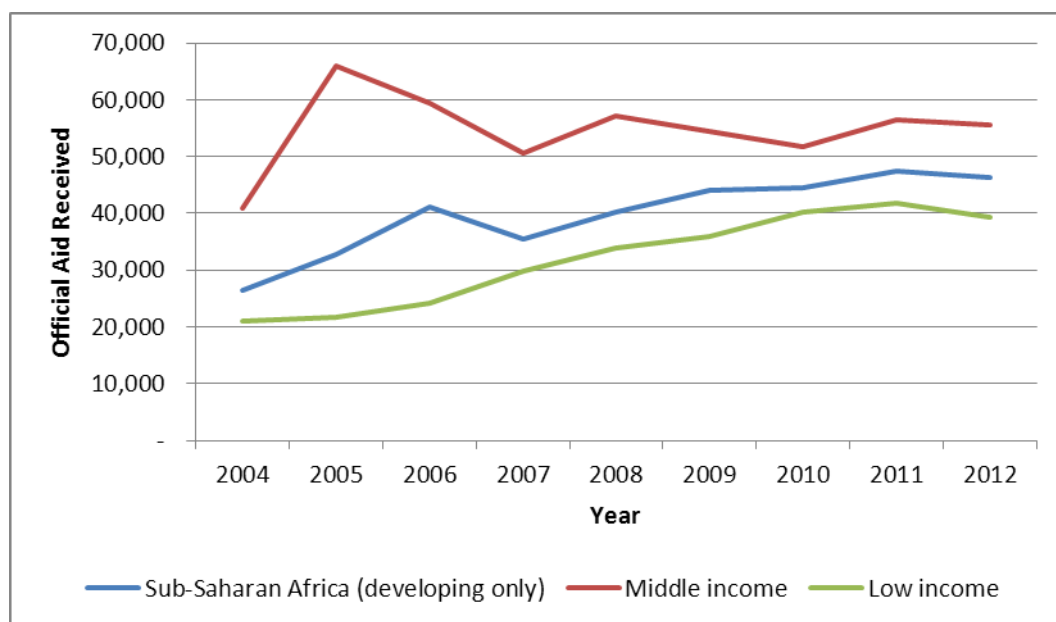
Burnside and Dollar (2000) investigate the interactions among macroeconomic policies, aid and growth. They discovered through an empirical test that aid would be more effective if it is aimed at governments with sound institutions and policies, suggesting that more aid be allocated to such governments. However, their research lacks evidence that aid leads to the adoption of good policies. The World Bank's estimates also find out that a \$10 billion rise in foreign aid influx would help 25 million people per year escape from poverty if aid targets countries with good governance, while it would lift only 7 million people per year from poverty if aid is indifferent to the economic policies and institutions (World Bank 1998). Pack & Pack (1993) and Feyzioglu et al. (1998) show that aid is relatively fungible, indicating that the recipient government spends the aid money arbitrarily, departing from originally intended purposes. The fungibility not only makes it difficult for donors and recipients to challenge the poverty, but also results in unfair distribution of income. This provides the government with additional resources to reallocate freely without collecting more taxes. Thus, for governments with poor institutions, foreign aid is likely to be used to benefit the ruling body, while for governments with strong democratic institutions, the aid tends to be used to improve the welfare of the citizens (Bueno de Mesquita & Smith 2004).

2.2 Donors' Interests: Political and Strategic Motivations

Degnbol-Martinussen and Engberg-Pedersen (2003) state that aid had not been distributed based on neither need nor effectiveness criteria. Aid would have been given to the most

impoverished countries that can implement growth-stimulating policies, and have the capacity to utilize aid if aid givers follow the aforementioned criteria. Nonetheless, other motivations including political, commercial and strategic in nature override the need and effectiveness criteria. In addition, several observers, including Alesina and Dollar (2000) have shown that aid giving is dependent on political and strategic factors. To be specific, economically close former colonies, and politically amicable to its former rulers obtain more foreign aid than other countries with comparable income level. In current practice, corrupted governments do not have a tendency to receive less aid than honest ones. According to the World Bank statistics, in fact middle income countries tend to receive a larger extent of aid than low income countries with the biggest number of poor people as shown in Figure 1 below.

[Figure 1] Official Aid Received by Income (Current Million US\$)³



Bearce and Tirone (2010) claim that aid can lead to economic development in developing countries by catalyzing economic reform only if donors' strategic motivation for providing aid is negligible. When the strategic interests are considerable, aid turns to be ineffective because donor

³ Source: Author using World Bank Data (<http://data.worldbank.org/indicator/DT.ODA.ALLD.CD/countries/ZG-XP-XM?display=graph>)

governments are likely to loosen their conditions for economic reform. To be specific, Western aid was controlled more by strategic causes during the Cold War. It implies that aid was slackly related with economic reform. It was after 1990 when the Western governments could put more pressure on recipient countries that they would cut aid unless such reform was expected. This indicates that aid has supported economic growth to some extent, but it was true only when most Western donors moved away from connecting aid provision with strategic benefits.

2.3 Wrong Sector Distributions

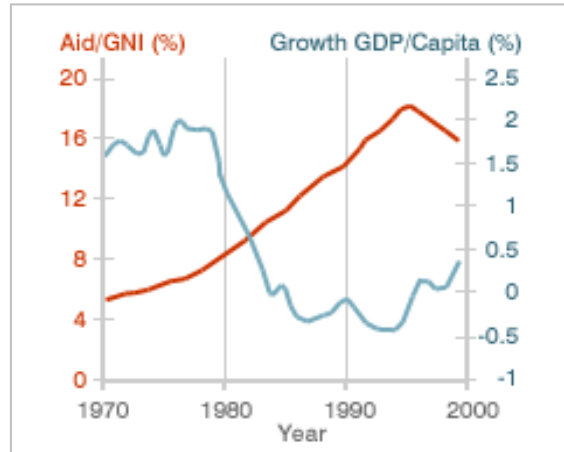
Hubbard and Duggan (2009) drill down the ineffective aid distribution problem to aid receiving nations' domestic sector level. They emphasize the role of the private sector in the recipient-state, and argue that more aid should be allocated to more aid effective fields, namely the business sector. According to them, charities or programs run by government agencies or nongovernmental organizations (NGOs) have never been able to drag people out of poverty, and only the business sector can do so because it creates jobs and helps people help themselves, leading to sustainable growth. They take the example of India and China that reaped dramatic benefits from removing licensing barriers that had impeded the progress of business. Hubbard and Duggan do not seek to which nations the aid was distributed, but instead they talk about the allocation of aid to the private sector.

2.4 Remedies Suggested for Better Aid Effectiveness

Jeffrey Sachs' "Big Push" is one of many recommendations for enhanced aid effectiveness. He calls for financial shock therapy in his highly acclaimed book, *The End of Poverty* (Sachs 2005). The Big Push debate claims that aid as a major catalyst for investment that would result in economic growth. Shock therapy, Sachs insists, can eliminate extreme poverty by 2025 for the poorest billion in the world. Nevertheless, fifty years of historical evidence indicate that the Big

Push remedy does not work as the theory in practice as shown in figure 2.

[Figure 2] Aid and Growth in Africa 1970 – 2000 (10-year moving average)⁴



Furthermore, William Easterly tackles Sachs' claim in that the Big Push theory is just periodically recycled since the concept was initiated in Lord Hailey's African survey (1938) for the Committee of the African Research for the British government. Likewise, the Big Push policy has not led to any material changes in Africa during this period. Degnbol-Martinussen and Engberg-Pedersen (2003) challenge the macroeconomic approach as well, asserting that aid has just replaced domestic savings and investment rather than supplementing the local economy.

Meanwhile, Hubbard Duggan (2009) put a great emphasis on the role of the private sector in the aid recipient-state, and insist that aid should be distributed to a large extent to foster local business, as we saw with the Marshall Plan of 1948–1951 that made loans to private companies in Europe. The government receiving aid had to enforce business-friendly policies to ensure that their local businesses were able to take advantage of the loan, as they would later repay the loan. Hubbard and Duggan rebut the conventional wisdom surrounding the Marshall Plan that it brought revival to Europe by funding infrastructure. Instead, they claim that that the Marshall Plan worked successfully because it first lent money to businesses, which were then repaid to a

⁴ Erixon, Fredrik. "Why Aid Doesn't Work." BBC News. September 11, 2005. Accessed July 17, 2014.

national budget to build commercial infrastructure. This in turn suggests that a similar method can be applied to developing countries at present.

Fortunately, countries have begun to acknowledge the significance of business climate in developing countries. For example, the United Kingdom's International Development Secretary recently announced that Britain is to devote £1.8 billion to make it easier to do business in developing countries in 2015–2016.⁵ The Department for International Development (DFID), responsible for administering overseas aid of the United Kingdom, has helped streamline the business registration process in Bangladesh. As a result, the start-up duration was cut from 35 days to 1 day and it can now be finished online. It is reported that more than 19,000 new enterprises were created in two years and further simplifications of administration are estimated for business to save \$30 million.⁶ DFID empirically proved that to enforce policies that make business sector work is one of the best remedies to catalyze economic growth and reduce poverty.

2.5 What Needs to Be Discovered More

There are many previous findings on the relationship between a recipient-government's general policies and institutions and aid effectiveness. There are not, however, many studies that specifically shine the spotlight on using the business regulation of aid recipients as a major criterion of donor countries when select the aid destination. Therefore, this study tries to find out the relationship between the aid-receiving country's business climates and aid allocation through various empirical tests. The most recently available data will be used in this study when carrying out the quantitative analysis.

⁵ Tran, Mark. "UK to Boost Aid for Business in Poor Countries to £1.8bn." The Guardian. January 27, 2014. Accessed November 25, 2014.

⁶ "Helping Developing Countries to Remove Barriers to Trade and Investment." GOV.UK. November 23, 2014. Accessed November 13, 2014.

III. METHODOLOGY AND DATA

3.1 Methodology

The specification of the model for this study is illustrated as follows:

$$\begin{aligned} \text{Aid}_{it} = & \alpha_0 + \beta_1 \text{GDPpercapita}_{it} + \beta_2 \text{GDPpercapita}_{it}^2 + \beta_3 \text{InfantMortality}_{it} + \\ & \beta_4 \text{InfantMortality}_{it}^2 + \beta_5 \text{Civil / PoliticalRights} + \beta_6 \text{GovernmentEffectiveness} \\ & + \beta_7 \text{Population}_{it} + \beta_8 \text{Population}_{it}^2 + \beta_9 \text{DoingBusiness} + u_i + \varepsilon_{it} \end{aligned}$$

The dependent variable, Aid_{it} , is the amount of ODA flow for recipient country i in year t . The intercept α_0 indicates a common component to all recipient countries; u_i are unobserved random variables that follow a probability distribution; and ε_{it} represents an idiosyncratic error term. Heteroskedasticity in error terms was detected by the Breusch-Pagan test, and was corrected with robust option. In addition, this study adopts random-effects estimators because the Hausman tests favors the random-effects model over the fixed-effects model.

Even though this study espouses Bandyopadhyay and Wall's (2007) approach, it differs and improves on the existing literature on three major accounts: First, this study more narrowly focuses on the level of business-favorable climate of aid receiving countries as a major criterion of donor countries when selecting the aid destination. This is in contrast with the previous model which only took recipient-government's effectiveness, which is broader than mine, as a main variable. Second, more recent time series data (2007–2012) are able to be examined, which represent a more valid estimation, so the result should provide more insight into understanding the current aid giving practice especially after Paris Declaration on Aid Effectiveness (2005) and the subsequent Accra Agenda for Action (2008). Last, the random-effects estimation is adopted while Bandyopadhyay took the fixed-effects approach. As the random-effects approach does not need

dummy variables, it enjoys less loss of degree of freedom than the fixed-effects estimation.

3.2 Data

The empirical work of this study is based on the data of 120 countries that belong to low income or lower middle income or upper middle income groups, in accordance with the World Bank's classification, for the six-year span from 2007 to 2012. The dependent variable is the total amount of ODA commitments from different sources such as multilateral and bilateral, while private donation is excluded. GDP per capita, infant mortality rate, government effectiveness, population, and civil and political rights are included as dependent variables because it is considered that they appropriately represent developing countries' physical and economic needs, and soundness of their policies and institutions.⁷ If donor countries poverty-efficiently allocate aid according to Collier-Dollar's optimal aid allocation model,⁸ the coefficient of GDP per capita will be negative and the rest of variables that present recipient-states' need will have positive relationships with the allocation. To be specific, the coefficient of population will be positive because as population grows, the poor strata will grow, too. The uniqueness of this study is the fact that the doing business index is included as a major variable to discover whether aid is allocated in consideration of recipient-states' level of policy—specifically on the countries' business environment—other than the government effectiveness variable. There are many scholars who incorporate government effectiveness like Bandyopadhyay (2007) but their measurement of government effectiveness is insufficient since they did not take into account government policies on business environment. Government effectiveness variable in those studies only captures the quality of public and civil service delivery, the quality of policy formulation and implementation, and so on. Doing business variable in this study will complement the government effectiveness

⁷ Bandyopadhyay, Subhayu, and Howard J. Wall. "The Determinants of Aid in the Post-Cold War Era." *Federal Reserve Bank of St. Louis Review* 89(6) (2007): 533-47.

⁸ According to Paul Collier and David Dollar (2002), aid should be allocated to countries that suffer from poverty to a large extent and have good policy if donors want to reduce poverty effectively.

variable by adding a level of government's commitment to boost its business climate.

The data is obtained from the World Bank. If the ODA is allocated optimally, the coefficient of doing business is expected to be positive. In addition, squared values of GDP per capita, infant mortality and population are added as independent variables under the assumption that their relationships with the dependent variable can be quadratic, providing a deeper understanding of the relationship between aid and other variables. GDP per capita and ODA commitment are denominated in constant 2005 U.S. dollars for a precise comparison. When denominated, GDP Deflator (Inflation) provided by the World Bank was used.

Main sources of the data are from the World Bank database, OECD Stat Extracts, and Freedom House. ODA commitment data is sourced from OECD Stat Extracts; GDP per capita, infant mortality rate, government effectiveness and population, doing business are obtained from the World Bank; and data on civil and political rights from Freedom House. Full details of the dataset and summary statistics are attached in Appendix A.

1) Dependent variable

The dependent variable of this analysis is total official development assistance flows from different sources, including the Development Assistance Committee (DAC) members, multilateral institutions, and non-DAC countries for recipient country i in year t .

2) Independent variables

GDP per capita is gross domestic product, divided by midyear population in constant 2005 U.S. dollars terms and infant mortality rate is the number of infants dying before reaching one year of age, per 1,000 live births in a given year. The former indicates aid receiving countries' economic needs and the latter captures their physical and human needs. The aid should consider both aspects. Civil liberties and political rights capture the soundness of a country's institutions and policies. This variable is sourced from Freedom House, an independent watchdog organization that carries out annual evaluation of freedom in 195 countries and 14 disputed

territories.⁹ They rate each country numerically from 1 to 7 for political and civil rights respectively, with 1 representing the most free and 7 the least free.¹⁰ In this study, the two ratings for each country are combined. In addition to this, for the convenience of legibility, the ranking order is reversed, like what Bandyopadhyay and Wall did, so that the level of rights has a positive relationship with the index. The World Bank's Worldwide Governance Indicator (WGI) captures the aid-receiving governments' effectiveness by scoring governments between -2.5 and 2.5 on the basis of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies (Kaufmann et al. 2010). Population is included as an independent variable to see differences in terms of country size. The squared value of population takes population bias into consideration in order to avoid misinterpretation of aid allocation per capita that could fall with country size.

To measure the level of pro-business regulations and economic performance in the private sector, the World Bank's Doing Business index is adopted. According to Okey's research, the doing business index is one of the relevant sources to show economic performance of the private sector (Okey 2011). The doing business project, jointly launched by World Bank and International Finance Corporation (IFC), has been analyzing the business climate of 189 countries since 2002. The project ranks economies from 1 to 189, a lower rank means that the country's regulation is more in favor of business operation. This index is composed of the following ten indicators: 1) starting a business, 2) dealing with construction permits, 3) getting electricity, 4) registering property, 5) getting credit, 6) protecting investors, 7) paying taxes, 8) trading across borders, 9) enforcing contracts, and 10) resolving insolvency.¹¹ The index is one of the standard tools for measuring the impact of domestic regulations on business activities. However, the drawback of

⁹ "Freedom in the World." Freedom House. January 1, 2014. Accessed July 6, 2014.

¹⁰ "Freedom in the World 2013 - Methodology." Freedom House. January 1, 2013. Accessed July 6, 2014.

¹¹ "Ease of Doing Business and Distance to Frontier." Doing Business 2013. January 1, 2013. Accessed April 17, 2014. <http://www.tfsa.ca/storage/reports/Ease-of-doing-business-and-distance-to-frontier.pdf>.

the indicator is that it only shows relative rankings. To overcome this weakness, Distance to Frontier index data are used in this study. The only differences between the Doing Business index and Distance to Frontier index is that the latter is indicated in absolute terms. An economy's distance to frontier is shown numerically between 0 and 100, where 0 represents the worst performance and 100 means the frontier. For quantitative analysis of this study, the absolute numbers on the aforementioned ten component indicators were evenly averaged for each nation.

IV. EMPIRICAL FINDINGS

This chapter describes the empirical findings of the panel data analysis on which criteria donor states' aid allocation is significantly responsive to. For this study, six years of data (2007-2012) were collected from 120 recipient countries. After getting rid of observations that miss some data, 714 observations are incorporated in the analysis. The sample statistics for all variables are shown in Table 1. The mean country received \$543 million per year in ODA while the median countries Guatemala and Togo received only \$337 million and \$334 million respectively.¹² This skewness signifies that ODA commitment was not equally distributed. There were 17 countries that received aid more than \$1 billion annually and the top five were India (\$3,989 million), Afghanistan (\$3,760 million), Bangladesh (\$2,238 million), Vietnam (\$2,144 million), and Iraq (\$2,007 million). The top 17 aid receiving countries out of 120 countries accounted for 48.5 percent of the accumulated total ODA commitments during the sample years. More detailed information is provided in Appendix C.

¹² In Bandyopadhyay and Wall's findings (2007), there were 13 countries that received more than \$1 billion in aid per year, the top five of which were China, Poland, Congo, Indonesia, and Russia. Poland and Russia were not observed for this study because only low income, lower middle income, and upper middle income countries were in the sample. In this study, it is discovered that China ranked 9th, Indonesia ranked 10th, and Congo ranked 21st in aid.

[Table 1] Sample Statistics

| Variable | Obs | Mean | Std.Dev. | Min | Max |
|------------------------------|-----|----------|----------|----------|----------|
| ODA commitments (\$m) | 714 | 543.3422 | 737.5613 | 4.27 | 5081.87 |
| GDP per capita (\$) | 714 | 2455.923 | 2341.089 | 148.1409 | 13889.95 |
| GDP per capita squared (\$) | 714 | 1.15E+07 | 2.16E+07 | 21945.73 | 1.93E+08 |
| Infant mortality (‰) | 714 | 37.78431 | 25.06761 | 3.9 | 112.1 |
| Infant mortality squared (‰) | 714 | 2055.159 | 2448.292 | 15.21 | 12566.41 |
| Civil/Political rights | 714 | 8.298319 | 3.266442 | 2 | 14 |
| Government effectiveness | 714 | -0.50867 | 0.589296 | -1.77376 | 1.24741 |
| Population | 714 | 4.47E+07 | 1.65E+08 | 20118 | 1.35E+09 |
| Population squared | 714 | 2.92E+16 | 2.08E+17 | 4.05E+08 | 1.82E+18 |
| Doing business | 714 | 51.92081 | 10.43387 | 25.95 | 79.28 |

To see whether variables are correlated or not, a correlation matrix was deployed in Table 2 below. It is indicated that all the squared values are highly correlated with their initial value but squared values are not excluded in the estimation in order to find out if they have quadratic relationships between the dependent variable. Furthermore, no errors occurred with the squared variables while running panel regressions.

[Table 2] Correlation Matrix

| | ODA | GDP per capita | GDP per capita sq | Infant Mortality | Infant Mortality sq | Civil/Political rights | Gov. effectiveness | Population | Population sq | Doing business |
|------------------------|---------|----------------|-------------------|------------------|---------------------|------------------------|--------------------|------------|---------------|----------------|
| ODA | 1.0000 | | | | | | | | | |
| GDP per capita | -0.2576 | 1.0000 | | | | | | | | |
| GDP per capita sq | -0.1910 | 0.9158 | 1.0000 | | | | | | | |
| Infant Mortality | 0.1782 | -0.5938 | -0.4107 | 1.0000 | | | | | | |
| Infant Mortality sq | 0.1354 | -0.4939 | -0.3362 | 0.9638 | 1.0000 | | | | | |
| Civil/Political rights | -0.1690 | 0.4036 | 0.3152 | -0.3723 | -0.3563 | 1.0000 | | | | |
| Gov. effectiveness | -0.0515 | 0.5713 | 0.4370 | -0.6010 | -0.5636 | 0.4935 | 1.0000 | | | |

| | | | | | | | | | | |
|----------------|---------|---------|---------|---------|---------|---------|--------|--------|---------|--------|
| Population | 0.4781 | -0.0387 | -0.0473 | -0.0308 | -0.0361 | -0.0757 | 0.1292 | 1.0000 | | |
| Population sq | 0.3916 | -0.0270 | -0.0408 | -0.0436 | -0.0482 | -0.0670 | 0.1254 | 0.9754 | 1.0000 | |
| Doing business | -0.0708 | 0.4992 | 0.3529 | -0.6751 | -0.6546 | 0.4201 | 0.7131 | 0.0020 | -0.0044 | 1.0000 |

Heteroskedasticity in error terms was detected by the Breusch-Pagan test and it was corrected with robust option while no serial correlation problem was discovered by the Wooldridge test. More detailed information is provided in Appendix D and Appendix E. In addition, ODA commitment and doing business indicators may be potentially endogenous. To test if there is an endogeneity issue, Durbin-Wu-Hausman test as performed and concluded that doing business variable is truly exogenous.

4.1 Least Squares Estimation

Table 3 presents the results of least squares estimation. The coefficients that are significantly different from zero at least at the 10% level are highlighted in bold. Except for government effectiveness, the rest of the variables are positively or negatively associated with ODA commitments. In this linear regression analysis, GDP per capita, GDP per capita squared, infant mortality, population, population squared, and doing business climate are significantly associated with ODA commitments at the 10 percent level or less. Above all, it is found that donors care about how well business policy is being enforced by aid receiving governments. In practice, developed countries tend to give more aid to those which have a better business climate. Second, we see that donors are mainly responsive to the developing countries' economic needs (GDP per capita), physical needs (infant mortality). If the infant mortality rate is too high, however, the aid allocation is decreased. Third, the results indicate that aid tends to be more allocated to bigger countries (population) but only finitely. The population squared variable is negatively associated with ODA commitments as shown in the table. In other words, not always

the biggest ones receive most aid. Fourth, developing countries that enjoy higher level of civil and political rights receive less aid. Lastly, government effectiveness is not considered much by donors when distribute aid and this practice is not accordant with the ideal aid allocation model claimed by Burnside and Dollar (2000).

[Table 3] Least Squares Estimation Results

| Dependent Variable = ODA commitments | | | |
|--------------------------------------|---------------------|-----------------------|-------|
| Independent Variables | Coefficient. | Robust Standard Error | P> t |
| GDP per capita | -0.1383*** | 0.021977 | 0.000 |
| GDP per capita squared | 8.67E-06*** | 1.77E-06 | 0.000 |
| Infant mortality | 8.191839*** | 2.448101 | 0.001 |
| Infant mortality squared | -0.05916** | 0.024715 | 0.017 |
| Civil/Political rights | -12.4518* | 7.109447 | 0.080 |
| Government effectiveness | 44.95901 | 50.12275 | 0.370 |
| Population | 8.29E-06*** | 7.73E-07 | 0.000 |
| Population squared | -5.06E-15*** | 6.10E-16 | 0.000 |
| Doing business | 7.483128*** | 2.305305 | 0.001 |
| _cons | 110.0425 | 163.5902 | 0.501 |

Note: Heteroskedasticity of error terms is corrected with robust stander errors. *** (**, *) indicates statistical significance at the 1(5,10) per cent level.

There are some limitations on the least squares estimation because it is valid only on many assumptions such as error terms' homostkedasticity, no serial correlation between the error terms, and explanatory variables' exogeneity. If any of above assumptions are violated, least squares estimation will not effectively estimate the results. Even though the heteroskedasticity was corrected, still the validity of those assumptions needs to be verified and the most preferred model should be correctly used for more accurate estimation.

4.2 Hausman Specification Test

Since there are some limitations on the least squares estimation, either fixed or random effects models is also applied for more efficient panel data estimation. To decide between fixed or random effects, the Hausman test was carried out. As shown in the table 4 below, the alternative hypothesis for the Hausman specification test is rejected. In other words, it is concluded that the difference in coefficients is not systematic. Thus, the random effects model is suitable for this study.

[Table 4] Hausman Specification Test Results

| Dependent Variable = ODA commitments | | | | |
|--------------------------------------|--------------------------|-----------|---------------------|---------------------------------------|
| Independent Variables | ----- Coefficients ----- | | | |
| | (b) FE | (B) RE | (b-B) Difference | sqrt(diag(V_b-V_B)) Standard error |
| GDP per capita | -0.05805 | -0.0883 | 0.030255 | 0.029164 |
| GDP per capita squared | 2.00E-06 | 4.21E-06 | -2.21E-06 | 1.93E-06 |
| Infant mortality | 9.443289 | 8.817759 | 0.62553 | 2.794978 |
| Infant mortality squared | -0.07861 | -0.07446 | -0.00415 | 0.03175 |
| Civil/Political rights | -16.7735 | -12.0861 | -4.68735 | 6.848218 |
| Government effectiveness | -13.3681 | 8.397544 | -21.7656 | 41.24885 |
| Population | 6.56E-06 | 7.38E-06 | -8.22E-07 | 7.53E-07 |
| Population squared | -3.75E-15 | -4.35E-15 | 5.97E-16 | 1.96E-15 |
| Doing business | 4.515217 | 5.162344 | -0.64713 | 2.038963 |

b = consistent under H₀ and H_a; obtained from xtreg
 B = inconsistent under H_a, efficient under H₀; obtained from xtreg

Test: H₀: difference in coefficients not systematic

$$\chi^2(6) = (b-B)'[(V_b-V_B)^{-1}](b-B)$$

$$= 1.69$$

$$\text{Prob}>\chi^2 = 0.9459$$

4.3 Random-Effects Estimation

Table 5 illustrates the comparison of random-effects estimation and the least squares estimation. The coefficients that are significantly different from zero at least at the 10% level are

highlighted in bold. GDP per capita squared, infant mortality, government effectiveness and doing business variables are positively related while GDP per capita, infant mortality squared, civil and political rights, and population squared have a negative association with the dependent variable. Also, there are some major differences in the results between the two analyses: GDP per capita squared, civil and political rights, and doing business. The least squared regression results indicate that those three variables are statistically significant but the random-effects estimation does not. To decide which estimation to take, the Breusch and Pagan Lagrangian multiplier test for random effects was run. The test result concluded that there are significant differences across countries. Namely, the data have panel effects, meaning that the random-effects estimation overrides least squares estimation. The detailed test results are provided in Appendix F.

[Table 5] Comparason of Random-effects and Least Squares Estimation

| ODA commitments | Random Effects | | Least Squares | |
|--------------------------|--|-------|--|-------|
| | Coefficient (Standard error) | P>z | Coefficient (Robust Standard error) | P>t |
| GDP per capita | -0.0883** (0.037792) | 0.019 | -0.1383*** (0.0219766) | 0.000 |
| GDP per capita squared | 4.21E-06 (2.92E-06) | 0.149 | 8.67E-06*** (1.77E-06) | 0.000 |
| Infant mortality | 8.817759* (4.586697) | 0.055 | 8.191839*** (2.448101) | 0.001 |
| Infant mortality squared | -0.07446* (0.044682) | 0.096 | -0.05916** (0.024715) | 0.017 |
| Civil/Political rights | -12.0861 (9.501979) | 0.203 | -12.4518* (7.109447) | 0.080 |
| Government effectiveness | 8.397544 (64.04732) | 0.896 | 44.95901 (50.12275) | 0.370 |
| Population | 7.38E-06*** (8.49E-07) | 0.000 | 8.29E-06*** (7.73E-07) | 0.000 |
| Population squared | -4.35E-15*** (6.92E-16) | 0.000 | -5.06E-15*** (6.10E-16) | 0.000 |

| | | | | |
|----------------|------------------------|-------|---|-------|
| Doing business | 5.162344 (3.384156) | 0.127 | 7.483128*** (2.305305) | 0.001 |
| _cons | 162.534 (260.9125) | 0.533 | 110.0425 (163.5902) | 0.501 |

Note: *** (**,*) indicates statistical significance at the 1(5, 10) per cent level.

First, regarding the doing business environment, the random-effects model signifies that donor states do not consider much about the recipients' climate for business as a determinant of aid level. Such results show that the current aid practice is not poverty efficient. If the aid allocation is poverty efficient enough, more aid should have been allocated to those recipient states that have higher levels of business favorable policies because pro-business policies lead to a vibrant private sector development and the vibrant private sector drives economic growth that will eventually eradicate poverty.

Second, GDP per capita is negatively associated with the amount of ODA commitments in both estimations. It is interpreted that donor states are strongly responsive to the recipient states' economic need. This result confirms Wall's finding that countries with lower per capita GDP tend to receive correspondingly greater shares of aid (Wall 1995).

Third, infant mortality is positively related with total ODA commitments. This finding signifies developing countries' physical and human needs are taken into consideration when donor countries select where to give aid. Nonetheless, if the infant mortality rate goes too high, the ODA commitments decreased as shown in the sign of infant mortality squared coefficient. Such practice does not align with the theoretical aid allocation principle in that more aid should have been allocated to countries where human development is urgently needed due to extremely high infant mortality rates.

Fourth, the coefficient of the index of civil liberty and political rights is not significant. Notwithstanding it is statistically insignificant, it is still noticeable that the sign of the variable is opposite to expectation. The result weakens the claim of Neumayer that countries which put a

higher value on political and civil rights receive more aid (Neumayer 2003).

Fifth, the government effectiveness index is highly insignificant. This undermines the findings on policy selectivity by Dollar and Levin (Dollar and Levin 2004). They argue that aid agencies for 1984–2002 have allocated more aid towards countries with good institutions and policies. However, more recent panel data analysis revealed that aid giving practice retrogressed to 1984 – 1989 period when aid was allocated irrespective of good governance.

Lastly, the relationship of donors' assistance and population is significantly different from zero. This result indicates that aid tends to be more allocated to bigger countries in size. As bigger countries generally have more population living in poverty, donors' responsiveness to population is above criticism. It is also found that the biggest developing countries do not necessarily receive more aid since the population squared variable has a statistically significant negative sign. It is reasonable because the top biggest countries, such as China, India and Brazil, would have been allocated most aid resources otherwise.

V. CONCLUSION

The investigations through economic panel data estimation show that the recent aid practice during period 2007–2012 has not much changed from the past practice that focused mostly on the recipients' needs—generally represented by income level, infant mortality and population—rather than considering the aid's value for money or appropriate allocation in accordance with the Paris Declaration on Aid Effectiveness (2005) and the Accra Agenda for Action (2008). As Accra Agenda for Action declared that respect for human rights is one of the core elements for achieving

impact on lives in developing countries¹³, donors must not turn a blind eye to the status of human rights in aid-recipient countries. The finding regarding the government effectiveness is inconsistent with Burnside and Dollar's claim that aid should be allocated more to countries with sound policies and institutions, because aid has a positive effect for growth only in those countries.

Do countries with more business-friendly environments receive more aid? To the question, the main focus of this study, the answer is no. The hypothesis of this study was rejected by the empirical analysis so it concludes that the "doing business" variable is not statistically significant in the allocation of aid. The result is somewhat disappointing to those who believe that the favorable doing business climate should play an important role in the allocation of aid.

The policy implication of this paper is that donor states should recognize private sector developments are essential to a recipient country's economic prosperity, and consider the soundness of policies on business as a critical criterion when selecting where to give aid. By considering business climate as a major selectivity factor, donor countries will contribute to better aid effectiveness. What is more, donor countries should deliberately design the way of support to strengthen the business policies and regulations for recipient countries.

This study can be improved in several ways. The model in this study can become more sophisticated by building an 'aid allocation–business climate–growth' relationship specification but the direct relationship between the business climate and economic growth is not analyzed due to methodological issues. Moreover, the relationship between aid allocation and doing business can be elaborated by testing each sub-category of the variables. The relative importance of the sub-category may vary. On this account, the more detailed relationship between aid allocation and

¹³ Accra Agenda for Action (2008): Ministers of developing and donor countries responsible for promoting development and Heads of multilateral and bilateral development institutions endorsed the Accra Agenda for Action (AAA) in Accra, Ghana, on 4 September 2008 to accelerate and deepen implementation of the Paris Declaration on Aid Effectiveness(2005). In doing so, developing countries committed to taking control of their own future, donors pledged to co-ordinate better amongst themselves, and all agreed to be more accountable to each other – and to their citizens. (OECD)

doing business sub-categories, such as starting a business, getting credit, and protecting investors, can be discovered separately.

APPENDICES

APPENDIX A: DATA SOURCES

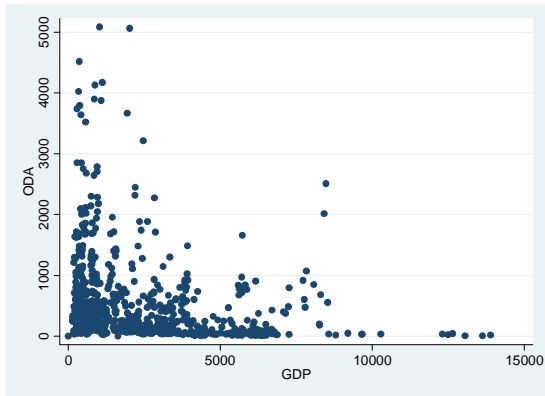
| Variable | Source | Description | Source URL |
|---|---------------|---|---|
| Inflation, GDP deflator (annual %) | World Bank | Inflation as measured by the annual growth rate of the GDP implicit deflator shows the rate of price change in the economy as a whole. | http://data.worldbank.org/indicator/NY.GDP.DEFL.KD.ZG |
| GDP per capita | World Bank | GDP per capita is gross domestic product divided by midyear population. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. | http://data.worldbank.org/indicator/NY.GDP.PCAP.KD |
| ODA Commitments | OECD | Commitments are considered to be made at the date a loan or grant agreement is signed or the obligation is otherwise made known to the recipient. ODA commitments include grants, capital subscriptions, associated financing and technical cooperation. | http://stats.oecd.org/viewhtml.aspx?datasetcode=TABLE3A&lang=en |
| Infant Mortality Rates | World Bank | Infant mortality rate is the number of infants dying before reaching one year of age, per 1,000 live births in a given year. | http://data.worldbank.org/indicator/SP.DYN.IMRT.IN |
| Civil and political rights | Freedom House | Political rights ratings are based on an evaluation of three subcategories: electoral process, political pluralism and participation, and functioning of government. Civil liberties ratings are based on an evaluation of four subcategories: freedom of expression and belief, associational and organizational rights, rule of law, and personal autonomy and individual rights. | http://www.freedomhouse.org/report/freedom-world-2013/methodology#.U7j-Efl_tAo |
| Government Effectiveness | World Bank | Government Effectiveness captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. | http://data.worldbank.org/data-catalog/worldwide-governance-indicators |
| Population | World Bank | Total population counts all residents regardless of legal status or citizenship - except for refugees not permanently settled in the country of asylum. | http://databank.worldbank.org/data/views/reports/tableview.aspx?isshared=true |
| Doing Business Index | World Bank | The doing business index provides objective measures of business regulations and their enforcement across 189 economies and selected cities at the subnational and regional level. | http://www.doingbusiness.org/data/distance-to-frontier |

APPENDIX B: COUNTRIES OBSERVED

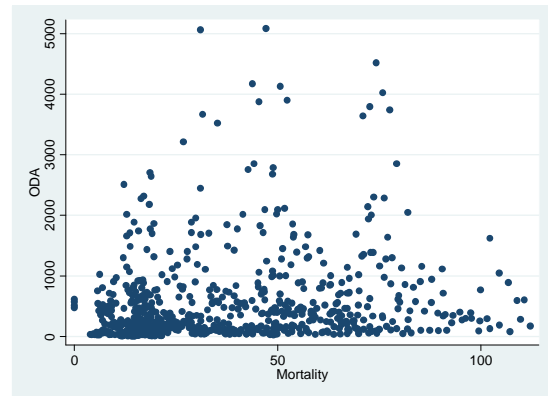
| | | | | | |
|----|--------------------------|----|-----------------------|-----|--------------------------------|
| 1 | Afghanistan | 50 | Indonesia | 99 | St. Vincent and the Grenadines |
| 2 | Albania | 51 | Iran, Islamic Rep. | 100 | Sudan |
| 3 | Algeria | 52 | Iraq | 101 | Suriname |
| 4 | Angola | 53 | Jordan | 102 | Swaziland |
| 5 | Armenia | 54 | Kazakhstan | 103 | Syrian Arab Republic |
| 6 | Azerbaijan | 55 | Kenya | 104 | Tajikistan |
| 7 | Bangladesh | 56 | Kiribati | 105 | Tanzania |
| 8 | Belarus | 57 | Kyrgyz Republic | 106 | Thailand |
| 9 | Belize | 58 | Lao PDR | 107 | Timor-Leste |
| 10 | Bhutan | 59 | Lebanon | 108 | Togo |
| 11 | Bolivia | 60 | Lesotho | 109 | Tonga |
| 12 | Bosnia and Herzegovina | 61 | Liberia | 110 | Tunisia |
| 13 | Botswana | 62 | Macedonia, FYR | 111 | Turkey |
| 14 | Brazil | 63 | Madagascar | 112 | Uganda |
| 15 | Burkina Faso | 64 | Malawi | 113 | Ukraine |
| 16 | Burundi | 65 | Malaysia | 114 | Uzbekistan |
| 17 | Cambodia | 66 | Maldives | 115 | Vanuatu |
| 18 | Cameroon | 67 | Mali | 116 | Venezuela, RB |
| 19 | Cabo Verde | 68 | Marshall Islands | 117 | Vietnam |
| 20 | Central African Republic | 69 | Mauritania | 118 | Yemen, Rep. |
| 21 | Chad | 70 | Mauritius | 119 | Zambia |
| 22 | China | 71 | Mexico | 120 | Zimbabwe |
| 23 | Colombia | 72 | Micronesia, Fed. Sts. | | |
| 24 | Comoros | 73 | Moldova | | |
| 25 | Congo, Dem. Rep. | 74 | Mongolia | | |
| 26 | Congo, Rep. | 75 | Montenegro | | |
| 27 | Costa Rica | 76 | Morocco | | |
| 28 | Cote d'Ivoire | 77 | Mozambique | | |
| 29 | Djibouti | 78 | Namibia | | |
| 30 | Dominica | 79 | Nepal | | |
| 31 | Dominican Republic | 80 | Nicaragua | | |
| 32 | Ecuador | 81 | Niger | | |
| 33 | Egypt, Arab Rep. | 82 | Nigeria | | |
| 34 | El Salvador | 83 | Pakistan | | |
| 35 | Eritrea | 84 | Palau | | |
| 36 | Ethiopia | 85 | Panama | | |
| 37 | Fiji | 86 | Papua New Guinea | | |
| 38 | Gabon | 87 | Paraguay | | |
| 39 | Gambia, The | 88 | Peru | | |
| 40 | Georgia | 89 | Philippines | | |
| 41 | Ghana | 90 | Rwanda | | |
| 42 | Grenada | 91 | Samoa | | |
| 43 | Guatemala | 92 | Senegal | | |
| 44 | Guinea | 93 | Serbia | | |
| 45 | Guinea-Bissau | 94 | Seychelles | | |
| 46 | Guyana | 95 | Solomon Islands | | |
| 47 | Haiti | 96 | South Africa | | |
| 48 | Honduras | 97 | Sri Lanka | | |
| 49 | India | 98 | St. Lucia | | |

APPENDIX C: ODA COMMITMENTS AND THE EXPLANATORY VARIABLES

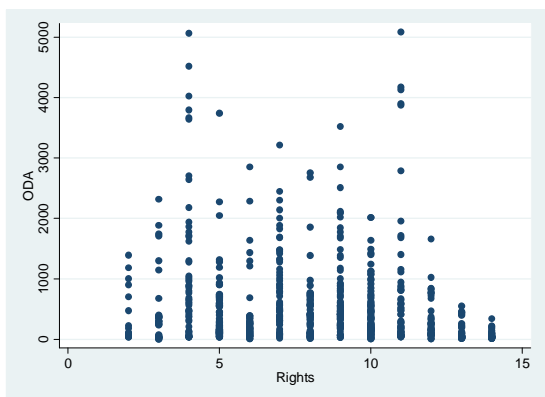
These plots illustrate the simple correlations between ODA commitments (the dependent variable) and independent variables as well as the distribution of the values of six independent variables.



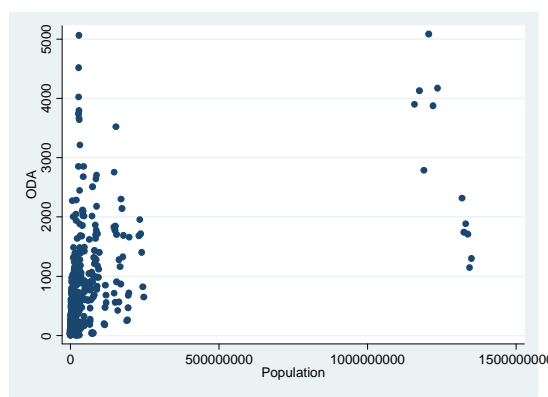
<GDP per capita>



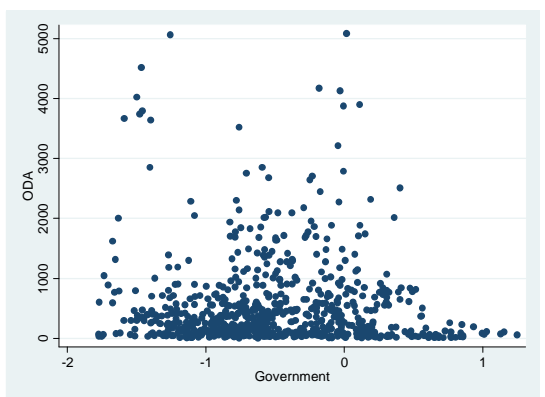
<Infant Mortality>



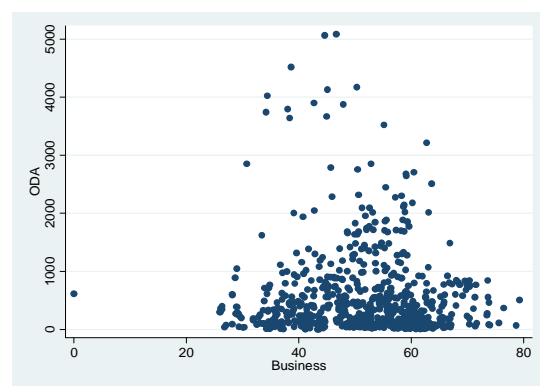
<Civil /Political Rights>



<Population>



<Government Effectiveness>



<Doing Business>

APPENDIX D: TOP ODA RECEIVED COUNTRIES

(2005 constant U.S. million \$)

| Ranking | Country | Year | | | | | | Total Sum | Annual Average |
|---------|---------------|----------|----------|----------|----------|----------|----------|-----------|----------------|
| | | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | | |
| 1 | India | 3,896.22 | 4,127.26 | 2,782.37 | 5,081.87 | 3,877.52 | 4,170.48 | 23,935.72 | 3,989.29 |
| 2 | Afghanistan | 2,851.38 | 3,741.02 | 4,020.96 | 4,518.49 | 3,791.53 | 3,639.37 | 22,562.75 | 3,760.46 |
| 3 | Bangladesh | 1,830.28 | 2,751.11 | 1,777.49 | 1,847.66 | 3,517.35 | 1,704.86 | 13,428.75 | 2,238.13 |
| 4 | Vietnam | 1,863.61 | 1,698.95 | 2,642.14 | 1,776.41 | 2,703.09 | 2,179.88 | 12,864.08 | 2,144.01 |
| 5 | Iraq | 3,666.82 | 5,061.75 | 1,188.88 | 903.47 | 563.29 | 658.51 | 12,042.72 | 2,007.12 |
| 6 | Tanzania | 2,093.14 | 2,096.27 | 2,847.64 | 2,013.92 | 1,426.75 | 1,488.94 | 11,966.66 | 1,994.44 |
| 7 | Kenya | 1,679.49 | 882.40 | 1,855.50 | 2,116.49 | 2,020.33 | 2,675.18 | 11,229.39 | 1,871.57 |
| 8 | Mozambique | 1,125.36 | 1,632.43 | 1,476.42 | 1,885.62 | 1,277.15 | 3,211.30 | 10,608.28 | 1,768.05 |
| 9 | China | 2,317.37 | 1,742.95 | 1,884.95 | 1,712.20 | 1,142.20 | 1,302.24 | 10,101.91 | 1,683.65 |
| 10 | Indonesia | 1,683.27 | 1,951.60 | 1,718.07 | 1,404.95 | 818.07 | 649.98 | 8,225.94 | 1,370.99 |
| 11 | Ethiopia | 1,210.84 | 1,296.61 | 1,632.42 | 1,278.38 | 985.04 | 1,716.08 | 8,119.37 | 1,353.23 |
| 12 | Uganda | 1,418.43 | 1,478.83 | 1,685.73 | 1,449.56 | 1,008.42 | 1,058.04 | 8,099.01 | 1,349.84 |
| 13 | Turkey | 605.96 | 916.78 | 795.66 | 1,068.27 | 2,011.51 | 2,508.41 | 7,906.59 | 1,317.77 |
| 14 | Palau | 30.87 | 28.43 | 2,301.42 | 2,139.82 | 1,325.35 | 1,689.88 | 7,515.77 | 1,252.63 |
| 15 | Cote d'Ivoire | 413.70 | 579.17 | 2,042.54 | 676.31 | 1,300.63 | 2,285.41 | 7,297.76 | 1,216.29 |
| 16 | Cameroon | 1,937.40 | 1,022.27 | 959.68 | 687.42 | 857.07 | 884.38 | 6,348.22 | 1,058.04 |
| 17 | Egypt | 906.16 | 1,020.98 | 645.33 | 1,318.75 | 687.90 | 1,434.96 | 6,014.08 | 1,002.35 |

APPENDIX E: BREUSCH-PAGAN TEST FOR HETEROSCADASTICITY

H_0 : Constant variance

Variables: fitted values of ODA Commitment

chi2(1) = 147.99

Prob > chi2 = 0.0000

To identify whether the error terms are homoskedastic or not, Breusch-Pagan test is conducted. The null hypothesis for the test is rejected at the level of 1 per cent, which concludes that the error terms are heteroskedastic.

APPENDIX F: WOOLDRIDGE TEST FOR SERIAL CORRELATION

H_0 : no first-order autocorrelation

$$F(1, 119) = 2.697$$

$$\text{Prob} > F = 0.1032$$

It is normally said that serial correlation tests apply to macro panels with long time series, over 20–30 years. Therefore, it would not be a problem in this study with 6-year span of panel data. As seen in the Wooldridge test results, it fails to reject the null and conclude the data does not have first-order autocorrelation.

APPENDIX G: BREUSCH AND PAGAN LAGRANGIAN MULTIPLIER TEST

$$\text{ODA commitments} [\text{country},t] = Xb + u[\text{country}] + e[\text{country},t]$$

| | Var | sd = sqrt(Var) |
|-----------------|----------|----------------|
| ODA commitments | 543996.7 | 737.5613 |
| e | 110116.7 | 331.8384 |
| u | 225197.4 | 474.5496 |

Test: $\text{Var}(u) = 0$

chi2(1) = 758.33

Prob > chi2 = 0.0000

The Breusch and Pagan Lagrangian Multiplier test help decide between a random-effects estimation and a simple OLS regression. The results reject the null and conclude that the random-effects estimation is appropriate for this study.

APPENDIX H: RANDOM-EFFECTS GLS REGRESSION

| | | |
|--|----------------------|-----|
| Random-effects GLS regression | Number of obs = | 714 |
| Group variable: country | Number of groups = | 120 |
| R-sq: within = 0.1516 | Obs per group: min = | 2 |
| between = 0.4762 | avg = | 6.0 |
| overall = 0.4125 | max = | 6 |
| Random effects u _i ~ Gaussian | Wald chi2(9) = | . |
| corr(u _i , X) = 0 (assumed) | Prob > chi2 = | . |

| ODA commitments | Coefficient | Standard error | z | P>z |
|--------------------------|--|----------------|-------|-------|
| GDP per capita | -0.0883** | 0.037792 | -2.34 | 0.019 |
| GDP per capita squared | 4.21E-06 | 2.92E-06 | 1.44 | 0.149 |
| Infant mortality | 8.817759* | 4.586697 | 1.92 | 0.055 |
| Infant mortality squared | -0.07446* | 0.044682 | -1.67 | 0.096 |
| Civil/Political rights | -12.0861 | 9.501979 | -1.27 | 0.203 |
| Government effectiveness | 8.397544 | 64.04732 | 0.13 | 0.896 |
| Population | 7.38E-06*** | 8.49E-07 | 8.7 | 0.000 |
| Population squared | -4.35E-15*** | 6.92E-16 | -6.28 | 0.000 |
| Doing business | 5.162344 | 3.384156 | 1.53 | 0.127 |
| _cons | 162.534 | 260.9125 | 0.62 | 0.533 |
| sigma_u | 474.54963 | | | |
| sigma_e | 331.83844 | | | |
| rho | .6716012 (fraction of variance due to u _i) | | | |

Note: *** (**,*) indicates statistical significance at the 1(5, 10) per cent level.

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