국제학석사학위논문

Budget Support ODA:
The Rationale Behind and
Its Actual Allocation Determinants

예산 지원 ODA: 집행의 논리적 근거와

실제 집행 결정 요인 분석

2016 년 2 월

서울대학교 국제대학원

국제학과 국제통상전공

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이 論文을 國際學碩士 學位論文으로 提出함

2016 年 2 月

서울大學校 國際大學院

國際學科 國際通商專攻

李 在 喆

鄭 朱 娟 의 碩士學位論文을 認准함

2016 年 2 月

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Budget Support ODA: The Rationale Behind

and Its Actual Allocation Determinants

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Date: February 2016

Abstract

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The ultimate goal of the paper is to design an economic framework that properly organizes the determinants of budget support and presents empirical results reflecting the modeling. The results seem to support the model's prediction about the eligibility stage and the budget support ratio selection, not perfectly but considerably.

Both in the model and in the empirical analysis, the total amount of ODA (Official Development Assistance) demonstrated a significant impact on the eligibility, although it had an ambiguous effect on the ratio choice. Furthermore, the findings indicate that governance indicators positively affect both stages, which is parallel to the framework. Besides, the model and the econometric results tell us that new emerging donors tend to be reluctant to place a higher ratio of their money upon the budget support modality. Lastly, the bilateral ODA relationship affects the eligibility stage positively and the ratio stage negatively, as predicted in the model.

When it comes to governance, similar to Kaufmann et al. (2011), this paper divides governance into three categories: (1) low corruption and fungibility risk, (2) political stability and (3) formulation of sound policies; it was revealed that the most robust factor is different in each part. In the eligibility part, political

stability is the most critical element, while low corruption and fungibility risk is the most influential in the ratio stage. This result shows the reluctance of donors towards budget support is still prevalent even among DAC (Development Assistance Committee) countries that use the new modality.

Key Words: Development, Development Cooperation, ODA, Aid Effectiveness, Budget Support, Governance

Student Number: 2013-22041

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I. Introduction

As the issue of aid effectiveness is at the center of the discussion in the ODA field, budget support is considered as an alternative to project aid, which is the traditional type of aid. The definition of budget support and its characteristics are listed in the table below. The modality is divided into two categories: general budget support and sectoral budget support. They are different in that the latter should be spent on a specific sector. Except for the conditionality, however, both mechanisms have much in common and they share same characteristics described in the table above. In addition, verifying differences between the both is not the main interest of this paper. Therefore, the present paper will focus on the 'whole' budget support, not differentiating the both mechanisms.

Table 1.1 The Definition of Budget Support

Budget support		Characteristics
Donor instruments that support the implementation of a country's medium-term poverty reduction strategy and consist of regular disbursements of untied resources to the budget. Budget support is typically based on an agreed set of performance indicators in the form of institutional or policy reform measures or outcome indicators.		• Channeling of donor funds to a partner country using its own allocation, procurement, and accounting systems • Support for a recipient country's own development programs, typically focusing on growth, poverty reduction, fiscal adjustment, and the strengthening of institutions, particularly the budgetary processes • Policy content, performance assessment, and an accountability framework that focus on policy measures and benchmarks related to overall budget and policy priorities, as set out in the country's own poverty reduction strategy and medium-term expenditure framework
General budget support	*Sector budget support*	• Provision at regular intervals, ideally in alignment with the country's annual budget cycle
It is defined as a general contribution to the overall budget (sometimes referred to as *macro support)*	It is defined as financial aid earmarked to a discrete sector (with any conditionality relating to these sectors).	• Agreement on general budget priorities and expenditures, so that in principle there is no need to earmark funds for specific items.

Source: Koeberle et al. (2006), reorganized by the author

The new modality is considered more effective than the other in that fortified country ownership, lower transaction costs, enhanced predictability, etc. can be realized. (Koeberle et al. 2006) Besides, it contributes to improving recipients' control over ODA and enables both donor and partner to share policy evaluation system and to have more policy dialogues. Furthermore, in terms of not only aid disbursement mechanism but also of results, it was revealed to have a positive influence on poverty level and economic growth (Europe Aid 2014)

Figure 1.1 The Annual Volume of Budget Support (Million $US)
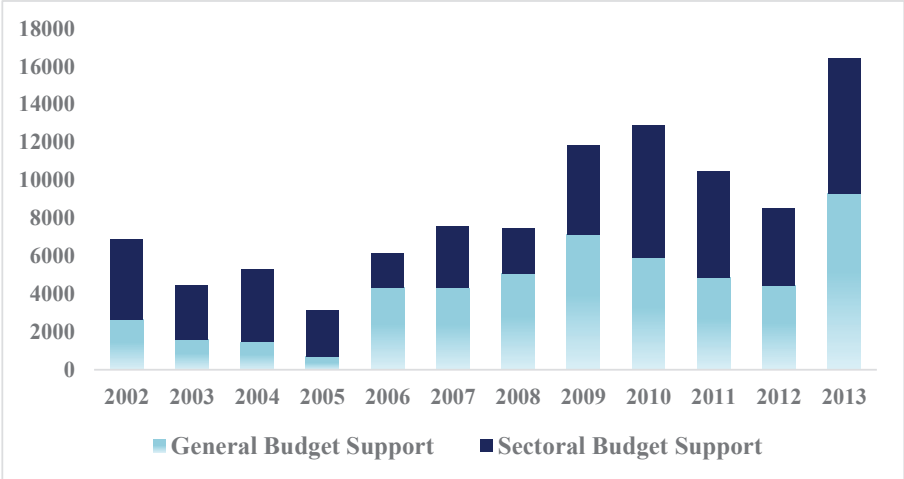
Source: Data retrieved from OECD stats, organized by the author

However, not all countries utilize the new modality. Besides, the overall portion that the new modality takes is quite small. Even though the amount of budge support increased drastically from in the recent decade, it only constitutes 15% of the total Country Programmable Aid (CPA) and is lower than 10% of the total ODA volume, which is considerably low if the alternative modality is assumed to be more effective. This implies that there would be factors deciding the ratio of budget support other than merely the effectiveness issue. Building an economic

framework to explain them and using a strict methodology to support the analysis are required tasks.

Figure 1.2 The Annual Ratio of Budget Support by DAC (of Total CPA)
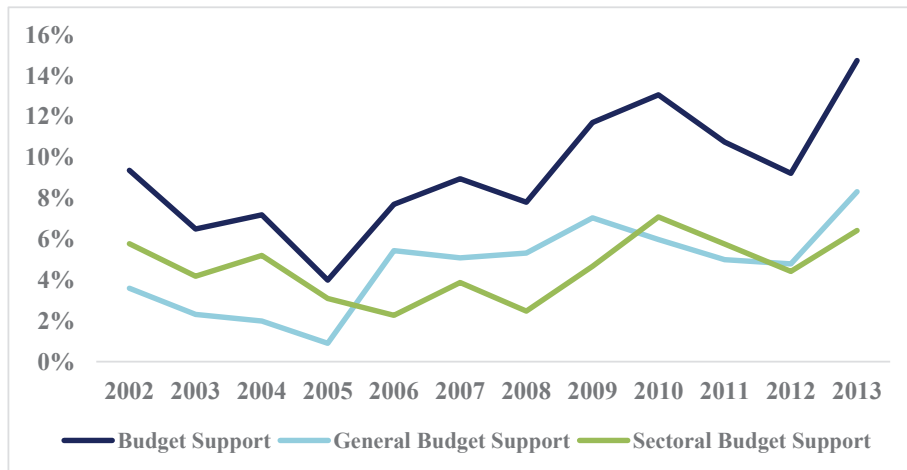
Source: Data retrieved from OECD stats, organized by the author

II. Literature Review

When it comes to theoretical modeling for budget support, the work of Cordella & Dell'Ariccia (2007) can be referred to as a pioneer for investigating the mechanism. The authors showed that budget support can be better when aid programs are smaller and recipient governments are more willing to spend for their societies. Nonetheless, there is a lack of empirical analyses and case studies to back the results of their model.

Faust & Koch (2014) analyzed which factors affect the amount of disbursed budget support. Based on the regression result in the paper, it was revealed that political factors influence the modality; specifically, right-wing governments tend to reduce the amount of direct funding. However, it only

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considers European donors, without caring about recipients' characteristics such as government effectiveness, political stability, or corruption, which are crucial. Neither did it take into account bilateral factors such as the years of cooperation, bilateral amount, etc.

Clist et al. (2012) elaborated a model explaining how a donor country can set its ratio for budget support within the total amount of ODA and ran some regressions to find the determinants of general budget support allocation only focusing on two multilateral donors: European Commission and World Bank. As well as the small scope of econometric analysis, the irrelevance between its theoretical model and empirical results is a weakness found in the paper.

Complementing these mentioned studies, the present paper will design an economic framework and try to support the model via econometric analysis. Furthermore, all DAC donors, all recipients, and bilateral factors will be considered in the empirical test.

III. Theoretical Modelling

3.1 Donor's Aid Allocation – Ratio Stage

One agent in the economic model is a "donor." The agent is assumed to be humanitarian, so that it tries to maximize the production of social good from the total amount of ODA, M. The total amount is decided exogenously based on the characteristics of the donor, those of the recipient, and their relationship. However, how the total amount is determined is not the core interest of this paper. The main

focus of analysis is how large is the portion of the amount that is allocated into the budget support scheme. As assumed in Cordella & Dell'Ariccia (2007) and Clist et al. (2012) the total amount is divided into two types of aid: Project aid, which is the traditional type of aid, and budget support. The donor will try to maximize the product created from the total ODA by allocating a certain amount of M to the project and the rest to budget support. γ is set to represent the ratio allocated to direct funding. The objective function and constraints of the donor are as follows:

(1) $\max\limits_{\gamma} g\big(c(\gamma M - k)\big)^e + a\big((1-\gamma)Mp\big)^e$

$s.t.\, 0 < \gamma < 1, \quad 0 < c < 1, \quad 0 < e < 1, \quad 0 < p < 1$

$M > 0, \quad k > 0, \quad a > 1, \quad g > 0$

$g(c(\gamma M - k))^e$ and $\big((1-\gamma)Mp\big)^e$ are the social good produced under the budget support and the project aid, respectively. The c represents the portion of the budget support actually allocated for making beneficial goods for the whole recipient society and has a range of 0–1; the reason it may be lower than 1 is that there exists the risk of fungibility in the recipient. The fiduciary risk is inevitable in direct funding, which is much less likely to be found in the case of project aid. (Leiderer 2012) The motivation can stem from many possible reasons, such as utilizing it for private use or military budget. The siphoned money does not increase the production of social and economic goods for poverty reduction and development. The level of c is different for each recipient according to their level of corruption and the strength of the rule of law.

Since workers within a donor's development agency and those of the recipient's government are limited, at least in the short run, the marginal product of each modality decreases as a larger amount of capital is used. This is represented

by e in the equation whose range is also 0–1. Both modalities share the same e, but it is possible that the social good produced by each modality based on the same amount of capital would differ. This is reflected in the element g that can be affected by the capacity of the recipient government, its political stability, etc. The higher the factor, the more social production can be made by the budget support.

However, the donor may put a higher value on the project aid due to the benefits of modality. Among them are the employment impact and the existence of tangible results. The former cannot be ignored, especially when there are many governmental institutions and NGOs implementing ODA-type projects. Even a higher level of budget support would be considered as lower job stability to those who work in ODA, and this can put pressure on a government that tries to spend on it. The existence of visible results is another important factor in making a bigger than 1. It is much easier in the case of project-type aid to make tangible results that can be advertised. This is why governments prefer traditional types of ODA, particularly right-wing governments. (Faust & Koch 2014).

Another issue is how the cost for each modality is spent. The cost of budget support is set as a fixed k, since the cost should not increase proportionally when the amount of budget support increases. Suppose a donor country decided to give a million dollars of direct funding and created a committee to monitor it; if the donor gave an extra US\$100 million to a recipient, they would not need to spend more on management, since the same committee would manage the extra amount of money. However, when new project aid is implemented, the monitoring cost increases accordingly, since a certain portion of the new plan must be allocated to the cost of monitoring, evaluation, and logistics for the project. The proportion of the managing cost is $(1 - \gamma)M(1 - p)$, where p is positive but lower than 1. Only

the rest $(1 - \gamma)Mp$ is utilized for the project aid. The donor decides γ, satisfying the first order condition (2).

(2) $gc^e e(\gamma M - k)^{e-1}M - aM^e p^e e(1 - \gamma)^{e-1} = 0$

(3) $\gamma^* = \dfrac{M\left(\frac{gc}{ap^e}\right)^{\frac{1}{1-e}}+k}{M\left(\frac{gc}{ap^e}\right)^{\frac{1}{1-e}}+M}$

Since the second order condition is always satisfied, it has a unique solution for the maximization of γ^*. The solution γ^* is a function of $g, c, M, e, a,$ k and $p,$ which are exogenously given. The relationship between the optimized ratio and the other elements can be proven utilizing implicit differentiation. The optimum ratio will be positively affected by an increase of $g, c,$ and k (as long as M is sufficiently large in the case of k), while it is negatively related with higher a. The impact of the total amount M is ambiguous and is dependent on other factors. It is noticeable that a larger fixed cost k causes a higher ratio to be put into budget support, because a donor may allocate more money to non-traditional types to equate marginal products of both modalities.

3.2 Donor's Threshold – Eligibility Stage

However, donors may not always choose to provide direct funding. It should be secured that the total profit under both modalities together is higher than that under either of the two separately. Using only budget support is definitely

worse than using both.[1] However, it is possible that sole project aid is better than both. In that case, the donor will give up direct funding; therefore, the eligibility condition for budget support is as follows:

(4) *Eligibility condition*

$$g\big(c(\gamma^*M - k)\big)^e + a\big((1 - \gamma^*)Mp\big)^e > aM^e p^e$$

First, the donor decides eligibility based on the recipient's control of corruption, which is c. If the expected incorruptness increases, the possibility of adopting both modalities rises. The impact of g is similar. However, the impacts of a and p are negative. Since $aM^e p^e(1 - (1 - \gamma^*)^e) > 0$, increasing a and p results in a higher threshold, which means a lower possibility of providing budget support. The impact of k is similar to that of a and p as increasing fixed costs would lower the left side of the inequality. The influence of e is ambiguous, since it is determined by other factors.

The effect of the total amount M is more complicated; however, it is certain that there is a threshold of M at which selecting both modalities would be better than selecting only the traditional one. The threshold is described below.

(5) $g\big(c(\gamma^*M - k)\big)^e > M^e p^e\{a(1 - (1 - \gamma^*)^e)\}$

$$\rightarrow M\left\{1 - \left(\frac{\frac{a}{g}p^e\left(\frac{gc}{ap^e}+1\right)^e}{c^e\left(\frac{gc}{ap^e}\right)^e + \frac{a}{g}p^e}\right)^{\frac{1}{e}}\right\} > k$$

Threshold: $\underline{M} = k\Big/[1 - \left\{\frac{\frac{a}{g}p^e\left(\frac{gc}{ap^e}+1\right)^e}{c^e\left(\frac{gc}{ap^e}\right)^e + \frac{a}{g}p^e}\right\}^{\frac{1}{e}}]$

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[1] $g(c(\gamma^*M - k))^e + a\big((1 - \gamma^*)Mp\big)^e > g(c(M - k))^e$ should be proved. This can be proved by Bernoulli's inequality. After putting γ^* as shown in (3), we get an inequality $t^e + \frac{ap^e}{gc^e} > (t + 1)^e$ where $t = \left(\frac{ap^e}{gc^e}\right)^{\frac{1}{1-e}}$. Since $\left(1 + \frac{1}{t}\right)^e < 1 + e\frac{1}{t} < 1 + \frac{1}{t}$ when $0 < e < 1$, the left side is always bigger than the right. See appendix for a more detailed discussion.

When the total amount is larger than $\underline{M}$, a donor may choose to provide both types of aid.[2] Intuitively, if a marginal product from the project aid is too small as the total amount of ODA is too large, a donor may choose to not only give the project aid but also give budget support in spite of the fixed cost k. Therefore, the higher amount of M will result in a higher probability of using direct funding as well.

Table 3.1 Predictions from the Model

	Variables	Eligibility	Ratio
g	*Government capacity*	+	+
c	*Control of corruption*	+	+
M	*Total amount of ODA*	+	?
k	*Fixed cost of budget support*	-	+
a	*Weight on project aid*	-	-

Whether this model for selecting budget support really works in the real ODA field can be proven by the probit estimation in the first part of the two-part model that is our main econometric method. The table below summarizes the expected influences of major factors on the eligibility and the optimum ratio in the model. "+" and "–" mean a positive or negative relationship, respectively, and "?" indicates that the influence is dependent upon other factors.

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[2] An issue is whether the lower power of the fraction is positive. If negative, the result will be that M should be lower than a negative number, which is a contradiction. However, we can prove that it is positive; put $\left(\frac{gc}{ap^e}\right)^{\frac{1}{1-e}} = t$. What should be shown is $ct^{e-1}(1+t)^e < ct^{e-1} + c^e t^e$. Dividing both sides results in $(1+t)^e < 1 + c^{e-1}t$. By Bernoulli's inequality, $(1+t)^e < 1 + tx < 1 + t < 1 + tc^{e-1}$. Therefore, $\frac{ap^e\left(\frac{gc}{ap^e}+1\right)^e}{c^e\left(\frac{gc}{ap^e}\right)^e + \frac{a}{g}p^e} < 1$. The lower part of the fraction is positive.

IV. Empirical Analysis

4.1 Empirical Methodology Selection

When it comes to econometric analysis in budget support issues, it is vital to consider zero values, which are countries with project aid but without budget support. One option can be a Tobit model. However, Tobit regression has two defects; first, it can create bias under certain conditions, especially when the proportion of zeros in the data is high. (Stewart 2013) Since the ratio of zero is higher than 85%, the problem can be a huge issue. Additionally, it does not separate the eligibility and ratio stages. Since the model discussed two issues separately, using the Tobit model is not a suitable option. The Heckit model and two-part model can be used as alternatives to cope with this problem.

In the present paper, as in the case of Clist et al. (2012), a two-part model will be utilized to soothe the problem inherent in the Tobit model. There are two reasons why the Heckit model was not chosen as an alternative. First, the biggest strength of the model can alleviate selection bias; however, the data used here is not a sample but whole data covering all countries, which weakens the problem of selection. Second, the model requires that variables for each procedure should not be exactly the same, while variables used in both stages are the same in this paper. In conclusion, empirical analysis will be shown based on the two-part model.

4.2 Variables and Empirical Model Specification

Table 4.1 Variables for Regression Analysis

Factor	Proxy	Brief Definition	Source
γ	Budget Support Ratio (bs_ratio)	Total budget support (both general budget support and sectoral budget support) divided by total Country Programmable Aid (CPA)	Based on the author's own calculation using constant value data. Budget support and CPA dataset from OECD stats
	Dummy variable for receiving Budget Support (bs_dummy)	When a country receives a certain amount of budget support (over 0) then the dummy is 1 and 0 otherwise	
M	Country Programmable Aid (cpa)	Total CPA amount, used in logarithmic terms	OECD statistics, constant value data
c *budget allocation*	Control of Corruption (cc)	This index captures perceptions of the level of how much corruption can be controlled.	
	Rule of Law (rol)	This index captures perceptions of how effectively the rule of law works in a country.	
g *political stability*	Voice and Accountability (va)	This index captures perceptions of the extent to which a country's citizens can participate in selecting their government.	Kaufmann et al. (2011) Data retrieved from www.govindicators.org
	Political Stability and Absence of Violence/Terrorism (ps)	This index captures perceptions of the level political stability and security from violence.	
g *effective production*	Government Effectiveness (ge)	This index captures perceptions of the level of government effectiveness in public services, civil services, policy formulation, etc.	
	Regulatory Quality (rq)	This index captures perceptions of the capacity of government in formulating and implementing sound policies.	
g *macro-economic signaling*	Five Year Growth (growth)	Geometric mean of GDP growth rates during the five years prior to bilateral cooperation. Calculated based on constant value data.	Word Bank World Development Indicators
a	Cumulative years of being in DAC (dac_year)	Years since a donor country joined DAC	Sorted based on the raw data of OECD stats
k	Cumulative years of bilateral cooperation (coop_year)	Years since two countries started their development cooperation relationship	
Control Variables	GDP per Capita (gdppc)	Gross Domestic Product per capita of recipient countries, used in logarithmic terms	Word Bank World Development Indicators, constant value data
	Population (pop)	Population of recipient countries, used in logarithmic terms	
	Year dummies (y_dummy)	Dummy variables for each year to rule out yearly shocks. (Not reported in tables)	Based on the author's own calculation

Variables that can be a proxy for each factor of interest are discussed in the economic modeling part, and will be added to the econometric equation of the present paper. The variables for the regressions in the present paper are listed in Table 4.1.

The budget support ratio was made based on the fraction where the upper part is the sum of general budget support and sectoral budget support. Assuming that giving either of the two types will be dependent upon similar factors, the summation value was utilized in the fraction. A few donor countries reported a negative value in the total budget support; they were treated as 0, since the absolute value of negative ones is meager.

The amount of ODA (factor M in the model) is represented not by the mere total amount of disbursement but by CPA, since we are interested in the ODA amount, which can be divided into project aid and budget support. The total ODA includes some other types of aid that may not be categorized in either of the two modalities. Examples are humanitarian aid for disasters or administrative costs spent in donor countries. The country programmable aid can be a proper proxy, since it excludes these kinds of ODA spending. Due to its well defined characteristics, Faust & Koch (2014) also utilized CPA for calculating the ratio. The definition of CPA provided by OECD and categories ruled out from the total ODA can be seen in Table 4.2.

Various aspects of governance are considered in the regression. When it comes to choosing indices for measuring governance, one of the most referred to indicators is World Governance Indicators, which were proposed by Kaufmann et al. (2011). They cover over 200 countries and measure six criteria of governance.

The authors also divide the six indices into three categories, as can be seen in Table 4.3.

This paper also focuses on three aspects of governance. The first is about whether budget is well allocated in producing social good, neither siphoned due to corruption nor utilized for other purposes that are not beneficial for society based on its fungibility. The second category is political stability, which is essentially how stably the allocated budget can be executed. Even if there is no corruption, money for producing social good cannot be smoothly executed during political instability, and a group that is independent from government effectiveness in the high capacity of an administration can easily be hindered by a low level of political stability. The third category is effective production, which refers to how effectively a government can produce social good given the executed budget amount.

Table 4.2 Definition of CPA and the List of Categories Excluded

Definition of CPA	CPA tracks the proportion of ODA over which recipient countries have, or could have significant say. CPA reflects the amount of aid that involves a cross-border flow and is subject to multi-year planning at country/regional level.
Excluded Categories (excepted from gross bilateral ODA)	- Debt relief (Source: DAC2a column 212, 214 and 221) - Humanitarian aid (Source: DAC2a column 216) - Food aid (Source: DAC2a column 213) - Administrative costs (Source: CRS sector code: 91010 or type of aid: G01) - Imputed student costs (Source: CRS sector code: 11425 or type of aid: E02) - Promotion of dev. awareness (Source: CRS sector code: 99820 or type of aid: H01) - Refugees in donor country (Source: CRS sector code: 93010 or type of aid: H02) - Core support to national and international NGOs (Source: CRS bi-multi: 3 and channel code 2xxxx or CRS sector codes: 92xxx or type of aid: B01) - Aid from local governments (Source: CRS expenditures reported under these agency codes) - Equity investments (Source: CRS flowtype:19 or finance type; 5xx) - Aid not from main agency (Source: CRS agency code identified by the donor) - Other non-CPA items (Source: CRS: additional elements identified by the donor) - Other unallocated (transactions reported as 998, unallocated, and is not in any of the categories above)

Source: OECD webpage (retrieved on 04/NOV/2015)
http://www.oecd.org/dac/aid-architecture/countryprogrammableaidcpafrequentlyaskedquestions.htm

Table 4.3 Definitions and Categories of World Governance Indicators

Category	Corresponding Factor	Governance Index	Definition
(a) the process by which governments are selected, monitored and replaced	g political stability	Voice and Accountability	capturing perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media.
		Political Stability and Absence of Violence/ Terrorism	capturing perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically-motivated violence and terrorism.
(b) the capacity of the government to effectively formulate and implement sound policies	g effective production	Government Effectiveness	capturing 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.
		Regulatory Quality	capturing perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.
(c) the respect of citizens and the state for the institutions that govern economic and social interactions among them	c budget allocation	Rule of Law	capturing perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.
		Control of Corruption	capturing perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests.

Source: Kaufmann et al. (2011), except for corresponding factor column

The governance indicators of Kaufmann et al. (2011) can be proxies for the governance categories on which this paper focuses. Political stability and the absence of violence/terrorism and voice and accountability indices will be used to

check the importance of political stability in real data. Indicators such as government effectiveness and regulatory quality will be utilized as proxies for effective production. The level of incorrupt budget allocation will be measured by rule of law and control of corruption, as indicated in Table 4.3. One variable of each category will be selected in regression analysis. Furthermore, the average of each category will be utilized. Additionally, to see the impact of the macroeconomic ability signaling of recipients, the five-year growth rates were added to the regression. The years will be adjusted to one, three, five, seven, and 10 to verify the different effects of various time intervals.

The element *a* in the theoretical model represents how much weight a donor country may put on the value of project aid. This aspect will be considered by utilizing the variable *dac_year,* which indicates cumulative years since a donor joined DAC. The rationale can be seen in two perspectives; the first is that traditional donor countries are less reluctant to spend money on budget support schemes. Some clues to this appear in the investigation of Faust & Koch (2014). Stating the UK case in their paper, the scholars argue that there are a huge number of advocacy NGOs or campaign-oriented ones in traditional donor countries.

As they are also interested in improving aid effectiveness, those organizations support the notion of giving direct funding to recipient countries; the longer the history of providing ODA, the greater the possibly that there would be organizations such as those in the UK case. The existence of that type of NGO can be a driving force of spending for budget support.

By contrast, new donors would be much more reluctant to use their money for direct funding, which is the second perspective. Such countries usually face circumstances in which people and governors are not in favor of spending money

on ODA. It is inevitable that issues related to ODA such as aid effectiveness are not yet profoundly shared. That results in an environment where ODA should be proven effective through tangible results or by creating benefits for donors such as a higher rate of employment in the donor country or higher influence on recipients. Therefore, the budget allocation would not be oriented for aid effectiveness but for project aid by which it is easier to advertise and to achieve visible consequences.

However, it is questionable whether *dac_year* is a good proxy for the additional weight *a* on project aid. Rather, the number of NGOs focusing on enhancing aid effectiveness would be a more reasonable proxy for the element *a*. Furthermore, even if the variable shows significance in the regression results, the interpretation may not be directly related with the weight issue. Nevertheless, since such alternatives are hard to reach and can at least capture how much more older donors would be willing to give direct funding, the impact of the variable will be investigated in the regression analysis.

The fixed cost *k* will be measured by bilateral years of cumulative cooperation. The earlier they started the ODA, the better the donor will understand its counterpart, and deeper mutual understanding would decrease the fixed cost of budget support. This will let the donor monitor the recipient more efficiently and let the recipient cooperate more willingly through denser connections.

z_j in the equations below is the vector of the control variables including GDP per capita, square of the GDP per capita, and population; year dummy variables were also added. Since the amount of disbursed budget support fluctuates considerably, those dummies were added to capture the yearly shocks as accurately as possible. In this way, period effects can be ruled out. Lastly, γ is the coefficient

vector corresponding to the control variables. All variables constitute the econometric specification below.

(6) $bs\_dummy_{ijt} = \beta_1 cpa_{ijt} + \beta_2 cc_{it} + \beta_3 ge_{it} + \beta_4 dac\_join_j + \beta_5 startyear_{ij} + \gamma_1 z_{jt} + \gamma_2 yr_t + u_{ijt}$

$$bs\_ratio_{ijt} = \beta_1 cpa_{ijt} + \beta_2 cc_{it} + \beta_3 ge_{it} + \beta_4 dac\_join_j + \beta_5 startyear_{ij} + \gamma_1 z_{jt} + \gamma_2 yr_t + u_{ijt}$$

Another critical issue regarding eligibility is the range of the unobserved dependent variable. That is, we should set an extent to which zero values will be considered. First, the countries that are not in the DAC recipient list were excluded. Those cases were deleted from the whole dataset and not even considered as zero values, since they cannot be even in the list of ODA candidates. Second, only occasions with CPA over than 0 were considered in the regression. That is, even though a country is an eligible recipient candidate, if a donor did not give any amount of CPA to the recipient then the case was deleted. This is because those recipients could not be candidates for budget support. What we are interested in is not the circumstances in which ODA is given, but the conditions under which budget support was allocated. Additionally, the modeling presented here only cares about cases with a certain amount of ODA, since it assumes that the ODA amount is exogenously given.

In short, if there is any budget support amount, then *bs_dummy* is 1. Data plots without budget support but with CPA will have this dummy value as 0. Data rows with neither budget support nor CPA were excluded from the regression.

4.3 Empirical Results

The econometric analysis will be divided into two parts: The first will handle the eligibility issue using probit estimation and the other will deal with the ratio selection issue. The respective results of the former and latter can be seen in Tables 3.4 and 3.5.

The CPA amount shows what the model expected about the budget support modality. In the model, the total ODA had a positive impact on eligibility and an ambiguous effect on the ratio, which is also shown in the regression results. Even though it shows four significantly positive results in the ratio selection, it is not highly robust, because the significance is swept away when *rol* is added.

When it comes to governance indicators, the indices were tested individually and in pairs in advance due to the collinearity issue. In the eligibility part, every indicator and pair showed only positive significant signs, except for the *ge* and *rol* pair, where *ge* lost its significance. However, in the ratio selection part, *va* lost significance in pairs *va & rol*, *va & cc,* and *va & rq*. ps is not significant in any pair where it is added, and *rq* and *ge* lose their significance in pairs such as *rq & cc* and *ge & cc*. All indicators were significant when they were added individually. In summary, all governance indicators can be said to be significantly positive overall, except for the cases mentioned above.

However, when all the three categories are considered, only the robustness of the specific group is alive, from which we can see which factors of governance are the most considered elements when it comes to the budget support issue, and the most robust indicator was different for each stage. In eligibility, indices related with political stability always showed significantly positive signs. *cc* and *rol* are

also significant in all specifications except for one case. By contrast, indices capturing government capacity for effective production were less consistently significant. Even though *rq* is significant and positive in three cases, *ge* does not show any significance, even at the 10% level. However, the most robust category was budget allocation in the ratio selection part; *ge* and *rq* were significant when *rl* replaced *cc*. Political stability indices were not significant in any regressions in the ratio part.

Table 4.4 Regression Results: Eligibility Part

Regressions		Two-part model - Eligibility							
		bs_dummy							
cpa_log		0.397	0.396	0.390	0.390	0.394	0.395	0.385	0.386
		(29.868)***	(29.811)***	(30.017)***	(30.040)***	(29.693)***	(29.732)***	(29.820)***	(29.841)***
Budget Allocation	cc	0.151	0.077	0.358	0.392				
		(1.965)**	(1.324)	(4.750)***	(7.22)***				
	rol					0.209	0.103	0.500	0.471
						(2.764)***	(1.668)*	(6.747)***	(8.532)***
Political Stability	ps	0.542	0.533			0.520	0.520		
		(15.562)***	(15.277)***			(14.173)***	(14.115)***		
	va			0.253	0.226			0.184	0.170
				(6.671)***	(5.638)***			(4.596)***	(4.140)***
Effective Production	ge	-0.008		0.130		-0.050		0.015	
		(-0.098)		(1.594)		(-0.608)		(0.191)	
	rq		0.150		0.144		0.133		0.093
			(2.699)***		(2.454)**		(2.277)**		(1.555)
Macro Signaling	growth	0.315	0.433	0.744	0.827	0.406	0.466	0.952	0.990
		(0.834)	(1.129)	(1.939)*	(2.141)**	(1.066)	(1.214)	(2.467)**	(2.560)**
dac_year		-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.003	-0.003
		(-1.135)	(-1.231)	(-1.174)	(-1.260)	(-1.203)	(-1.260)	(-1.332)	(-1.402)
coop_year		0.011	0.011	0.009	0.009	0.011	0.011	0.009	0.010
		(5.100)***	(5.283)***	(4.305)***	(4.464)***	(5.176)***	(5.320)***	(4.436)***	(4.567)***
pop_log		-0.059	-0.075	-0.149	-0.153	-0.059	-0.076	-0.146	-0.155
		(-3.527)***	(-4.802)***	(-9.652)***	(-10.171)***	(-3.665)***	(-4.870)***	(-10.039)***	(-10.659)***
gdppc_log		0.239	0.214	1.180	1.153	0.223	0.215	1.010	1.006
		(0.794)	(0.708)	(3.995)***	(3.895)***	(0.748)	(0.718)	(3.427)***	(3.424)***
gdppc_log2		-0.049	-0.049	-0.117	-0.115	-0.048	-0.049	-0.105	-0.105
		(-2.360)**	(-2.355)**	(-5.707)***	(-5.623)***	(-2.319)**	(-2.378)**	(-5.105)***	(-5.169)***
Constant		-6.254	-5.790	-7.722	-7.554	-6.234	-5.803	-7.243	-7.046
		(-0.053)	(-0.049)	(-0.063)	(-0.062)	(-0.053)	(-0.049)	(-0.060)	(-0.058)
Observations		20,760	20,760	20,760	20,760	20,760	20,760	20,760	20,760
Pseudo R2		0.418	0.419	0.393	0.393	0.419	0.419	0.395	0.396
Years		2006~2013							

*, **, *** Significant at the 10%, 5%, 1% level respectively
Notes: 1) In all regressions, year dummy variables were included but not reported.
2) The dummy for 2013 was omitted to avoid the collinearity
3) z-statistics in parentheses

The results related to macroeconomic signaling are not robust, since it loses significance when *ps* is added to the eligibility part. Using different time

intervals did not make a huge difference except for one-year growth, which did not show any significance in any specification, and three-year growth's significance level was lower. Even though the variable was not the most robust indicator, at least we can say that long-term growth was revealed to be more important when it comes to the budget support issue. However, it was not significant in the ratio selection.

Table 4.5 Regression Results: Ratio Selection Part

Regressions		Two-part model - Ratio Selection							
		bs_ratio							
cpa_log		0.004	0.004	0.003	0.003	0.002	0.002	0.001	0.002
		(0.685)	(0.608)	(0.579)	(0.554)	(0.329)	(0.249)	(0.193)	(0.241)
Budget Allocation	cc	0.162	0.135	0.157	0.133				
		(5.121)***	(5.635)***	(4.974)***	(6.019)***				
	rol					0.059	0.075	0.057	0.089
						(1.870)*	(2.875)***	(1.812)*	(3.797)***
Political Stability	ps	-0.001	-0.002			0.006	0.008		
		(-0.071)	(-0.123)			(0.430)	(0.595)		
	va			0.008	0.004			0.017	0.005
				(0.580)	(0.278)			(1.113)	(0.299)
Effective Production	ge	-0.022		-0.021		0.068		0.072	
		(-0.627)		(-0.604)		(2.124)**		(2.213)**	
	rq		0.026		0.024		0.053		0.047
			(1.100)		(0.955)		(2.164)**		(1.833)*
Macro Signaling	growth	-0.033	-0.026	-0.035	-0.028	0.007	0.076	0.001	0.066
		(-0.207)	(-0.164)	(-0.222)	(-0.179)	(0.125)	(0.480)	(0.004)	(0.413)
dac_year		0.007	0.007	0.007	0.007	0.006	0.007	0.007	0.007
		(7.629)***	(7.482)***	(7.625)***	(7.491)***	(6.997)***	(6.831)***	(7.198)***	(7.018)***
coop_year		-0.006	-0.006	-0.006	-0.006	-0.006	-0.005	-0.006	-0.006
		(-6.588)***	(-6.414)***	(-6.516)***	(-6.391)***	(-6.060)***	(-5.857)***	(-5.930)***	(-5.840)***
pop_log		-0.003	-0.008	-0.002	-0.007	-0.014	-0.013	-0.015	-0.015
		(-0.426)	(-1.267)	(-0.269)	(-1.058)	(-2.161)**	(-2.061)**	(-2.326)**	(-2.213)**
gdppc_log		-0.071	-0.071	-0.069	-0.072	-0.041	-0.080	-0.051	-0.092
		(-0.551)	(-0.557)	(-0.545)	(-0.570)	(-0.317)	(-0.614)	(-0.409)	(-0.733)
gdppc_log2		0.002	0.002	0.002	0.002	-0.001	0.002	0.000	0.003
		(0.222)	(0.180)	(0.208)	(0.189)	(-0.317)	(0.246)	(0.002)	(0.369)
Constant		0.742	0.860	0.718	0.844	0.867	0.963	0.883	0.929
		(1.649)*	(1.888)*	(1.595)	(1.835)*	(1.893)*	(2.071)**	(1.965)*	(1.987)*
Observations		1,053	1,053	1,053	1,053	1,053	1,053	1,053	1,053
Adj. R2		0.120	0.120	0.120	0.120	0.100	0.100	0.105	0.104
Years		2006~2013							

*, **, *** Significant at the 10%, 5%, 1% level respectively

Notes: 1) In all regressions, year dummy variables were included but not reported.

2) The dummy for 2013 was omitted to avoid the collinearity

3) t-statistics in parentheses

Table 4.6 Regression Results Using Average Values

Regressions		Two-part model - Eligibility & Ratio Selection							
		bs_dummy				bs_ratio			
cpa_log		0.386	0.395	0.385	0.386	0.009	0.009	0.010	0.009
		(29.525)***	(30.406)***	(29.497)***	(29.525)***	(1.456)	(1.460)	(1.560)	(1.458)
Budget Allocation	ccrol	0.153	0.620		0.152	0.144	0.124		0.124
		(2.458)**	(8.282)***		(1.795)*	(5.823)***	(3.769)***		(3.424)***
Political Stability	psva	0.660		0.700	0.660	-0.001		0.026	-0.000
		(13.003)***		(15.285)***	(12.987)***	(-0.034)		(1.562)	(-0.014)
Effective Production	gerq		0.087	0.109	0.002		0.028	0.122	0.028
			(1.018)	(1.673)*	(0.019)		(0.033)	(4.743)***	(0.751)
Macro Signaling	growth	0.779	0.673	0.792	0.779	0.006	0.005	0.023	0.005
		(2.027)**	(1.757)*	(2.063)**	(2.025)**	(-0.039)	(-0.033)	(0.150)	(0.033)
dac_year		-0.002	-0.002	-0.003	-0.002	0.007	0.007	0.006	0.007
		(-1.191)	(-1.186)	(-1.305)	(-1.191)	(7.195)***	(7.118)***	(6.787)***	(7.113)***
coop_year		0.010	0.009	0.011	0.010	-0.006	-0.006	-0.005	-0.006
		(4.901)***	(4.099)***	(5.252)***	(4.879)***	(-6.367)***	(-6.246)***	(-5.632)***	(-6.213)***
pop_log		-0.072	-0.160	-0.081	-0.072	-0.006	-0.009	-0.020	-0.009
		(-5.093)***	(-10.255)***	(-5.079)***	(-4.319)***	(-0.930)	(-1.248)	(-2.973)***	(-1.192)
gdppc_log		0.624	1.107	0.555	0.624	-0.075	-0.078	-0.115	-0.078
		(2.102)**	(3.749)***	(1.881)*	(2.102)**	(-0.601)	(-0.632)	(-0.918)	(-0.624)
gdppc_log2		-0.078	-0.112	-0.073	-0.078	0.002	0.002	0.005	0.002
		(-3.797)***	(-5.449)***	(-3.605)***	(-3.796)***	(0.244)	(0.249)	(0.512)	(0.244)
Constant		-7.164	-7.304	-6.771	-7.162	0.797	0.873	1.169	0.873
		(-0.060)	(-0.058)	(-0.057)	(-0.060)	(1.805)*	(1.929)*	(2.616)***	(1.926)*
Observations		20,760	20,760	20,760	20,760	1,048	1,048	1,048	1,048
Pseudo or Adj. R2		0.414	0.393	0.414	0.414	0.111	0.111	0.101	0.110
Years					2006~2013				

*, **, *** Significant at the 10%, 5%, 1% level respectively

Notes: 1) In all regressions, year dummy variables were included but not reported.

2) The dummy for 2013 was omitted to avoid the collinearity

3) z-statistics or t-statistics in parentheses

The effect of *dac_year* was highly significant and positive in the ratio selection. It means that older DAC donors were more positive to place higher ratio for direct funding. If the variable can be said to be a proper proxy for *a*, then the model's validity can be strengthened once again, but it only partly fortifies the model, since the impact was shown to be ambiguous in the eligibility stage, which is not as expected in the model. Meanwhile, the variable "*coop_year*," a proxy for *k*, always shows significance, but the sign is opposite according to each part. The sign is negative in the decision phase, which means that the donors gave budget support to recipients with older relationships. However, the sign changes in the second phase, so we can see that donors put a higher ratio of direct funding on

newly linked recipients. The result shown in the variable is same as the model's expectation on k.

Table 4.7 Comparison between the model and the empirical results

Factors		Proxies		Model's Expectation Eligibility	Model's Expectation Ratio	Empirical Results Eligibility (proxy)	Empirical Results Eligibility (group)	Empirical Results Ratio (proxy)	Empirical Results Ratio (group)
g	*Government capacity*	*political stability*	Political Stability and Absence of Violence/Terrorism	+	+	+	?	+	?
			Voice and Accountability			+	?	+	?
		effective production	Government Effectiveness			?	?	?	+
			Regulation Quality			?	?	+	+
		macro-economic signaling	Growth rates of 5 years			+		?	
c	*Control of corruption*	*budget allocation*	Control of Corruption	+	+	+	+	+	+
			Rule of Law			+	+	+	+
M	*Total ODA*	Country Programmable Aid		+	?	+		?	
k	*Fixed cost of budget support*	Bilateral History of Cooperation		-	+	-[3]		+	
a	*Weight on project aid*	The number of years after joining DAC		-	-	?		-	

Since all the variables in each governance category seem to affect the capacity of the recipient's government, selecting one indicator by group would not be an appropriate approach to dealing with those indices. To consider all variables and to avoid the collinearity issue as much as possible, each group's indices were averaged in the regressions, as shown in Table 3.6.

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[3] Since the proxy is negatively correlated with the factor k, even though the empirical result is positive, it is written as negative in this table. This is also applied to the factor a.

Similar to the previous regressions, the most robust factors were political stability and budget allocation elements, or only political stability with 1% significance level when it comes to eligibility. In the ratio part, only sound budget allocation factors were revealed to be positively effective. All the results of *cpa_log*, *dac_year,* and *coop_year* are exactly same as the previous results. However, those of *growth* did change, showing significant and positive signs in the eligibility part, which was sustained even when *gerq* was removed from the regression to avoid collinearity. In addition, the results of *gerq* were maintained when the *growth* variable was absent. From here, we can see that donors are more responsive to practical and visible macroeconomic growth than they are to perceptions of the ability of their government.

The comparison between the expectation from the model and the overall result is as shown in Table 4.7. The gray signs indicate that the factor was not always significant; a dimmer gray color indicates that the factor was shown to be less robust, and the colored cells show which factors were not consistent with the expectation from the model.

V. Conclusion

This paper tried to show under which conditions donor countries decided to provide budget support to a recipient and how the budget support ratio would be determined through economic modeling. While the ratio stage was discussed with economic models in previous papers, the eligibility process has not been dealt with thus far, which makes the model in this paper meaningful. Furthermore, if we can accept the variables mentioned in the empirical analysis as proper proxies for the modeling, the overall regression results are consistent with what the modeling expected, which was not attempted in previous studies.

Overall, the main findings from the regressions can be summarized in four points. First, the total amount matters for the decision to give budget support. It can be a result of capturing donors' perspective that the budget support is a kind of "secondary option" that is only considered when they have plenty of total ODA. Furthermore, the amount did not exert a huge influence on the ratio. The different impact of the total amount on the eligibility and the ratio is exactly what is expected in the modeling.

The second finding is that the most robust governance factor is different in each part. In the eligibility, political stability is the most robust, while corruption and fungibility risk control are revealed to be the most important factors in the ratio selection part. Interestingly, the factors related to formulating sound policies were not revealed to be the most robust category. In particular, the government effectiveness index did not show any significance when three categories were considered simultaneously. It can be interpreted as another evidence of the reluctance donor countries have towards budget support modality. Even though

effectiveness is at the center of budget support issues, the factor that was revealed to be most important is not the capacity of recipients itself, but the political stability and control of corruption, which are related with "lower risk." Rather than the matter of implementing sound policies, the matters of allocating budgets without siphoning and of securing political stability were found to be more essential. In addition, the results from the ratio selection stage show that this reluctance is still valid among pairs where donors give direct funding to their recipients.

This result also implies that budget support modality cannot be understood deeper without differentiating the stages (eligibility and ratio). Furthermore, one should consider that various aspects of governance have dissimilar impacts on each stage. In this context, using only the government effectiveness index in both parts, as in the case of Clist et al. (2012), may have an associated risk of misunderstanding the real determinants of budget support.

The third main finding is that the number of years of experience in ODA (being in DAC) is important for attaining a higher ratio of budget support. Surprisingly, the cumulative year was not particularly important in the eligibility aspect, from which we can see that older donors were not significantly more generous in the eligibility stage, and this result is consistent with modeling. However, whether *dac_year* is an appropriate proxy for the weight on project aid is still an issue.

The final point is that the number of bilateral cooperation years is a quite critical actor for both stages. Besides this, the opposing direction that the bilateral cooperation years showed in the regression results reaffirms the importance of dividing the stages. Even though whether it is a good proxy for the fixed cost is

questionable, as in the case of *dac_year*, if we can assume that the deeper relationship would be related with a lower fixed cost k, then the result can be interpreted as that which the model predicted.

There are several limitations in this paper. First, whether the variables used in the regression are suitable proxies should be readdressed. In addition, the adjusted R^2 is low in the ratio stage, which means that there would be omitted variables and biases following the omission. In spite of those defects, this paper contributes to a better understanding of budget support, revealing the impacts of factors such as the total amount, various aspects of governance, DAC experiences, and bilateral cooperation history. In conclusion, it would be misleading to try to understand the budget support allocation mechanism without recognizing the effects of factors that had not been considered influential.

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Appendix I. Data issues

Table I. Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
cpa (mil US$)	22,346	20.37	111.27	0.01	8174.05
bs (mil US$)	1,152	27.13	79.27	-0.13	2037.91
cc	21,597	-0.55	0.60	-1.92	1.56
rol	21,625	-0.59	0.64	-2.67	1.71
ps	21,606	-0.53	0.90	-3.32	1.61
va	21,614	-0.49	0.79	-2.28	1.25
ge	21,597	-0.52	0.62	-2.45	1.60
rq	21,597	-0.50	0.69	-2.67	1.54
dac_year	22,348	34.36	18.85	0.00	52.00
coop_year	22,348	28.68	15.20	0.00	53.00
pop (mil)	22,146	53.1	183.0	0.0	1360.0
gdp (bil US$)	21,587	166.0	674.0	0.0	9490.0
gdppc_log	21,587	7.59	1.11	4.95	10.04

Table II. Cases of Negative Values

d_alpha3	r_alpha3	year	Budget Support (mil. US$)
FRA	COD	2011	-0.002
FRA	GIN	2008	-0.127
DNK	BFA	2009	-0.013
CHE	TJK	2011	-0.006

There are several issues in the data which should be carefully considered before focusing on regression results. The first issue is negative numbers. There are four negative numbers among 1,152 reported data plots of budget support which were retrieved from OECD stats. Those cases above in the table 2 were treated as 0, assuming recording negative number is as same as giving zero amount of budget support.

Table III. Cases of Budget Support Larger than CPA

d_alpha3	r_alpha3	year	bs	cpa
GBR	DJI	2012	0.012399	0.01
GBR	NER	2012	0.051784	0.05
NLD	BTN	2012	2.684143	2.68
USA	MHL	2013	68.258450	68.14
BEL	MWI	2011	1.326957	0.01
BEL	MWI	2013	1.991503	0.03
ESP	BFA	2010	4.022836	3.64
ESP	SOM	2011	1.339606	1.33

Note: Differences in data row 1-3 are suspected to be results of rounding

Table IV. Cases of Rounding Problems

d_alpha3	r_alpha3	year	bs	cpa
GBR	DJI	2011	0.019723	0.02
NLD	BTN	2011	2.719002	2.72
USA	PLW	2011	18.94801	18.95
GBR	NER	2012	0.051784	0.05
GBR	DJI	2012	0.012399	0.01
NLD	BTN	2012	2.684143	2.68

Note: Data in row 6-8 also appeared in the table III.

The second issue is ratios over than 1. CPA is the most appropriate proxy for the sum of budget support and project type aid in that CPA does not exclude either general budget support or sectoral budget support and it does exclude a portion of aid such as administration costs which cannot be divided into budget support or project aid. Nonetheless, there are some cases where budget support amount is larger than CPA. Among 1152 pairs, there are 8 cases where CPA amount is smaller than the other.

The problem may have appeared only due to rounding issue in that CPA figures were rounded to two decimal places. Suspected cases are GBR-DJI, GBR-

NER and NLD-BTN that are painted in gray color in the table 3. There are few more cases where the difference of *bs* and *cpa* came from the rounding issue, which can be seen in the table 4. Those numbers suspected to be results of rounding were added as they are and changed to 1 in independent regressions.

However, there are still left five cases where the budget support ratio larger than 1 cannot be explained. It is difficult to verify which factors caused the larger-than-expected ratios. In order to deal with the issue, two measures were adopted. First, they were treated as 1. Second, they were included without changing anything. Nevertheless, in the second measure, 'extreme' outliers (BEL-MWI year 2011, 2013) were not added. The reason of excluding those extreme outliers is that those ratios are 132.6957 and 66.3833, 13269.57% and 6638.33% of CPA respectively, which may make a huge distortion in empirical results.

In sum, in order to improve robustness of the empirical analysis presented in this paper, this paper ran regressions in 4 ways: 1. both rounding and outlier issues are handled, which represents the regression analysis in this paper. 2. only rounding issue is handled. 3. Outliers are changed to one without handling the rounding issue. 4. No changes in the raw data (except for the extreme outliers, BEL-MWI cases).

In all cases, the results of significance and direction of coefficients are same. Only two exceptions were detected. The first one is that the p-value of the rule of law index increased over than 5% when the rounding issue was not handled and *ps* and *ge* were added. Second, when the governance categories were utilized in average values, the p-value of *psva* increases so that it is no more significant at 10% level under the same data processing criteria as the first exception. Clearly,

those few differences do not change the conclusion and the interpretations for empirical results of this paper.

Appendix II. Mathematical Proofs

It was mentioned that the impact of various factors on the optimized budget support ratio can be proved by implicit differentiation. The optimal ratio satisfies the equation as below which was also shown in (2) in theoretical modeling chapter.

(1) $F = gc^e e(\gamma M - k)^{e-1} M - aM^e p^e e(1 - \gamma)^{e-1} = 0$

(2) $F_\gamma = gc^e e(e-1)(\gamma M - k)^{e-1} M^2 + aM^e p^e e(e-1)(1-\gamma)^{e-1} < 0$

This paper focused on the elements g, c, M, k and a. Since e ranges from 0 to 1, F_γ is always negative as it can be seen in the (2). The impact of g can be verified in the equation below.

(3) $\dfrac{\partial \gamma}{\partial g} = -\dfrac{F_g}{F_\gamma} = -\dfrac{c^e e(\gamma M - k)^{e-1} M}{gc^e e(e-1)(\gamma M - k)^{e-1} M^2 + aM^e p^e e(e-1)(1-\gamma)^{e-1}} > 0$

In the same measure, $\dfrac{\partial \gamma}{\partial c}, \dfrac{\partial \gamma}{\partial M}, \dfrac{\partial \gamma}{\partial k}$ and $\dfrac{\partial \gamma}{\partial a}$ can be proved.

(4) $\dfrac{\partial \gamma}{\partial c} = -\dfrac{F_c}{F_\gamma} = -\dfrac{ec^{e-1} e(\gamma M - k)^{e-1} M}{gc^e e(e-1)(\gamma M - k)^{e-1} M^2 + aM^e p^e e(e-1)(1-\gamma)^{e-1}} > 0$

(5) $\dfrac{\partial \gamma}{\partial M} = -\dfrac{F_M}{F_\gamma} = -\dfrac{gc^e e(\gamma M - k)^{e-1} + (e-1)gc^e e(\gamma M - k)^{e-2}\gamma - aeM^{e-1} p^e e(1-\gamma)^{e-1}}{gc^e e(e-1)(\gamma M - k)^{e-1} M^2 + aM^e p^e e(e-1)(1-\gamma)^{e-1}}$

(6) $\dfrac{\partial \gamma}{\partial k} = -\dfrac{F_k}{F_\gamma} = -\dfrac{-gc^e e(e-1)(\gamma M - k)^{e-2} M}{gc^e e(e-1)(\gamma M - k)^{e-1} M^2 + aM^e p^e e(e-1)(1-\gamma)^{e-1}} > 0$

(7) $\dfrac{\partial \gamma}{\partial a} = -\dfrac{F_a}{F_\gamma} = -\dfrac{-M^e p^e e(1-\gamma)^{e-1}}{gc^e e(e-1)(\gamma M-k)^{e-1}M^2 + aM^e p^e e(e-1)(1-\gamma)^{e-1}} < 0$

The second mathematical issue is whether choosing both the budget support and the project type aid is always better off than selecting only the former modality.

(8) $g\big(c(\gamma^* M - k)\big)^e + a\big((1-\gamma^*)Mp\big)^e > g\big(c(M-k)\big)^e$

→ $g\left(\dfrac{c(t(M-k))}{t+1}\right)^e + ap^e\left(\dfrac{M-k}{t+1}\right)^e > g(c(M-k))^e$ where $t = \left(\dfrac{ap^e}{gc^e}\right)^{\frac{1}{1-e}}$

→ $(ct)^e + \dfrac{a}{g}p^e > (c(t+1))^e$

→ $1 + \dfrac{a}{g}\dfrac{p^e}{(ct)^e} > \left(1 + \dfrac{1}{t}\right)^e$

→ $1 + t > \left(1 + \dfrac{1}{t}\right)^e$

According to Bernoulli's inequality, when $0 < r < 1$, $(1+x)^r < 1 + rx$ given that real number $x \geq -1$. So the inequality can be applied to the case above either.

(9) $\left(1 + \dfrac{1}{t}\right)^e < 1 + e\dfrac{1}{t} < 1 + \dfrac{1}{t}$

In conclusion, utilizing the both modalities is always better than using only the budget support.

국문 초록

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본 연구는 예산 지원 공적 원조의 결정 요인들을 포괄하는 경제 모델을 제시하고 나아가 이를 데이터를 통해 검증하는 것을 궁극적인 목표로 한다. 계량 분석을 실시한 결과는 예산 지원 원조와 관련한 적격성 및 실제 예산 지원 원조를 주는 비율과 관련한 본 논문의 경제 모델이 예측한 것과 상당히 합치하는 것으로 나타났다.

모델과 계량 분석 모두에서 공적 원조의 총 금액은 적격성과 관련해서는 유의미한 양의 효과를 보였으며 비율에 대해서는 모호한 영향을 미쳤다. 나아가 개도국의 거버넌스와 관련된 지표들은 적격성 단계 및 비율 단계 모두에서 양의 영향을 미쳤으며 이는 모델이 예측한 것과 상통한다. 더불어 모델과 회귀 분석 모두 비교적 새로운 공여국들이 예산 지원 체계를 통해 원조를 집행하기 꺼려할 것이라는 점을 보였다. 마지막으로 데이터에서 양자간의 공적 원조 관계가 적격성에는 양의 영향을 미친 반면 비율 단계에는 음의 효과를 가져왔는데 이것은 모델이 예측한 것과 연결되는 부분이다.

Kaufmann et al. (2011)이 정리한 거버넌스 범주를 활용하여 본 논문에서도 거버넌스를 세분화하여 예산 지원 원조에 미치는 영향을 세분화하여 살펴보고자 하였다. 거버넌스는 (1) 낮은 부패 정도와

원조의 용도대체 리스크, (2) 정치적인 안정성 그리고 (3) 견실한 정책의 시행 가능성 세 부분으로 나뉘었으며, 적격성 단계 및 비율 단계에서 가장 중요한 거버넌스 변수가 상이한 것으로 나타났다. 적격성과 관련해서는 정치적 안정성이 가장 영향력 있는 지수인 반면 비율과 관련해서는 낮은 부패 정도가 더 중요한 척도인 것으로 밝혀졌다. 이와 같은 결과는 예산 지원 원조 체계를 활용하는 DAC 공여국들조차 여전히 예산 지원 원조와 관련하여 보수적이며 주저하는 태도를 보인다는 점을 방증한다고 할 수 있다.

주요어: 개발, 개발 협력, 공적 개발 원조, 개발 효과성, 예산 지원, 거버넌스

학번: 2013-22041