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論文審査担当者	主査： 焼田 党 副査： 大野 幸一， 板倉 健

**Towards Scaling Multi-Benefit Type Projects in LDCs:
Empirical Analyses on CDM Project Hosting**

Abstract

Katsuya Kasai

c143602

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I. Introduction

The latest integrated assessment report on climate change (IPCC, 2013) alleges that “It is extremely likely that human activities caused more than half of the observed increase in global average surface temperature from 1951 to 2010.” IPCC (2013) estimates that climate change influences human lives in various ways, not just in temperature rises, but also in changes in sea levels, changes in rainfall patterns and changes in frequency of droughts, heat waves, cold waves, and typhoons. UNEP (2011) argues that reducing greenhouse gas (GHG)¹ emissions to the level that can hold a temperature rise within 2°C is technologically and economically feasible. To realize this goal, it is necessary to undertake immediate and pertinent actions with the international community (UNEP, 2010). Theoretically speaking, it may be possible to take immediate actions and prevent from rapid temperature rise. However, in reality, it is highly unlikely for this to be actualized considering the current human activities such as increasing global economic activities and sluggish pace of the agreements about the details of the post Kyoto Protocol.

In this social context, the Clean Development Mechanism (CDM)², the world’s first innovative financial mechanism enabling GHG reductions internationally in a cost-effective manner, was put into force in 2005. The CDM played an important role in worldwide GHG reduction activities (e.g., Sutter and Parreño, 2007) for the first several years after its initiation but it is currently nearly defunct due to the deterioration of the market condition. There are three major reasons why the Certified Emission Reduction (CER)³ market has an imbalance of demand versus supply: first is the issue of equality on legally binding targets, as the targets were set with on the basis of inadequate evidence and inequitably. Due to this, Russia, Canada, and Japan did not join the second commitment period of the Kyoto Protocol; the second reason is the lower GHG emissions in Annex I countries as the Lehman Brother's fall in 2008 caused economic stagnation and many Annex I countries, especially within the EU, did not have much demand for CERs to fulfil their targets; and third, the increasing amount of CER issuance as this accelerated the sharp depreciation of CER price. Aside from the rapid decreasing of the CER price, the skewed distribution of CDM projects has been a controversial issue (e.g., Muller, 2007; Kasai, 2013). The majority of Least Developed Countries (LDCs)⁴ have no CDM

¹ GHG is a gas in an atmosphere that absorbs and emits radiation within the thermal infrared range. The Kyoto Protocol has designated six GHGs (i.e., CO₂, CH₄, N₂O, HFCs, PFCs, and SF₆).

² The CDM is one of the Kyoto Mechanisms which was introduced at COP3 in Kyoto, Japan. It enables Annex I countries (developed countries and EU) to implement GHG reduction project activities in Non-Annex I countries (developing countries) in an cost-effective manner due to the huge potential of GHG reductions, gap of energy efficiencies, labor costs, etc. compared to Annex I countries to meet legally binding GHG reduction target imposed by the Kyoto Protocol.

³ The Kyoto Protocol unit equal to one metric tonne of CO₂ equivalent. CERs are issued for emission reductions from CDM project activities. Two special types of CERs called temporary certified emission reduction (tCERs) and long-term certified emission reductions (ICERs) are issued for emission removals from afforestation and reforestation CDM projects.

⁴ As of 2014, there are 48 LDCs under the Kyoto Protocol. Recently, Samoa and Maldives graduated from the

projects, whereas the major GHG emitters, especially China and India, have been receiving a lot of fund flows from Annex I countries by implementing CDM projects (Kasai, 2013) which have had a variety of positive side effects such as technology transfers, electricity generated from clean renewable sources, and the promotion of sustainable development in their own countries in various ways.

Hence, considering the current distributional imbalance of CDM projects, several studies were conducted in this dissertation aiming to identify the determinants of CDM project hosting in order to recommend promising approaches for LDCs based on empirical evidence.

II. Macroeconomic Analysis of the Effects of CDM Using a Two-Country Model

In Chapter 2, the effects of the CDM on the host country's GHG emission tax rate and GHG reduction policies were investigated by examining the effects of increased environmental awareness in the Annex I country using the two-country model created by Hatzipanayotou *et al.* (2002).

This macroeconomic analysis shows that, in a Nash equilibrium where the Annex I country chooses the amount of CDM investment and the host sets the proportion of CDM revenue used in GHG reduction activities and GHG emission tax rate, a rise in environmental awareness of the Annex I country increases the CDM investment, does not affect the GHG emission tax rate, and plausibly reduces GHG emissions of the host country. Moreover, the results indicate that the degree of effectiveness of CDM projects in reducing GHG emissions affects the behavior of the Annex I country. This means that, in a plausible case, the more effective the CDM investment is, the greater the reduction of GHG emissions in the host country is. If the effectiveness reflects the recipient country's ability to adopt advanced technologies (e.g., education levels or human capital stock of the country), the Annex I country tends to undertake CDM investments in such countries with greatest human capital. This prediction arises from our theoretical consideration.

III. Empirical Analyses of the Determinants of CDM Project Hosting

Following the theoretical analysis above, cross-country empirical analyses and panel data analyses were conducted to identify the determinants of CDM project hosting in Chapters 3 and 4, respectively. These analyses focused mainly on three factors: 1) the qualities of the business environment; 2) scientific levels in the host countries; and 3) economic ties with advanced countries. The reasons are that: 1) although many previous studies have analyzed the significance of a business environment, their results were not homogenous. Further, their notions of a business environment seemed to be narrow and limited; 2) no previous studies attempted to verify the significance of scientific levels; and 3) previous studies produced different results on proxies of economic ties with advanced nations.

Consequently, the results of cross-country analyses indicates that several factors regarding a

LDC status in 2014 and 2011, respectively.

business environment (i.e., “ease of registering property,” “ease of getting credit,” and “ease of trading across borders”) are significant for both bilateral and unilateral CDM projects. Similarly, the scientific and technical levels were found to be significant, but only for unilateral CDM projects (Kasai, 2012a). In addition to the cross-sectional analysis, the results of panel data analyses also identify several significant decisive factors by running random effects panel Tobit models. Although it was expected that all independent variables would be found to be significant in the analytical results, four variables, namely “GDP per capita,” “control of corruption,” “tertiary school enrolment rate,” and “Official Development Assistance (ODA) received,” were found to be statistically insignificant. Furthermore, it was confirmed that the “former British colony dummy” has negative significant effects on CDM project hosting. This implies that CDM investors in the U.K. have not utilized networks with former colonies in their CDM business. On the other hand, the panel data analyses reveal four important factors that have a significant and positive impact on CDM project hosting. They are: “GHG reduction potentials,” “government effectiveness,” “science and technology levels,” and “economic ties between host and Annex I countries in the private sector.” This empirical evidence is in accordance with expectations from a theoretical point of view (Kasai, 2012b).

IV. Policy Implications

On the basis of the findings of theoretical and empirical analyses, some policy implications were suggested in Chapter 5 followed by remaining challenges and the concluding statement.

Basically, it is considered to be appropriate that LDCs’ future concerning the CDM and other similar mechanisms will depend on how successfully they can utilize the findings of this paper in a factual manner. The important point to note is that some determinants can be controlled by the host countries, but other determinants cannot. It is impossible to boost the past GHG emission levels in the base year. Thus, LDCs should focus exclusively on improving factors that they can control (i.e., “business environment,” “government effectiveness,” “science and technology levels,” and “economic ties with the Annex I countries in the private sector”) (Kasai, 2012a and Kasai, 2012b). If this is actually achieved, LDCs will have better conditions for attracting CDM investors.

Alternatively, by taking a different perspective on a promising approach for LDCs, it seems feasible to develop the programmatic CDM. Because LDCs have a serious disadvantage in their lower GHG reduction potentials, they cannot be expected to simulate the major GHG emitters, such as China (Kasai, 2012a). The programmatic CDM allows the collection of a vast number of small-scale interventions (e.g., the use of energy-saving fluorescent bulbs and clean cookstoves) to be grouped, registered, and verified as a single CDM program. This is intended to reduce the transaction costs of processing a number of small-scale activities, which are generally the types of projects that have a direct impact on community development (ACP, 2014). In recent years, several international organisations have assisted in disseminating the programmatic CDM in LDCs. As a result, the number

of CDM activities in LDCs has been increasing slowly but steadily. As of February 28, 2014, there were 247 registered programmatic CDM activities (UNFCCC, 2014). Using this case as a good example, it is hoped that more promising and useful new market-based mechanisms will be developed by UNFCCC and others.

In addition, as a more realistic suggestion, LDCs should continue to request financial assistance from the international society. When looking at negotiation circumstances at COPs⁵, LDCs basically have cooperated with articulating common needs. However, it also appears that specific countries may have been affected by particular world powers, whereas others have not been greatly interested in the issue. It is not imperative that LDCs always work together. However, by working together, they probably would be able to obtain greater proportion of the assistance that they require. Thus, LDCs should consider working together more closely to explain and elaborate their strategies. From a theoretical point of view, a rise in the level of citizens' environmental awareness in the Annex I country reduces GHG emissions in the host country and increases the amount of investment required in CDM activities. This is confirmed by the macroeconomic analysis of the effects of the CDM in Chapter 2. LDCs should raise the environmental awareness level not only by enhancing political dialogues, but also by implementing various activities at the grassroots level in cooperation with international organizations and NGOs. This is because, from a standpoint of equality, LDCs have a right to receive more financial assistance from developed countries and some emergent nations.

In summary, an effective strategy to promote CDM activities in LDCs is constructed with three dimensions: 1) efforts made by the host country. LDCs should improve the significant factors that they can control by themselves and attempt to implement the programmatic CDM; 2) efforts of international organizations (i.e., UNFCCC) as it would be helpful to improve and/or simplify the CDM policies/rules and create new mechanisms, such as the programmatic CDM; and 3) efforts by the international community, particularly developed countries, which are responsible for a vast amount of GHG emissions that are of concern in the climate change discussion. Their further efforts are absolutely necessary to provide funds, subsidiaries, technical assistance, capacity development programs and other forms of assistance.

V. Remaining Challenges

Regarding the empirical analyses of the determinants of CDM projects, the findings of this paper is based on the limited data for the period between 2005 and 2010. It is hoped that further empirical studies will be conducted utilising data that has been collected after 2011. Furthermore, it is worth applying other analytical models and/or variables if there are better ones. More specifically, it might be interesting to add regional dummies in an empirical model as the significance and effects of each

⁵ COP stands for "the conference of parties to the UN Framework Convention on Climate Change (UNFCCC)."

variable may be different according to the region where the host countries are situated. This method appears to help LDCs identify more practical approaches.

VI. Concluding Statement

The CDM is a mechanism, utilized not only for alleviating the impacts of global warming, but also for enhancing sustainable development in host countries and, furthermore, it can generate a new type of fund flows as it has similar feature to subsidies. Assuming that the CDM will be continuously developed as a GHG reduction mechanism under the post-Kyoto Protocol after 2020, this paper underscores the importance of aggressively pressing ahead with the development of CDM projects activities for the sake of improving their quality of life as well as reducing the impacts of global warming.

Having said this, in light of the current status of international climate negotiations, it feels challenged to have all major countries that participate planning to agree to the legally binding targets at COP21 to be held in Paris, France in 2015. Moreover, as mentioned before, while the CDM market worked and functioned well until 2008, as the market got an imbalance of demand versus supply, the CER price started falling down in 2009 and unfortunately the current secondary CER price is now extremely low at less than one Euro/ton (ICE, 2014). This might be considered a typical fate of a financial commodity which relies on the market mechanism. Therefore, learning from a lesson from the CDM, LDCs might want to seek other possibilities including subsidiary programs as well as promising market-based mechanisms (e.g., VCS⁶, NAMA⁷, JCM⁸, REDD+⁹, etc.) while carefully watching developments of the CDM at CDM EB meetings and COPs.

Looking back over history, humankind has improved the quality of life by making innovations happen such as the industrial revolution and green revolution (Kasai, 2012b). Hence, it is hoped that both the Annex I and non-Annex I countries tackle the climate change issue while stimulating the effective use of innovative mechanisms including the CDM and make innovations

⁶ The Verified Carbon Standard (VCS) is the world's leading voluntary GHG reduction scheme which was founded by a collection of business and environmental leaders who saw a need for greater quality assurance in voluntary carbon markets.

⁷ Nationally Appropriate Mitigation Action (NAMA) refers to a set of policies and actions that countries undertake as part of a commitment to reduce GHG emission. The term recognizes different countries may take different nationally appropriate action on the basis of equity and in accordance with common but differentiated responsibilities and respective capabilities. It also emphasizes financial assistance from developed countries to developing countries to reduce emissions.

⁸ The Joint Crediting Mechanism (JCM) is Japan's program to contribution to the reduction of GHG emissions in partner countries through transferring low-carbon technology and products. Currently, bilateral agreements on the JCM have been signed by twelve countries (i.e., Mongolia, Bangladesh, Ethiopia, Kenya, Maldives, Viet Nam, Laos, Indonesia, Costa Rica, Palau, Cambodia, and Mexico).

⁹ Reducing emissions from deforestation and forest degradation + (REDD+) is a mechanism that has been under negotiation by the UNFCCC since 2005, with the twin objectives of mitigating climate change through reducing emissions of GHG and removing GHG through enhanced forest management in developing countries.

happen in terms of both sustainable socioeconomic systems and technology advancement for the future generations. Last but not least, time is limited but it is unquestionable that our possibilities are unlimited. The author strongly hopes that this dissertation will be read by as many people as possible in order for LDCs to utilize “latecomer’s advantages” to realize sustainable development by implementing various multi-benefit type projects/programs in their countries.

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名古屋市立大学学位授与報告書

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報告番号	※ 甲第 号
学位の種類	博士（経済学）
氏名	笠井 勝也
学位授与の要件	学位規則第4条第1項該当者
授与年月日	平成 27 年 3 月 25 日
学位論文の題名	Towards Scaling Multi-Benefit Type Projects in LDCs: Empirical Analyses on CDM Project Hosting
論文審査の結果の要旨およびその担当者氏名	<p>笠井勝也氏の課程博士学位請求論文に関する最終試験は平成27年1月28日（水）午後4時より約1時間30分にわたり、経済学研究科セミナー室において公開で行われた。</p> <p>まず、課程博士学位請求論文の構成および内容について笠井勝也氏から報告があり、その後、予備審査において議論のあった点についての対応についての説明があった。その後、審査員から内容の確認およびこれらからの研究についての質問等がなされた。審査委員全員の評価として、本研究科入学後に取り組んできた理論分析と入学前の公表論文との結びつきが明確になり、学位請求論文として十分な内容になったことが確認された。</p> <p>その結果、最終試験担当者3名は笠井勝也氏が「専攻分野について研究者として自立して研究活動を行うに必要な高度な研究能力とその基礎となる豊かな学識を有する」ことを証するに十分な課程博士学位請求論文であるとの判断で一致した。</p> <p>論文審査担当者</p> <p>主査 焼田 党  副査 大野 幸一  板倉 健 </p>
最終試験担当者氏名	<p>主査 焼田 党  副査 大野 幸一  板倉 健 </p>
学位論文審査機関の名称および組織	<p>名 称 審査委員会</p> <p>組 織 論文審査委員3人（主査1人、副査2人）</p>
判定の方法	<p>名 称 経済学研究科教授会</p> <p>判定の方法 研究科教授会での無記名投票による</p>

最終試験の結果の要旨及び担当者

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報告番号	甲第	号 ※	氏名	笠井 勝也
最終試験担当者	主査	焼田 党		
	副査	大野 幸一		板倉 健 
(論文題目) Towards Scaling Multi-Benefit Type Projects in LDCs: Empirical Analyses on CDM Project Hosting				
(最終試験の結果の要旨)				
<p>笠井勝也氏の課程博士学位請求論文に関する最終試験は平成 27 年 1 月 28 日 (水) 午後 4 時より約 1 時間 30 分にわたり、経済学研究科セミナー室において公開で行われた。</p> <p>まず、笠井勝也氏から課程博士学位請求論文の構成および内容について報告があり、その後、予備審査において議論のあった点についての対応についての説明があった。その後、審査員から内容の確認およびこれらからの研究についての質問等がなされた。質問に対する返答は的確であり、課程博士学位請求論文の内容以上に、これまでの研究生活において修得してきた知見がより広範にわたることが認められた。</p> <p>特に、入学前に査読付き学術雑誌に掲載された実証研究における独立変数としてその効果が検証されていた変数の選択が、理論的研究において CDM プロジェクト受け入れ国のプロジェクト実施における効率性という観点から合理的であることが明確にされたことが確認された。</p> <p>論文審査委員全員の評価として、本研究科入学後に取り組んできた理論分析と入学前の公表論文との結びつきが明確になり、学位請求論文として十分な内容であることが確認された。</p> <p>その結果、最終試験担当者 3 名は笠井勝也氏が「専攻分野について研究者として自立して研究活動を行うに必要な高度な研究能力とその基礎となる豊かな学識を有する」ことを証するに十分であり、最終試験に合格したものと判断した。</p>				
(平成 27 年 1 月 28 日実施)				

論文審査の結果の要旨及び担当者

報告番号	甲第	号 ※	氏名	笠井 勝也
最終試験担当者	主査	焼田 党		
	副査	大野 幸一		板倉 健 
論文題名				
Towards Scaling Multi-Benefit Type Projects in LDCs: Empirical Analyses on CDM Project Hosting				
(論文審査の結果の要旨)				
<p>笠井勝也の学位請求論文は京都議定書で導入された Clean Development Mechanism (CDM)が、実際に途上国間でどのように推進されてきたかを分析した実証研究である。特に、特定の途上国に CDM プロジェクトが集中し、逆に多くの国が CDM プロジェクトを保有できていない要因を明らかにすることで、CDM プロジェクトから得られる Certified Emission Reduction (CER)売却益および副次的に発生するマルチベネフィットの偏在を緩和する手立てを提案しようとする極めて実践的な研究である。</p> <p>本論文は次の通り、3つの章と序章および結論から構成されている。</p> <ol style="list-style-type: none"> 1. Introduction 2. The effect of the CDM on GHG reduction policies: Macroeconomic analysis 3. Empirical analysis focusing on business environment: A cross-country analysis 4. The revisit of empirical analysis: A panel data analysis 5. Conclusions <p>序章で、CDM が置かれている現状を概観している。京都議定書発効後の 2005 年に温室効果ガス (GHG) 削減に対する国際的なメカニズムとして導入されたが、2007 年/2008 年の世界金融危機に伴う世界経済の景気後退に伴って排出権価格が低迷するなどによって、CDM はややその期待された働きを果たせない事態に陥っている。しかし、他方で、その間 CDM プロジェクトの途上国間での偏在が議論されてきた。特に GHG の排出量の大きい 中国やインドが多くの CDM プロジェクトを付属国 I 国と協働で実施してきたことが批判されている。CDM プロジェクトが技術移転や持続可能な経済発展を促す効果をもつとすれば、この CDM プロジェクトの偏在が一定程度解消され、多くの途上国で実施されることが望ましい。</p> <p>第 2 章では、その後に示される実証的な分析に先だって、CDM プロジェクトが先進国と途上国間でお互いにどのようなマクロ経済学的な影響を与えるかを、理論的に分析している。通常、地球環境問題に関する国際的な取り決めで問題になるように、先進国は途上国の環境政策を直接設定することはできず、また逆に先進国は自国の利益を図りながら環境政策を立てる。したがって、国際的な交渉は Nash 均衡的な状況でなされていると考えることができる。そこで、2 章では、先進国 (付属国 I) が途上国に対して CDM</p>				

(名古屋市立大学大学院経済学研究科)

No.

論文審査の結果の要旨及び担当者

プロジェクトへの投資としての援助をどのように与えるかを定める。その際、先進国は途上国の GHG 排出の影響を越境して被ることをその援助の大きさを定める際に考慮する。他方、途上国は、CDM プロジェクトを通じて GHG 排出を削減すると同時に、CDM プロジェクト実施によって得られた収入のうち公的な GHG 削減に充てる割合と自国の環境税率の大きさを定める。これらの政策の決め方によっては CDM プロジェクトへの投資を通じる援助の受け取りに影響が出る。この様な Nash ゲームの均衡において、もし先進国の環境意識が強くなる、つまり、途上国からの越境汚染からの外部不経済効果をより敏感に感じるようになったとした場合、それぞれの国の政策にどのような変化が見られるかを分析している。ありそのような状況では、先進国は CDM プロジェクト投資という援助を増加させる。他方、途上国は環境税率を変化させないが、援助からの公的 GHG 削減への支出割合を上昇させる。それによって、途上国の GHG 排出による越境汚染は小さくなることが示された。これら結論は、CDM プロジェクトを伴う援助を考えないモデルの結論とほぼ同じである。しかし、CDM プロジェクトによる GHG 排出削減の効率性 effectiveness が高ければ高いほど、CDM プロジェクトを伴う援助が大きくなり越境汚染が小さくなる可能性が示された点が従来の分析とは異なる。プロジェクトの効率性は受け入れ国側の人的資本や科学技術に関する知識の水準に大きく依存している可能性があることを示している。以下の分析の根拠の一つを与えている。

第 3 章および第 4 章では、それぞれクロス・カンントリー・データおよびパネル・データに基づいて、CDM プロジェクトの受入れ国側の要因を特定しようとしている。要因として、(1)GHG 削減ポテンシャル、(2)社会経済ファクター、(3)人的資源レベル、(4)先進国との経済的な結びつきの強さに分けて、それぞれの重要性を検証している。特に、ビジネス環境の変数として世界銀行が公表している Doing Business Index の 8 つの sub-indices を採用している点、および、(2)人的資源レベルについて、先行研究では教育年数等が採用されてきたのに対し、本研究では科学技術の論文数という実体的な変数を採用して検証を行っている点に新規性が認められる。クロス・カンントリー分析からは、財産・資産登記の容易さや信用獲得の容易さ或いは海外との貿易の容易さといったビジネス環境が当初から先進国が関わっているかどうかに関わらず CDM プロジェクト受け入れにとって重要であることが示された。また、科学技術水準が、途上国のみでプロジェクトを設計している CDM プロジェクトについて統計的に有意であることが示された。さらに、パネル・データを使った精緻な分析を行っており、一人当たり GDP、汚職制御、高等教育機関入学率および ODA の受給といった変数が期待とは異なり、統計的に有意ではないことが示された。さらに、旧英領植民地ダミーが負の影響を有意に与えていることも示された。他方、このパネル・データ分析では、GHG 削減の潜在能力、政府組織の効率性、科学技術水準および民間部門の付属国 I 国との結びつきなどが CDM プロジェクトの受入れに正で有意な影響を与えていることが示された。この様なパネル・データによる分析は先行研究では行われてこなかったという意味では、分析自体が学術的貢献の一部と考えられる。

5 章では、分析の纏めと、これからの環境政策における CDM の位置づけについて、最近の状況を考慮して述べている。

なお、3 章および 4 章は以下の公表論文に基づいている。

Kasai, K. (2012) "A cross-country empirical analysis of determinants of Clean Development Mechanism (CDM) projects," *Journal of Environmental Information Science*, 40(5), 1-10.

Kasai, K. (2012) "How can LDCs benefit from the CDM?: A panel data analysis of determinants of CDM project hosting," MPRA Paper 52137, University Library of Munich, Germany.

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Kasai, K. (2013) "Factors affecting the distribution of CERs: A cross-sectional empirical analysis,"
Journal of Environmental Information Science, 41(5), 37-46.

本論文の意義は次の点に求められる。

第一に、京都議定書では途上国に GHG 排出削減義務は課されていなかったが、一部の途上国の GHG 排出量はかなり大きいものであった。それらを削減する間接的な方法の一つが CDM プロジェクトによる排出量削減であったと考えてよい。CDM プロジェクトは Certified Emission Reduction (CER) の売却益をもたらすだけでなく、様々な意味で途上国にとっても有益なメカニズムであり、多くの途上国で実施されることが望ましいと言えるだろう。それにもかかわらず、実際には、中国やインドなど、経済規模が大きい途上国にプロジェクトが集中した。この状況に対して、笠井勝也氏は、CDM プロジェクトの偏在の原因を明らかにすることで、より多くの途上国にそのメリットが及ぶと考え分析を進めている。分析方法自体は、独創的なものではないが、このような分析は以前にはあまりなされておらず、分析対象としては独創的であったと考えられる。

第二に、クロス・カンントリー・データを用いて分析した後、さらにより大きなパネル・データを使って詳しい検証を行い、より精緻な結果を得ている。結果的に追加的な知見を得ており、その意味では、同じ分析を繰り返したというより、むしろ分析を拡張してより一般化していると言える。先行研究ではパネル・データを用いた分析がほとんどないことも特筆に値する。

第三に、先行研究に CDM プロジェクトを導入する形で理論モデルを拡張し、理論的な結果を導くことで、実証研究の理論的基礎を与えている。笠井氏の専門はむしろ実証分析であるにもかかわらず、理論的な分析によって 2 国モデルではあるが、CDM プロジェクトの授受双方の経済（国）の行動を分析したことは、理論的な発展にもなっている。

以上、ベースとなる 2 論文が査読付き論文として国際学術雑誌に掲載されている事実と、本研究科での理論的展開を合わせて、その学術的貢献は大きいと認められる。