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Enforcing the rules in timber concessions: Performance bonding in the presence of corruption risk

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ABSTRACT

Performance bonding is a common method to enforce logging standards and timber contract rules, yet their applications in tropical concessions are still uncommon, with prohibitively high cost of capital, imperfect enforcement, risk of corruption, and long payback periods cited as reasons. In the face of these factors, we derive conditions for a feasible bond scheme and the amount of additional insurance a landowner can ask from a harvester in the form of a higher than strictly needed bond payment. We then determine the effect of confiscation risk on the feasibility of bond schemes, with this risk stemming from the presence of a corrupt inspector and taking the form of either collusive or non-collusive corruption. We show that confiscation risk can seriously limit the range of possible bond payments and the effects differ between the corruption types. An empirical example evaluates these results in the context of enforcement of reduced impact logging techniques in tropical concession management. The results will help governments better apply bond schemes and in particular adjust them in the presence of risks and external constraints.

1. Introduction

Unregulated logging practices have historically contributed to deforestation and forest degradation, depletion of soils, impairment of water quality, and losses in wildlife habitats and biodiversity. While some governments have adopted Forest Practices Acts and various types of environmental regulations to enhance the sustainability of forest management and extraction there still remain vast areas, especially in the tropics, where harvesters continue to use environmentally detrimental logging methods and technologies. While much progress has been made in reducing the negative environmental effects of harvesting, the question of how to enforce logging standards continues to be a critical challenge, especially in environments characterized by institutional shortcomings such as corruption and lack of enforcement resources (Blaser et al., 2011; Finer et al., 2014; Lambin et al., 2014; Brandt et al., 2016).

An important case where logging standards prove critical to the environment is with concession harvesting, where governments grant a temporary right to a private firm to harvest timber under an expectation that the firm uses practices which mitigate environmental damages (Gray, 2002; Karsenty et al., 2008). One of the most important type of logging standard in tropical developing country concessions is reduced impact logging (RIL) (Holmes, 2015). These techniques reduce residual stand damages and logging waste and have been actively researched for at least three decades (Putz et al., 2008; Pinard and Putz, 1996; Putz et al., 2000; Sist et al., 1998). Although the literature provides mixed evidence on the relative profitability of RIL over conventional logging practices, it has been shown that voluntary adoption of RIL by harvesters does not generally occur (Medjibe and Putz, 2012). Boltz et al. (2003) for example finds that RIL techniques incur much higher opportunity costs than conventional logging, while Holmes et al. (2002) point out that investing in only certain components of RIL is profitable.

One promising and relatively new way to ensure RIL use in tropical concessions is through performance bonding, where harvesters are required to pay a bond that is returned only when the bond holder (government) is assured that RIL methods have been followed (Howard et al., 2001; Fraser, 2002). Boscolo and Vincent (2000) and more recently Macpherson et al. (2010) investigate the effectiveness of these schemes and renewability audits in industrial forest concessions using simulation studies. Both suggest that performance bonding can successfully encourage RIL practices in a range of forest management settings.

In developed countries, performance bonding has frequently been employed to enforce concession RIL standards (Howard et al., 2001;

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Kuusela and Amacher, 2016). Bonds have also received attention for developing country tropical timber concessions either as a way to complement or replace royalties for governments seeking to both capture rents, or to ensure harvesters follow concessions rules (Paris et al., 1994; Boscolo and Vincent, 2000; Leruth et al., 2001; Macpherson et al., 2010; Ruzicka, 2010). Fraser (2002) suggests that bonds targeting RIL retain some financial means to compensate poorer governments should environmental damages occur. Recently, Kuusela and Amacher (2016) point out how bonds encourage socially beneficial actions while penalizing negative ones. Others have argued that bonds furthermore provide insurance against contract violations and environmental damages in settings where proper enforcement is too costly for developing country governments (Costanza and Perrings, 1990; Fraser, 2002; Mathis and Baker, 2002). This said, while there have been actual experiments with performance bonds in tropical timber concessions, the policy outcomes have been generally disappointing. One probable cause for these failures may have been lower than optimal bond payments (Anderson, 2002; Coria and Sterner, 2011).[1] This has prompted recent calls for further study of bond mechanisms in order to overcome these problems (Ruzicka, 2010; Nasi et al., 2011).

Surprisingly, the economics literature has not addressed the choice of the correct bond payment. This is a critical question. If the bond level is set too low, then it may fail to deliver expected compliance with terms of the concessions contract. A level that is set too high will overburden harvesters up to a point where entry costs become prohibitive (Fraser, 2002). We also have almost no understanding of how bonds should be designed under the realities that developing countries face, such as corruption and the high cost of capital.

Our purpose in this paper is to examine the design of performance bonding for developing country forest concessions, but we assume enforcement is not perfect because of corruption risk; it is well known that corruption is omnipresent in these situations (e.g., see Smith et al., 2003, Sundström, 2016, Contreras-Hermosilla, 2000, Amacher et al., 2012). Such an exploration is currently missing in the literature, which may be one of the reasons why performance bonds still remain underutilized as an enforcement mechanism in tropical concessions. We show that a bond scheme is susceptible to failure in such an environment because it essentially gives more power to corrupt officials to extract rents. Using a simple enforcement model, we obtain novel analytical results with respect to the conditions that need to be satisfied for a bond scheme to become feasible with and without corruption. We also determine the highest bond levels that a government can ask from the harvester while still guaranteeing the harvester's participation. Given the analytical results, we then provide an empirical examination of RIL enforcement problem in the presence of corruption risk.

We allow for two types of corruption scenarios. Corruption can be collusive or non-collusive meaning, respectively, that the harvester and a government inspector can potentially cooperate, or not, to produce false reports. The distinction between these two types has been discussed and documented in several studies (Shleifer and Vishny, 1993; Bardhan, 1997, 2006; Foellmi and Oechslin, 2007). An example of non-collusive corruption is when a government official demands for a bribe for approving a harvesting permit or a license. Such a bribe presents an additional cost to the firms over the usual costs of operations. In the case of performance bonds, a government official may demand a bribe in exchange for a fast release of the bond, even when all the requirements for its release have been already met. An example of collusive corruption is when the government official offers to forgo the enforcement of laws or contract rules in exchange for a bribe. For example, the harvester and the government inspector can collude to produce a false report on the actual compliance with RIL rules and then share the profits from not complying with the concession rules. Smith et al. (2003) documents the presence of both types of corruption – collusive and non-collusive – in concession harvesting in Indonesia, while Alemagi and Kozak (2010) find similar evidence in Cameroon, and McElwee (2004) in Vietnam.

Our results shed light as to why previous bond schemes may have failed and how these problems may be ameliorated in the context of RIL methods in tropical forest concessions. To achieve this, our enforcement model incorporates two critical features: 1) enforcement risk in the form of collusive and non-collusive corruption, and 2) the harvester's participation constraint. The presence of participation constraint is caused by “thin” financial markets and high cost of capital which may prevent especially small scale concessionaires from obtaining credit (Simula et al., 2002; Canby and Raditz, 2005; Pescott et al., 2010; Grossheim, 2011). This confounds a government setting a high enough bond deposit that will incentivize compliance with any given harvesting standard. Low enforcement has been frequently identified as one of the most problematic features of tropical timber concessions (Callister, 1999; Hardner and Rice, 2000; Contreras-Hermosilla, 2000; Amacher et al., 2012). Obstacles to enforcement can be multifold, such as lack of resources, vast spatial scales, corrupt officials, and inefficient judicial systems, which partly stem from unpredictable institutional and political environment common in many of the tropical countries (Ross, 2001; Kuusela and Amacher, 2015). For example, Merry and Amacher (2005) predict that Brazilian loggers would be highly suspicious of bonding schemes due to distrust of public institutions.

Our work is most closely related to three studies of concession design. First, Amacher et al. (2012) examine royalty and concession size choices under the possibility of a corrupt inspector, showing that corruption has significant effects and that concession area and royalties are potential instruments to ameliorate the problem. Unlike their study, we focus on the impact of corruption risk on the design of a performance bond instrument and we furthermore distinguish between collusive and non-collusive corruption.[2] Second, our work is different than Boscolo and Vincent (2000) and Macpherson et al. (2010). Boscolo and Vincent (2000) derive the required performance bonds payments under sequential and repeated harvesting policy scenarios and examine how interactions between royalties, performance bonds, and contract renewability influence the required bond payment. They find that renewal conditionality provides a strong incentive to adopt RIL under sequential harvesting scenario, making performance bonds effectively redundant. However, unlike our work their analysis assumes perfect enforcement. Macpherson et al. (2010) introduce imperfect enforcement into a similar type of concession optimization model. In their model, the concession harvester faces a risk of getting caught from non-compliance with the contract rules, with penalties involving fines and possibility of non-renewal of concession contract. However, they assume that the government is able to perfectly observe the level of compliance with RIL rules needed for the release of the performance bond. In our model, corruption risk specifically impinges on the government's ability to detect non-compliance with the contract rules that lead to the release of the bond payment, and we are able to consider impacts of both collusive and non-collusive corruption risk on the compliance decision and the design of the bond instrument together with the maximum additional insurance the government may be able to ask for.

The plan of the paper is as follows. The next section presents a model of perfect enforcement. Section 3 analyses the impact of corruption risk. Section 4 provides an empirical study of bonding schemes in enforcing compliance with RIL standards. Finally, the last section

[1] The Philippines and Malaysia previously experimented performance bonding in forest concession bonds, but these failed given that harvesters forfeited their bonds without implementing the required reduced impact harvesting methods (Anderson, 2002; Coria and Sterner, 2011). Similarly, performance bonding experiments in Indonesia failed in the early 1990's due to too low bond payments and suspicions of corruption (Ross, 2001; Barr et al., 2010).

[2] The topic of corruption and performance bonding has been discussed in the context of constructing industry (Deng et al., 2003).