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The role of political-industry nexus in promoting illegal extraction of mineral resources and deforestation: A case of iron ore mining in Goa

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ABSTRACT

Mining of mineral resources entails significant deforestation in developing countries. The large financial rewards associated with mining create corrupt linkages between the government regulators and mining industry, often resulting in illegal extraction of minerals in environmentally sensitive areas. We develop a model of political-industry corrupted relationship to explore the problem of illegal mining of iron ore and its impact on deforestation in Goa, India. For the regulator, the decision to allow illegal extraction and relaxation from environmental remediation requirement is made with the objective of accumulating illegal wealth while simultaneously mitigating the risks of political ouster and conviction. Results suggest that several factors, such as the relative risks of political survival and conviction, the degree of impatience displayed by the regulator as well as the contribution of the mining sector to the economy, play a role in influencing the extent of illegal mining activity. When the regulator faces a low risk of political ouster, an increase in conviction risk may not provide enough deterrence to illegal mining, resulting in high levels of deforestation.

1. Introduction

While mining of earth's mineral resources provides economic benefits to the society, it also causes significant environmental degradation, directly as well as indirectly. For instance, while gold mining in Guyana supports more than 10,000 small and medium businesses, it is also the largest driver of deforestation in the country. In 2009, about 9000 ha of forest area loss was directly attributed to mining related activities in Guyana (Lowe, 2014). Similarly, it has been estimated that extracting a year's supply of coal for domestic consumption in the US leads to a degradation in the quality of 2300 km of water streams and destroys ecosystems with enough carbon sequestration potential to offset emissions of 33000 homes (Lutz et al., 2013). The indirect effects of mining manifest through the auxiliary industrial activities, urbanization and land use changes in the vicinity of mineral rich regions. The presence of large deposits of coal reserves in the Singrauli district of Madhya Pradesh in India has resulted in significant forest cover loss and land use changes (Areendran et al., 2013). In Singrauli, during the period 1978–2010, about 365 km^2 of the original 773 km^2 of dense forests (i.e. forests with a canopy cover of 40% or more) were degraded into open forests (which have a canopy cover between 10% and 40%), and an additional 165 km^2 and 16 km^2 of dense forests got converted in scrublands and farmlands, respectively (Areendran et al., 2013).

Very often, economic forces such as high mineral prices can exacerbate the incentive to mine unsustainably. In Madre de Dois, Peru, the annual rate of gold mining related deforestation in the past decade has increased non-linearly, even with a constant rate of increase in international gold prices (Swenson et al., 2011). Between 2003 and 2009, the price of gold increased at an annual rate of 18%, whereas, the mining driven deforestation in Peru increased from 292 ha/yr between 2003 and 2006 to 1915 ha/yr between 2006 and 2009. There also appears to exist some spatial correlation across biodiversity protected areas and the presence of mineral ore deposits, as about 14% of the world's protected regions hold mines within their vicinities (Duran et al., 2013). This correlation has been attributed to a policy bias towards creation of protected regions in high altitude topographical areas and away from locations with significant economic activities. Coincidently, some of the world's main metal deposits are found in similar high altitude and complex topographical regions (Edwards and Atkinson, 1986).

In addition to the mining led destruction of their forests and ecosystems, economies rich in mineral resources (such as Nigeria, Papua New Guniea, Saudi Arabia, etc.) have also faced the 'resource curse' challenge (Auty, 1993; Hilson and Laing, 2016). The resource curse idea is based upon the empirical observation that resource-rich countries (those with a high share of natural resource based exports in their national incomes) have performed substantially worse than their resource-poor counterparts in terms of economic growth. The inability of the resource-rich countries to gainfully utilize the natural resource generated incomes towards promoting economic development has been

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primarily attributed to their institutional shortcomings. A sudden surge in resource led revenues promotes corruption and rent-seeking behaviour, which, coupled with inefficient bureaucracy hampers economic progress (Sachs and Warner, 1995). Further, an increase in the export of natural resources puts other export oriented domestic industries at a disadvantages through causing an appreciation of the domestic currency.

In the above context of the various challenges generated through mineral resource exploitation, their illegal extraction creates further complications, as it not only exacerbates the environmental degradation problem (through unauthorised deforestation) but also hampers economic development through a leakage of precious revenues (Banchirigah, 2008; Lahiri-Dutt, 2007; Schueler et al., 2011). The large profits generated in the mining industry create a corrupted relationship between the government regulators, who are entrusted with the task of allocating mining rights, and the mining firms. The Western Ghats region in India is one such example of a biodiversity region that is characterized by large-scale illegal mining, high levels of environmental degradation and the presence of a corrupted relationship between politicians and the mining firms (Ghosh, 2012; Jha et al., 2000; Ministry of Environment and Forests, 2013; Panigrahy et al., 2010; Padma, 2013). Illegal mining has also deprived the local state government of the much-needed revenues. A supreme court appointed Commission reported that illegal mining in Goa, in the period 2007–2012, had led to a loss of 35,000 crore INR (which is roughly 5 Billion USD) to the state government. It also pointed to the presence of a large-scale illegal nexus between several state ministers and the mining firms (Ministry of Mines, 2014). In 2017, a special investigation team in Goa, arrested a local businessman who was charged with illegally extracting iron ores worth 2 lakh tonnes between 2007 and 2012. The businessman was alleged to have the support of the former chief minister of the state, who has been separately charged with mining related fraud (Times of India, 2017b). The presence of a corrupted relationship between regulators and polluting industries is a global phenomenon, which is not confined to the developing world only (Oates and Portney, 2003). For instance, between 2010 and 2015, mining companies were found to have paid more than 2 million dollars to various politicians at local and federal levels in Australia in order to gain approval for mining gas, coal and sand in Queensland (Aulby and Ogge, 2016).

The key reason behind the existence of such an illegal nexus is that preserving the environment requires curtailing the existing patterns of environmentally polluting economic activities, which puts the interests of the environment at loggerheads with those of commerce and trade. In this context, the political economy of environmental decision making, such as those concerning the regulation of polluting industries or allowing oil exploration in biodiversity protected areas, has been a subject of extensive research in the past (Becker, 1983). The key insight from this body of literature is that governments propose and enact policy measures that suit the interests of various industries or lobby groups in order to receive political or other forms of in-kind support (Ekins and Speck, 1999; Grossman and Helpman, 1994). The objective of the government is to increase its chances of getting elected, or if already in power, to promote its future political interests. Environmentally polluting economic activities, therefore, are sustained through political support. The polluting firms, in return, provide monetary and political contributions to the policy makers and their political parties (Smith et al., 2003a, 2003b; Ross, 2012; Gibson et al., 2005; Oates and Portney, 2003; Grossman and Helpman, 1994). Stratmann (1991) analysed contributions (totalling 177 million USD) made by political action committees representing various agricultural groups (such as dairy, peanut, sugar, etc.) in the US during the 1987–88 elections and found that such contributions had an important role to play in the voting behaviour of the congressmen.

The policy maker returns the favor to the interest groups through enacting rules benefitting them, or imposes lax environmental regulations and allows under-reporting of environmental degradation. Magat et al. (1986) found that while setting industry standards over removal of total suspended solids and biological oxygen demand, the US environmental protection agency (EPA) had different expenditure requirements for different industries. These requirements were not based upon economic efficiency criteria or the impact such standards had on the industry's outputs and employments, but purely on the strength of the trade associations that were representing those industries. However, more recent empirical evidence also suggests that public policies often tend to balance the interests of various industry groups with the larger societal welfare considerations (Hird, 1990). For instance, the superfund program was started in the US in 1980 to allocate funds towards the identification and clean-up of hazardous sites. There were allegations that the EPA selected sites influenced by congressmen's needs of catering to their particular constituents. However, Hird (1990) used data associated with the selection of hazardous sites, the speed of clean-up, and measures of congressional influence along with variables that would indicate acting in public interest, to conclude that the EPA acted fairly independently in the selection of sites and was more influenced by public interest motives than congressional 'distributive politics'.

In the context of illegal exploitation of mineral resources in developing economies, the crucial challenge is to understand the key drivers of the corrupted relationship between the regulators and the mining industry and to predict the implications that could arise for the environment if the same were to continue into the future. Despite the significance of the problem, the political economy aspect of illegal mining within the biodiversity regions of developing economies is a topic that has remained inadequately addressed in the literature. Keeping this gap in mind, the objective of this paper is to explore the role of political incentives at the regulatory level in promoting the illegal exploitation of mineral resources and allowing deforestation through enforcing lax remediation requirements.

We develop a dynamic optimization model of the regulator's objective function that has illegal wealth accumulation as its key argument. The regulator optimizes over allowing the extent of illegal extraction keeping in mind the proven reserves of the mineral ore and its economic value. The mining firm bargains with the regulator over profit sharing resulting through the illegal extraction as well as seeks relaxation in environmental remediation requirements. The higher the relaxation granted, the more is the illegal payment received by the regulator. The significance of mining related deforestation in influencing the political survival chances of the regulator, as well as the role of political survival in protecting the regulator from conviction are also incorporated in the model. Key insights are derived using the context of illegal iron ore mining in the state of Goa.

2. Model

This section presents the model background and the equations. It further sets up the dynamic optimization problem and derives optimality conditions.

2.1. Background

The model presented in this paper uses the case of iron ore mining in Goa as an example. In order to keep the model tractable, we abstract away from the real world scenario in a number of ways. First, we pick a single representative regulator and a single representative firm. All legal and illegal transactions are assumed to go through these two representative agents. Second, it is assumed that all illegal mining activities occur with the direct approval and knowledge of the regulator. Third, the level of legal licenses to be granted per year is fixed through a legal framework, which the state regulator has little power to alter. This has indeed been the case, as the ministry of environment and forests (MoEF) as well as the supreme court of India have, on separate occasions in the past, suspended mining licenses in the state citing the presence of environmental or financial irregularities (Banerjee, 2014).