Factors Affecting the Distribution of CERs: A Cross-Sectional Empirical Analysis

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Abstract : The CDM has promoted GHG reduction activities in developing countries. There is, however, a controversial issue of an unequal distribution of CDM benefits among developing nations. To date, some emerging economies have been receiving the majority of CERs while most LDCs have few of them. This paper, hence, attempts to empirically identify determinants of the amount of CERs in order to suggest potential approaches for LDCs. Consequently, this paper finds that GHG reduction potentials, governance levels, and science and technical levels have significant positive effects on the amount of CERs. In contrast, looking at host countries in LDCs, ODA is the only factor having significant positive effects. This seems to show that CDM activities in LDCs have been implemented against the principle of market mechanism. Ultimately, this paper suggests that, LDCs ought to ameliorate their endogenous factors (i.e., governance levels and science and technical levels), and that international organization and advanced nations should further encourage LDCs by providing finance and capacity development programs.

Key Words : CDM, CER, LDCs, Kyoto Protocol, unequal distribution, global warming

INTRODUCTION

The Clean Development Mechanism (CDM) was introduced under the Kyoto Protocol (KP) adopted at the third session of the conference of the parties to the United Nations Framework Convention on Climate Change (UNFCCC) in Kyoto, Japan, in 1997.

The CDM has dual objectives: to reduce greenhouse gas (GHG)[1] emissions; and to assist sustainable development in host countries[2]. It enables Annex B countries[3] to meet their national GHG reduction targets by implementing CDM projects in Non-Annex B countries[4]. Project participants (PPs) of CDM projects can earn saleable certified emission reductions (CERs) issued by the CDM executive board based on the amounts of GHG reduced by CDM projects. Theoretically speaking, the CDM is an innovative mechanism which can mitigate the negative impacts of climate change and assist sustainable development simultaneously. In fact, it is likely that CDM has been successful in achieving its first objective to an extent (e.g., Huang *et al.*, 2012; Wang and Firestone, 2010).

On the other hand, some controversial issues exist such as an unequal distribution of CDM projects (e.g., Muller, 2007; UNEP Riso Center, 2008). China is (Fig.1). In contrast, although 128 developing countries supposed to gain more than 68% of CERs until 2030 are able to host CDM projects[5], the majority of least developed countries (LDCs)[6] (Table 1) do not possess any CDM projects[7]. Decision 17/CP.7 of the Marrakesh Accords emphasizes the necessity of the promotion of equitable distribution of CDM activities at regional and sub-regional levels[8]. Thus, the current distribution status is undesirable in terms of the equitability amongst developing countries. In order to solve this problem, some measures have been taken such as the exemption of registration fees and a share of proceeds to cover administrative expenses for projects in LDCs[9]. This distribution issue, however, has not been resolved yet. Therefore, this paper aims

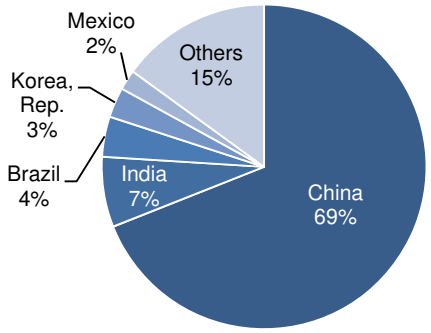

Fig. 1 Expected CER distribution

Source: IGES CDM project database (as of 8 May 2012)[7]

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Table 1 List of least developed countries (LDCs)

Africa (33)	
Angola	Madagascar
Benin	Malawi
Burkina Faso	Mali
Burundi	Mauritania
Central African Republic	Mozambique
Chad	Niger
Comoros	Rwanda
Democratic Republic of the Congo	São Tomé and Príncipe
Djibouti	Senegal
Equatorial Guinea	Sierra Leone
Eritrea	Somalia▲
Ethiopia	Sudan
Gambia	Togo
Guinea	Uganda
Guinea-Bissau	United Republic of Tanzania
Lesotho	Zambia
Liberia	
Asia (15)	
Afghanistan	Nepal
Bangladesh	Samoa
Bhutan	Solomon Islands
Cambodia	Timor-Leste
Kiribati	Tuvalu
Lao People's Democratic Republic	Vanuatu
Maldives	Yemen
Myanmar	
Latin America and the Caribbean (1)	
Haiti	

▲ Not parties to the UNFCCC

Source: UNFCCC (2012) [6]

to suggest potential approaches for LDCs to enjoy CDM benefits based on the analytical results of empirical analysis.

This paper is structured as follows: Section 1 creates a conceptual framework based on the result of literature review; Section 2 illustrates the data and methodology; Section 3 discusses regression results; finally, implications are suggested in the conclusion.

1. CONCEPTUAL FRAMEWORK

In this section, all dependent and independent variables used in the analysis of this article are illustrated based on the result of literature reviews.

Table 2 Global Warming Potentials (GWPs)

Species	GWPs
Carbon dioxide (CO_2)	1
Methane (CH_4)	21
Nitrous oxide (N_2O)	310
Hydrofluorocarbons (HFCs)	140 - 11700
Sulphur hexafluoride (SF_6)	23900
Perfluorocarbons (PFCs)	6500 - 9200

Source: UNFCCC (2012) [10]

This study adopts the log of the expected amount of CERs as a dependent variable, while many existing empirical studies utilized the log of the number of CDM projects. The reason for this is to investigate more appropriate decisive factors of CDM benefit distribution. In reality, the number of CDM projects cannot reflect the amount of monetary benefits for host countries. Meanwhile, benefits from CDM depend solely on the amount of CERs. This gap is attributed to global warming potentials (GWPs) (Table 2). For instance, a CDM project reducing SF_6 can generate tremendous amounts of CERs in comparison to that of a CDM project reducing CO_2.

As for independent variables, this study employs four sets of independent variables: GHG reduction potentials; socioeconomic factors; science and technical levels; and links to advanced nations. Each category contains one or more independent variables which are selected based mainly on the results of existing literature. The details are explained in the following paragraphs.

GHG reduction potentials

Much theoretical literature argues that lower potentials in GHG emission reductions hinder the development of CDM projects in LDCs (e.g., Jung, 2006). Explanatory variables with respect to GHG emissions are actually significant in several empirical studies (e.g., Kasai, 2012; Wang and Firestone, 2010; Winkelman and Moore, 2011). This is reasonable as without a certain level of GHG emissions, CDM projects cannot be implemented. Accordingly, this study adopts "the log of CO_2 emissions".

Socioeconomic factors

With regard to socioeconomic factors of host

countries, it can be theoretically said that rich countries can easily launch CDM projects as certain funds and technologies are needed to do it. Further, countries having a good governance level must be able to easily attract CDM investors.

In fact, two empirical studies carried out by Flues (2010) and Dinar *et al.* (2008) confirm the significance of GDP per capita and governance levels, respectively. This study, hence, utilizes a set of socioeconomic factors composed of "the log of GDP per capita" and "government effectiveness".

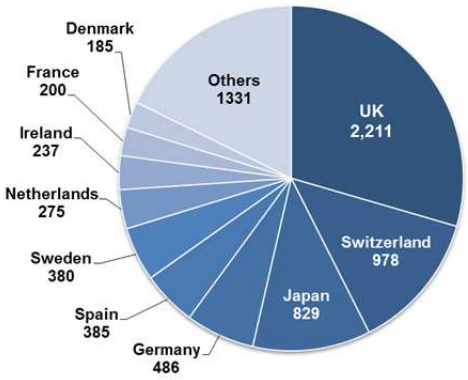

Fig. 2 No. of CDM projects by investor countries
Source: UNEP Risø Centre (2012)[11]

Science and technical levels

Concerning science and technical levels, many existing studies affirm that it is important to have a certain level of science and technical levels to host CDM projects (e.g., Jahn *et al.*, 2004 and Winkelman and Moore, 2011). Furthermore, Kasai (2012) attests to the fact that scientific and technical levels positively affect CDM project hosting.

Science and technical levels are likely to be one of important factors for host countries because CDM projects often adopt relatively new and advanced technologies to effectively reduce GHG emissions. This study, thus, uses "the log of scientific and technical journal articles" as a proxy of science and technical levels.

Links to advanced countries

In addition to endogenous factors of host countries, given that CDM projects are implemented by private firms in both host and investor countries, holding strong links to advanced countries must increase the probability of hosting CDM projects (Flues, 2010).

Dinar *et al.* (2008) demonstrates the importance of tighter links to advanced countries utilizing an independent variable of total trade. On the contrary, though Flues (2010) tried to find the significance of links to advanced nations using a dummy variable of colonial status, which indicates 1 if countries were the former British, Spanish, Dutch, German, and French colonial countries; 0 otherwise, the result, however, fails to demonstrate it. Also, Wang and Firestone (2010) shows insignificant results on common colony dummies. This study, therefore, utilizes a revised colonial dummy, which indicates 1 if countries were former British colony; 0 otherwise. This is because of the fact that the U.K. is the largest CDM investor in the world. As can be seen from Fig. 2, Spain, Netherlands, Germany, and France have had limited influence in CDM markets.

This study utilizes two more independent variables as proxies of links to advanced countries, namely foreign direct investment (FDI) inflows and official development assistance (ODA). This is because both factors can be thought to be good indicators for relationship between host and developed countries as explained in the following paragraphs.

Looking at FDI inflows, there is a contradiction among the existing literature. Jung (2006) argues that host countries having abundant FDI inflows tend to host a lot of CDM projects. Furthermore, Dinar *et al.* (2008) insist that the CDM can be regarded as a sort of FDI. On the other hand, Winkleman and Moore (2011) empirically show insignificance of FDI inflows. Moreover, Niederberger and Saner (2005) keenly refute the effects of FDI inflows on CDM investment based on the fact that some countries having failed to induce FDI have actually succeeded in hosting CDM projects. As discussed above, the results with regard to FDI are not identical in previous literature. Hence, this study attempts to verify whether or not FDI inflows have significant impacts in promoting CDM activities.

Another factor to consider is ODA, no study analyzed its significance with the exception of Kasai (2012) whose study finds statistically insignificance of the log of ODA. However, this result seems inconclusive since the variable of ODA is utilized only

Table 3 Descriptive statistics of dependent and explanatory variables

Variables	Obs	Mean	S.D.*	Min	Max
Log of CER issuance	128	9.224	8.176	0	22.67
Log of CO_2 emissoins	127	2.120	2.174	-2.207	8.695
Log of GDP per capita	126	0.690	1.351	-2.120	4.065
Government effectiveness	128	40.23	23.58	0.650	98.29
Log of the No. of scientific journal articles	128	3.757	2.427	-1.309	10.74
Log of ODA received	117	5.405	1.534	-1.609	8.205
Log of FDI inflows	127	6.166	1.939	0.788	11.64
Colony dummy	128	0.336	0.474	0	1

* robust standard errors

Table 4 Expected amounts of CERs issuance and the number of CDM projects

Host countries	CERs (tCO_2eq)		CDM projects	
Host countries without LDCs (79)	10,409 million	(99.4%)	4,003	(99.0%)
LDCs (48)	67 million	(0.64%)	42	(1.04%)
All host countries (128)	10,476 million	(100%)	4,045	(100%)

Source: IGES CDM project database (as of 8 May 2012)[7)]

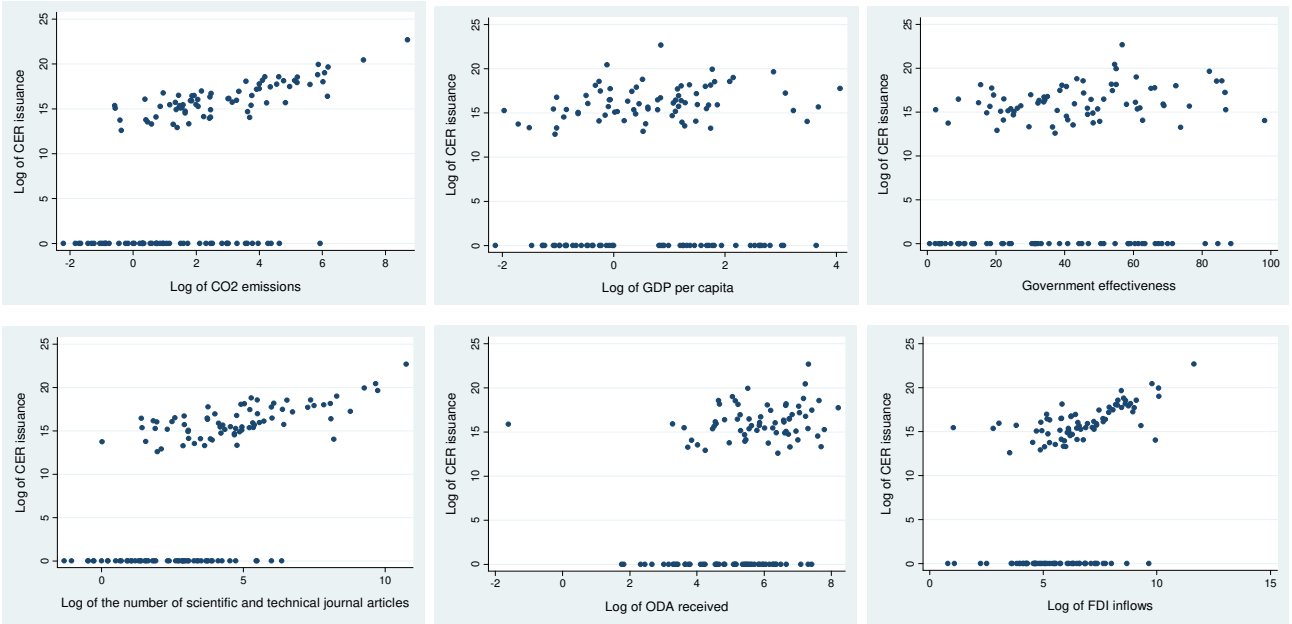

Fig. 3 Scatter diagrams (a dependent variable vs. independent variables)

in one specification out of six. Thereby, further analysis is necessary to figure out the impact of ODA on CER issuance. This study hypothesizes that the amount of ODA should positively affect CDM activities because it reflects political and economic closeness between host countries and advanced countries. Therefore, the log of ODA is adopted as one of independent variables.

2. DATA

Descriptive statistics of dependent and independent variables are listed in Table 3 and Fig. 3 shows the relationships between dependent and independent variables.

Data of a dependent variable, the log of the expected amount of CERs is originated from CDM project

database[7]. The expected amount of CERs were computed by summing all registered CDM projects' estimated emission reductions until 2030 derived from project design documents (PDDs).

With respect to independent variables, data come from various sources: data of the log of CO_2 emissions, the log of GDP per capita, the log of scientific journal articles[12], the log of ODA, and the log of FDI are obtained from World Development Indicators[13]; data of government effectiveness[14] are sourced from Worldwide Governance Indicators[15]; and data of former British colony are based on Hensel (2006)[16]. This analysis adopts the six-year average data from 2003 to 2008 for all independent variables, except colony dummy, which is more desirable than using a single year's data, in order to mitigate the influence of temporal or rapid changes and outliers.

This analysis covers 128 eligible host countries which have ratified the KP and established the designated national authority (DNA)[11]. While there are some missing values in independent variables owing to limited data availabilities, these deficits are unlikely to have a profound effect on the analytical results as missing countries host few CDM projects.

Additionally, the gap between LDCs and other host countries in terms of the amount of expected CER issuance and the number of CDM projects are summarized in Table 4.

3. METHODOLOGY

Data used in this analysis are available for eligible host countries regardless of whether or not they host CDM projects. The data, therefore, can be thought of as censored data in which any negative values of dependent variables are set to a lower bound of zero. Accordingly, this study employs the Tobit model developed by Tobin (1958). Specifically, Type I Tobit model defined by Amemiya (1984) is adopted in this analysis. Type I Tobit model is shown below:

$$y_i^* = \mathrm{x}_i\,\beta + \varepsilon_i, \varepsilon_i|\mathrm{x}_i, \mathrm{c}_i \sim \mathrm{Normal}(0, \sigma^2)$$

$$y_i = \begin{cases} \mathrm{y}_i^* & y_i^* \geq 0 \\ 0 & y_i^* < 0 \end{cases}$$

where y_i^* is a latent response variable, x_i is an explanatory variable, and ε_i is a residual of a country i. The latent variable y_i^* satisfies the classical linear model assumptions which have a normal and homoscedastic distribution with a linear conditional mean. An observed variable y_i is equal to y_i^* when $y_i^* \geq 0$, but y_i equals 0 when $y_i^* < 0$.

The Tobit model utilized in this analysis contains a dependent variable of the log of CERs, and the four sets of independent variables: GHG reduction potentials; socioeconomic factors; science and technical levels; and links to advanced nations, as listed in Table 3. This econometric model is applied to two data coverage: all eligible host countries; and eligible host countries in LDCs.

The model this study adopts is as follows:

$$\begin{aligned} lncer_i = {} & \alpha_i + \beta_1 lnco2_i + \beta_2 gdppc_i + \beta_3 lngovef_i \\ & + \beta_4 lnarticle_i + \beta_5 lnodai_i + \beta_6 lnfdi_i \\ & + \beta_7 colony_i + u_i \end{aligned}$$

where

lncer$_i$: the log of the expected amount of CERs;
lnco2$_i$: the log of CO_2 emissions;
lngdppc$_i$: the log of GDP per capita;
govef$_i$: governance effectiveness;
lnarticle$_i$: the log of the numbers of scientific and technical journal articles;
lnoda$_i$: the log of ODA received;
lnfdi$_i$: the log of FDI inflows;
colony$_i$: the former British colony dummy.

4. REGRESSION RESULTS

The regression results for the determinants of the amount of CERs are shown in Table 5. The results are described by category in the following paragraphs.

GHG reduction potentials

The study has basically obtained similar findings as previous studies in terms of GHG reduction potentials when all eligible host countries were covered in the analysis. The log of CO_2 emissions is statistically significant and positive in explaining the amount of CERs though the significance level is the upper limit, 10%. On the contrary, looking at the model covering only eligible host countries in LDCs, the log of CO_2 emissions is insignificant. Probably, this result was influenced by other independent variables that are

strongly correlated to the log of CO_2 emissions (i.e., the log of scientific journal articles: correlation coefficient (ρ) =.825 (1% significance level); the log of FDI inflows: ρ=.778 (1% significance level)). In fact, the model excluding those two variable shows that the log of CO_2 emissions has significant and positive effects on the amount of CER issuance at the 1% significance level for both models.

Thus, the regression result is likely to illustrate the difficulty of hosting CDM project activities for LDCs.

Socioeconomic factors

In the existing literature, it is confirmed that independent variables for socioeconomic factors have positive and significant effects on CDM project activities (e.g., Dinar *et al.*, 2008; Flues, 2010). Following previous literature, two independent variables, the log of GDP per capita and government effectiveness were included in the model.

Firstly, this study was not able to obtain statistically positive analytical result for the log of GDP per capita in both models covering all eligible host countries and those in LDCs. Further, its signs are negative contrary to an expectation. Theoretically speaking, richer countries can develop CDM project activities much easier than poorer countries. This conjecture, however, was not supported by the regression result.

However, as Dinar *et al.* (2008) find, it is obvious that GDP has significant and positive impacts on the amount of CERs due to a strong correlation with GHG emissions. This paper, therefore, judges that the result does not directly mean that economic condition does not matter for receiving a larger amount of CERs. This regression result was probably affected by larger population sizes of advanced CDM host countries (i.e., China and India). Furthermore, based on most existing theoretical and empirical literatures, it is certainly a fact that levels of economic development affect the amount of CERs as economically well developed countries must have succeeded in industrialization, resulting in a large amount of GHG emissions.

Next, government effectiveness is statistically significant and positive at the 5% significance level for all eligible host countries, as expected. In contrast, it resulted in statistically insignificant for LDCs but its sign is positive as well and t-value is 1.30, which is not very far from being statistically significant. This result seems to be consistent with finding of the study carried out by Dinar *et al.* (2008). Therefore, based on the regression result, acquiring effective governance levels is likely to help promote CDM project activities.

Science and technical levels

In accordance with previous studies, this study demonstrates the significance of the log of the number of scientific and technical journal articles at the 10% significance level for a model covering all eligible host countries. Given the importance of scientific and technical levels for the development of CDM projects, this result can be thought to be rational.

On the contrary, it is insignificant and negative for LDCs. This can be attributed to the specific circumstances in LDCs because, differing from usual CDM projects, the majority of CDM projects in LDCs have been funded by multilateral funds/donors (e.g., the World Bank) to mitigate the huge gap between LDCs and other host countries or invested by private firms with the intent of CSR.

Summing up, as Kasai (2012) suggested, human capital including science and technical levels should be one of crucial factors to enjoy CDM benefits. Countries wanting CDM activities ought to improve scientific and technical levels as well as the entire educational systems for their citizens.

Links to advanced nations

To host CDM project, links to advanced countries must be one of material factors as CDM projects are usually developed by PP(s) in host countries in cooperation with PP(s) in Annex B countries. There are three independent variables here: the log of ODA; the log of FDI; and the former British colony dummy.

Firstly, although this paper expected that the amount of receiving ODA reflects the political and/or economic closeness between developing and developed countries, the log of ODA is not significant for all eligible host countries. Meanwhile it is statistically significant and positive at the 5% significance level for LDCs. This should be variable finding as it is likely to reveal that links to advanced countries matter to

Table 5 Regression results for all eligible host countries and those in LDCs

Category	Dependent variables / Coverage of host countries / Independent variables	Log of CER issuance: All host countries	Log of CER issuance: LDCs
GHG reduction potentials	Log of CO_2 emissions	1.933 *	1.055
		(1.92)	(0.32)
Socioeconomic factors	Log of GDP per capita	-2.398	-0.555
		(-1.31)	(-0.09)
	Government effectiveness	0.165 **	0.321
		(2.24)	(1.30)
Science and technical levels	Log of the number of scientific and technical journal articles	1.560 *	-0.737
		(1.81)	(-0.22)
Links to advanced nations	Log of ODA received	1.015	10.515 **
		(0.84)	(1.95)
	Log of FDI inflows	-0.535	-1.721
		(-0.69)	(-1.35)
	Colony dummy	-5.557 ***	-6.062
		(-2.49)	(-1.14)
Observation		113	37
Log pseudo likelihood		-273.8	-63.7
Log pseudo R-sq		0.099	0.128

Values in parentheses are t statistics; * p<0.10 ** p<0.05 *** p<0.01

promote CDM activities for LDCs due to their lack of attractiveness (i.e., GHG reduction potentials). The statistical insignificance of the log of ODA for entire host countries is likely to suggest that CDM investors act differently from their governments by following the market mechanism or other factors.

Secondly, the log of FDI inflows is statistically insignificant for both models and its signs are negative contrary to an expectation. This result is in accordance with the empirical result of Winkleman and Moore (2011). It, however, contradicts the argument of the previous theoretical literatures (e.g., Jung, 2006; Niederberger and Saner, 2005). Certainly, strong economic ties with developed nations in which CDM investors located can be thought of one of advantages to lure foreign investments for CDM projects. Having stated that, CDM projects are basically implemented by private firms following the market mechanism. The result, hence, show that CDM investors focus heavily on the profitability of projects (i.e., the amount of GHG reductions).

Lastly, this study finds that the former British colony dummy has statistically significant negative impacts on the amount of CERs differing from the expectation. This is consistent with the study carried out by Wang and Firestone (2010). The adverse effects of the former British colonies seem to allude to the fact that CDM investors in the U.K. do not lay weight on colonial ties but focus mainly on profitability of projects (i.e., the larger amount of GHG reduction). This tendency must be attributable to the nature of CDM owing to a market mechanism.

5. DISCUSSIONS

Based on the regression results, GHG reduction potentials and governance levels, and science and technical levels are highly likely to positively affect the amount of CER issuance for entire host countries. On the other hand, ODA is the only statistically significant factor when focusing only on host countries in LDCs. Although two important determinants (i.e., science and technical levels and governance levels) are likely to be ameliorated by efforts made by developing nations themselves, other two critical factors (i.e., GHG reduction potentials and ODA) cannot be

controlled by developing nations and/or take long time to remedy.

With regard to GHG reduction potentials, as Haites (2004) asserts, the potential for launching CDM activities in LDCs are highly likely to be quite low since there ordinarily are few facilities emitting a volume of GHGs in LDCs. Needless to say, CDM investors would judge GHG reduction projects that produce small amounts of CERs as commercially unattractive following the principle of the market mechanism. Therefore, based on the regression result, this paper is likely uncover the fact that although GHG reduction potentials must be one of crucial factors to receive a larger amount of CERs in general, it has not been an important factor for LDCs in the past.

Whilst the imbalance issue has not been resolved, the number of registered and proposed CDM projects in LDCs has been increasing slowly but surely (Fig. 4). Actually, LDCs has been supported by international organizations, governments, and some private firms in terms of financial and technical aspects (UNFCCC, 2010). According to the CDM executive board reports, it is noted that the international community cared about the unequal regional distribution issue in the early stage. For instance, at the 24th executive board meeting (EB24), the five submissions publicizing grievances against the distribution issue received as response to the call for inputs on the regional distribution of CDM projects were introduced; the applicability of microfinance system for LDCs was discussed at EB44; and "Guidelines for Demonstrating Additionality of Microscale Project Activities", which is created for LDCs, was adopted at EB54. These activities must have promoted CDM activities in LDCs. In addition, there are two more major assistance schemes for LDCs: the first is financial assistance from international organizations such as the World Bank; the second is capacity building programs provided by some international organizations (e.g., UNFCCC secretariat). Summing up, in order to boost CDM activities in LDCs, it is important for LDCs to improve their endogenous factors by focusing on science and technical levels and governance levels relevant to CDM activities.

In addition, LDCs should keep strongly arguing

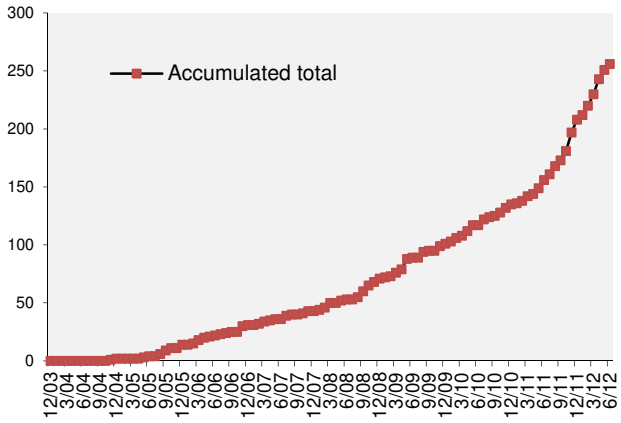

Fig. 4 CDM projects in the pipeline situated in LDCs
Source: UNEP Risø Centre (2012)[11)]

against the imbalance issue in the international society to receive further supports from advanced countries. More importantly, LDCs ought to suggest concrete measures: one possible measure is to reform the CDM rules on the utilization of ODA, although developing countries opposed it in order not to decrease the amount of ODA in the past. In reality, LDCs have started hosting CDM projects by being funded public resources.

CONCLUSIONS

This paper analyzed determinants of the amount of CER issuance. The current unequal distribution of CDM benefits needs to be resolved for the smooth progress in the international climate negotiation.

As stated in previous sections, it is found that GHG reduction potentials, governance levels, science and technical levels are significant determinants which positively affect the amount of CER issuance for entire host countries. With respect to links to advanced nations, this study was not able to confirm positive effects of FDI inflows. Furthermore, this paper finds that former British colonies have not largely benefitted from the CDM. Concerning the analytical result for LDCs, only ODA is a significant factor, meaning that it is unlikely that LDCs reach sufficient levels in terms of GHG reduction potentials and science and technical levels. If LDCs simply keep complaining about the current inequality, LDCs will obtain little improvement. Appropriate and practical

measures should be undertaken.

In order to ameliorate the imbalance issue, LDCs must make best efforts on improving their endogenous factors (i.e., governance levels and science and technical levels). On the other hand, in addition to LDCs' own efforts, international organizations and advanced nations also must proactively support and encourage LDCs by reforming the CDM or providing LDCs with finance and capacity building programs, and so forth.

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NOTES

1) GHGs defined under the Kyoto Protocol are CO_2, CH_4, N_2O, HFCs, PFCs, and SF_6.

2) UNFCCC. (1998 updated) The Kyoto Protocol. <http://unfccc.int/resource/docs/convkp/kpeng.pdf>, 05/01/2012 referred.

3) Annex B countries are industrialized countries which are listed in Annex B of the Kyoto Protocol. They are committed to GHG reduction targets.

4) Non-Annex B countries are developing countries which have not listed in Annex B of the Kyoto Protocol. They do not have GHG reduction targets under the Kyoto Protocol.

5) UNFCCC. (2012 updated) DNAs. <http://cdm.unfccc.int/Statistics/Registration/RegisteredDNAPieChart.html>, 05/01/2012 referred: DNA is a body granted responsibility by a host country. The main task of DNA is to determine whether potential CDM projects assist sustainable development in a host country.

6) 49 countries classified as Least Developed Countries (LDCs) by the United Nations are given special consideration under the FCCC. UNFCCC, (2012 updated), Least Developed Countries <http://unfccc.int/cooperation_and_support/ldc/items/2666.php>, 07/07/2012 referred.

7) IGES. (05/08/2012 updated) CDM project database. <http://www.iges.or.jp/jp/cdm/report_cdm.html>, 05/08/2012 referred.

8) UNFCCC. (2001 updated) Decision 17/CP.7: Modalities and procedures for a CDM as defined in Article 12 of the Kyoto Protocol. <http://unfccc.int/files/meetings/workshops/other_meetings/application/pdf/17cp7.pdf>, 05/05/2012 referred.

9) UNFCCCC. (2010 updated) EB54 Report Annex 29. <http://cdm.unfccc.int/Reference/Guidclarif/reg/reg_guid07.pdf>, 31/12/2012 referred.

10) UNFCCC. (2012 updated) Global Warming Potentials. <http://unfccc.int/ghg_data/items/3825.php>, 15/05/2012 referred.

11) UNEP Risø Centre. (2012 updated), CDM Pipeline overview, <http://uneprisoe.org/>, 03/07/2012 referred.

12) Scientific and technical journal articles refer to the number of cientific and engineering articles published in the following fields: physics, biology, chemistry, mathematics, clinical medicine, biomedical research, engineering and technology, and earth and space sciences.

13) World Bank. (2012 updated) World Development Indicators. <http://data.worldbank.org/data-catalog/world-development-indicators>, 04/17/2012 referred.

14) Government effectiveness is an indicator reflecting the degreeof the quality of public services, its independence from political pressures, the quality of policy formulation and implementation,and the credibility of the government's commitment to those policies.

15) Worldwide Governance Indicators. (2012 updated) The World wide Governance Indicators (WGI) project. <http://info.worldbank.org/governance/wgi/index.asp>, 03/07/2012 referred.

16) Hensel, P. R. (2006 updated) ICOW colonial history data 0.4. <http://www.paulhensel.org/Data/colhist.zip>, 27/04/2012 referred.

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