



Heterogeneous governance capabilities, reference emission levels and emissions from deforestation and degradation: A signaling model approach



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ABSTRACT

Heterogeneous governance capabilities of developing countries are one of the major challenges to the effectiveness of REDD+ projects. Consequently, the effects of heterogeneous governance capability, and reference emission levels on emissions from deforestation and degradation under information asymmetry, are both theoretically and empirically analyzed by using two signaling models to interrogate the panel data during the period 2011–2015 from 13 partner developing countries involved in the UN-REDD Programme. Empirical results confirm that compensation payments based on heterogeneous governance capability can improve the incentive effectiveness of such compensation payments in REDD+ projects, thereby making developing countries more willing to reduce their emissions from deforestation and degradation. Furthermore, higher baseline targets for reducing emissions can lead to greater efforts to reduce emissions. Therefore, the heterogeneous governance capabilities of developing countries should be considered in calculating the level of compensation payment for future REDD+ projects. Instead of a uniform compensation payment for all developing countries, compensation payments should be distributed according to the heterogeneous governance capabilities of each of those developing countries.

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1. Introduction

Almost 12–20% of global anthropogenic emissions comes from deforestation and degradation, and is now one of the major sources of all carbon emissions (van der Werf et al., 2009). Therefore, “Reducing Emissions from Deforestation and Degradation-plus (REDD+)” has become a priority policy option in response to global climate change in developing countries (Stern, 2007). One of the common practices in the REDD+ project is the Payment for Environmental Services (PES), which rewards developing countries according to the reduction in their emissions from deforestation and degradation (Bond et al., 2009).

However, there are a series of difficult issues relating to REDD+ projects, one of which is the heterogeneous governance capabilities of developing countries (Vatn and Vedeld, 2013). Governance

capability is more and more important in day-to-day regulatory management, rule-making, and enforcement (Wu et al., 2017). According to (Skutsch and Van Laake, 2008), we conceive governance capability for REDD+ projects as a set of skills and resources that enable REDD+ policies geared to the environmental and ecological aims. The governance capability is mainly influenced by the national policy-making process, as well as the drivers of deforestation and the measures required to curb them (Aquino and Guay, 2013). A good governance capability for REDD+ projects is built around the principles of accountability, inclusiveness and transparency (Kanowski et al., 2011). Government efficiency, which is the general quality of the state government, is commonly considered to be a reasonable indicator to reflect the governance capability (Cerbu et al., 2011). More stability often means greater possibilities for REDD+ projects, especially from international donors. However, the risk of corruption may damage the government efficiency, lessen emissions reduction, leading to a decrease in an investment in the REDD+ projects (Sheng et al., 2016).

There are significant differences in governance capabilities in different developing countries, which leads to differences in the

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level of achievement in forest conservation (Pfaff et al., 2014). The success of future REDD+ projects will depend more on governance capabilities than on technical issues (Lederer, 2012; Somorin et al., 2014; Vijge et al., 2016). The difference in the governance capabilities of those implementing policy impacts significantly on reducing emissions in the REDD+ projects, and those with a capacity for a high level of governance are more likely to achieve success in reducing emissions (Vijge et al., 2016). However, in the REDD+ projects, the governance capabilities of those responsible for decision making, just as with opportunity costs, is considered to be private information. The policy implementers, and donors, may have a different understanding of the governance capabilities of those carrying out decisions. At the same time, there are obvious differences in the targets of individual projects. The donors, as principals, hope to reduce emissions from deforestation and degradation and increase the co-benefits (such as biodiversity, community benefits, etc.) by the effective implementation of REDD+ projects (Potts et al., 2013), while the implementers, as agents, aim to maximize their benefits. Part of the benefits comes from logging revenue and the gains from Land Use Change (LUC) (Irawan et al., 2014), and the other gain originates from emission offsets due to forest conservation in REDD+ projects (Krasovskii et al., 2016).

Although there are hundreds of existing governance indicator datasets for international investors, donors of official development assistance, development analysts and academics (Christiane, 2006), the information of governance capability about specific REDD+ projects is still lacking (Gallemore and Jespersen, 2016). The donors of REDD+ projects often face a principal-agent issue of asymmetric information in that the countries or organizations they fund have private information about their preferences, resource endowments, and project success or failure (Rivera-Santos and Ruffin, 2010). Considering that principals lack information about the governance capabilities of agents in REDD+ projects, agents may well possess more information on their own governance capabilities than the principals. As a result, the information on the governance capabilities of agents available to principals may be inaccurate, creating asymmetric information between principals (donors) and agents (implementers). Principals cannot, in this case, accurately calculate the governance capabilities of agents, but still hope to achieve reduction in emissions and forest conservation. Agents with low levels of governance capabilities could obtain short-term gains by using their superiority in terms of information to provide misleading information on capacities which might result in the compensation payments not being high enough to incentivize those agents with high governance capabilities, i.e. so-called “moral hazard” (Vedel et al., 2015).

There is far less literature available for the effects of Reference Emission Levels (REL) on emissions from deforestation and degradation, and most is more focused on the issue of setting REL for REDD+ (Murdiyarso et al., 2012; Romijn et al., 2013). There is currently no standardized method for the determination of REL, and each country has some flexibility in calculating reference (Romijn et al., 2012). These flexibility means that each country can choose which historical period is considered and whether it is applicable for adjustment (Hargita et al., 2016). Thus, different REL setting may also impact emissions from deforestation and degradation. Higher REL may lead to more emissions and so endanger the effects of REDD+ projects. This paper attempts to verify the effects of REL on emissions from deforestation and degradation. In contrast to previous research, this paper presents an improved signaling model to reflect the impact of heterogeneous governance capabilities and REL on emissions in REDD+ projects.

The current literature indicates that asymmetric information or REL can affect the emissions from deforestation and degradation (Delacote et al., 2014; Skidmore et al., 2014). However, how the information on heterogeneous governance capabilities and REL

affects the reduction in emissions of REDD+ projects is still uncertain. In order to address this issue, this paper makes the following two contributions: (i) through two signaling models, theoretically analyzes the relationship between heterogeneous governance capabilities, REL and emissions from deforestation and degradation based on asymmetric information; (ii) uses the results of the UN-REDD Programme as a practical example to analyze the impacts of heterogeneous governance capabilities and REL on emissions.

The structure of the paper is as follows: Section 2 outlines the two signaling models, including REDD+ donors and implementers, to analyze the effects of heterogeneous governance capabilities and REL on emissions from deforestation and degradation; Section 3 presents the data and model specifications utilized to analyze the relationship between heterogeneous governance capabilities, REL and emissions by using the related panel data from 13 partner countries involved in the UN-REDD Programme during 2011–2015; Results and a discussion stemming from them are given in Section 4; This is followed by the conclusion in Section 5.

2. Signaling model for heterogeneous governance capabilities

2.1. The heterogeneous governance capabilities of agents

There are two types of stakeholders in REDD+ projects: implementers and donors. The implementers are mainly in developing, including the least developed, countries; donors are from the main industrialized countries (Dulal et al., 2012). There is often a contractual relationship of PES between implementers and donors, who are the principals and agents of the REDD+ projects respectively (Ferraro, 2008). The principals may come from private sector purchasers of REDD+ credits, or public-sector donors (McFarland, 2015). Following Delacote et al. (2014), the principals are assumed to achieve their welfare maximization, which could include net income, environmental benefits or social welfare. Agents can decide the optimal effort for reducing emissions according to available financial support from principals, while principals provide financial incentives to agents in the light of reductions in emissions. However, principals cannot accurately assess agents' behavior on the effort for reducing emissions (Delacote et al., 2014). Thus, there is information asymmetry between agents and principals. Principals and agents will make the most favorable behavior choice to maximize their own benefits under asymmetric information. The emissions from deforestation and degradation usually depend on the effort for reducing emissions (Arhin, 2014), governance capability (Vijge et al., 2016) and other socio-economic factors (Culas, 2012). Due to information asymmetry and other uncertainties, principals are unable to reach a conclusion as to how much the reductions in emissions are caused by the effort of agents.

The difference in governance capability can be categorized into two types: high governance capability and low governance capability, which can be represented by h and l respectively. Following Gürtler and Gürtler (2014), we assume that the type of governance capability applicable to an agent is private information, which cannot be accessed by the principal. However, the prior probabilities of high and low governance capabilities are known by principal, which are designated p and $1-p$ respectively. Due to the information asymmetry between principal and agent, the agent needs to send a signal to the principal, so that the type of agent's governance capability can be effectively identified by the principal who will then provide compensation payments to the agent according to the reduction in emissions in the REDD+ project. The reduction in emissions can, therefore, be regarded as a signal from the agent.

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