



# Resource management under endogenous risk of expropriation<sup>☆</sup>



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## ABSTRACT

This paper explores how the dynamic management of a non-renewable resource is affected by an endogenous (i.e., mitigable) risk of expropriation. The time at risk increases with the value of the resource in the ground and decreases with the cost of expropriating the resource. When the risk of expropriation is internalized by the legitimate owner, in the absence of capacity constraints, the resource is depleted faster than it is socially optimal. Interestingly, a marginal improvement in the protection of property rights exacerbates the over-extraction of the resource. In the presence of endogenous capacity constraints, and when property rights are imperfectly protected, both under- and over-extraction are possible. If property rights are relatively strong the resource owner under-invests in extraction capacity and depletes the resource below the socially optimal rate. If property rights are relatively weak the owner over-invests and the resource is over-extracted.

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## 1. Introduction

It is a well-known economic principle that the appropriate definition and enforcement of property rights is a necessary condition for efficiency. However, in many economic environments property rights are inadequately protected. For instance, in the oil and gas industry, the relationship between multinational firms and governments has been characterized by the persistence of weakly protected property rights.

In recent years, the commodity super-cycle and the political environment in Latin America, home of about one fifth of the world's oil reserves (BP, 2015), brought expropriations in the oil and gas industry—also known as resource nationalism—back to the headlines. Among the Latin American governments, Venezuela's has been portrayed as one of the most salient trespassers of private property.<sup>1</sup> An example of this, in the oil and gas industry, is the nationalization of ConocoPhillips and Exxon Mobil's operations, ordered by Hugo Chavez in 2007. ConocoPhillips' recount states that on June 11th, 2007—nine days before the nationalization was executed—the company declined the, allegedly unfair, compensation offered by the Venezuelan gov-

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<sup>1</sup> This is well reflected in Venezuela's dismal Ease of Doing Business rank for 2016, 186 out 189 (World Bank, 2016).

ernment in exchange for its local operations. Upon the company's refusal to accept this deal, the government proceeded to inform that "the nationalization process was nonnegotiable and would move forward on the government's terms, with or without ConocoPhillips" (ICSID, 2013, p. 128). The International Centre for Settlement of Investment Disputes (ICSID) tribunal, arbitrating the case between ConocoPhillips and the Venezuelan government, ruled that the government "breached its obligation to negotiate in good faith for compensation for its taking of the ConocoPhillips assets" (ICSID, 2013, p. 131).

More recently, in April 2012, the Argentine government of Cristina Fernandez announced the seizure of 90% of Repsol's stake in YPF, a move to re-nationalize this oil and gas company (Forbes, 2012, April 17, 2013). At the time of the expropriation, Argentina faced an energy crisis, caused by a strict capping of energy prices, which significantly undermined the incentives to invest in the sector while increasing the demand for energy. Paradoxically, the government justified the expropriation of Repsol's assets on the grounds that Repsol's lack of investment was a main contributor to Argentina's trade deficit in fuel (Costamagna et al., 2015; Melgarejo et al., 2013). In the midst of the energy crisis, the expropriation of Repsol's YPF stake occurred only a few months after Repsol's announcement of the discovery of the Vaca Muerta basin; "[Vaca Muerta] is estimated to hold 16 billion barrels of shale oil and 308 trillion cubic feet (8.7 trillion cubic metres) of shale gas, which would give Argentina the world's fourth-largest reserves of shale oil and second-largest of shale gas." (The Economist, 2013, June 27, 2013). The discovery of Vaca Muerta presented itself as an obvious opportunity for the cash-strapped Argentine government to reach the goal of energy independence, and put YPF's re-nationalization under a thick cloud of suspicion.

These expropriations not only occurred at a time of high commodity prices; but, they also were carried out by governments with at best moderate constraints, from the legislature, to take action against private interests.<sup>2</sup> In the case of Venezuela, the lack of constraints on the executive occurred because the executive enjoyed special powers; while in Argentina, the parliament was largely controlled by the government's party. In other words, these expropriations occurred under what appeared to be favorable circumstances for the expropriator. Specifically, they took place in a context of: (i) increased value of the assets to be seized, because of the higher oil prices and the unexpectedly large size of the newly found basin; and, (ii) low cost of expropriation, because of the lack of political constraints on the executive.

These observations reveal the importance of incorporating the expropriation decisions as endogenous outcomes of a cost-benefit analysis in the study of resource management problems. The case for the economic motives behind expropriations is not only an intuitive or anecdotal one. Guriev et al. (2011) and Stroebel and van Benthem (2013) further substantiate this line of reasoning with evidence from nationalizations occurring after the 1960s. Both of these studies find that nationalizations in the oil sector have a higher probability of occurring when oil prices are high and in countries with low constraints on the executive.

This paper contributes to the literature on the dynamic management of a non-renewable resources by incorporating the notion that the decision to expropriate follows a cost-benefit analysis, and by exploring the effect of the endogenous risk of expropriation resulting from this decision making process. The theoretical analysis presented here rests on two main elements. First, it is assumed that expropriations only occur if the benefits of doing so outweigh the cost of expropriation. Second, the endogenous nature of the risk of expropriation is internalized by the resource owner. A direct implication of the combination of these elements is that the risk of expropriation vanishes endogenously in finite time when the stock of the resource reaches a certain threshold. If the owner is aware that the resource is at risk of being expropriated, her effective discount rate is higher than it would have been in the absence of the risk; as a consequence the resource is over-exploited. More interestingly, if on top of recognizing that there is a risk of expropriation the owner actually internalizes that this risk is endogenous, the over-exploitation of the resource is exacerbated: by reducing the size of the available stock the owner is protecting her property rights over the resource left in the ground.

From a broader perspective, this theoretical framework allows for a systematic analysis of the extraction of a non-renewable resource for the whole range of intermediate property rights regimes in between the two extremes commonly explored in the literature: perfectly protected property rights and fully exogenous risk of expropriation. From this analysis one can infer the effect of strengthening the property rights protection on the depletion of a non-renewable resource. When the risk of expropriation is treated as exogenous, it induces a higher effective discount rate, which in turn leads to the over-extraction of the resource relative what would be extracted under perfect property rights protection (e.g., Bohn and Deacon, 2000; Long, 1975; Sinn, 2008). Interestingly, when the risk of expropriation is endogenous, marginally improving the protection of property rights (i.e., a marginal increase in the cost of expropriation) exacerbates the over-extraction problem. However, from the viewpoint of the resource owner, an improvement in the strength of property rights protection unambiguously increases the value of the resource in the ground.

Taking into account that complementary capital investments (e.g., demulsification and storage facilities) are needed to build-up a well's extraction capacity, the theoretical analysis is extended to allow for endogenous extraction capacity. Under endogenous capacity constraints, the risk of expropriation can be (strategically) internalized in one of two opposite ways. The owner can opt for reducing the value of the well, and the incentives to confiscate it, by running down the stock; this is achieved by installing extraction capacity above the efficient level. Alternatively, the resource owner may reduce the well's value by under-investing in the well's extraction capacity. Evidently, each of these two alternatives comes at a cost for the owner. Over-investing in extraction capacity is costly in the short run because of the higher installation costs,

<sup>2</sup> Another common characteristic is that the compensation offers, appear to have been well below the market value of the seized assets. For example, in November 2013 the Argentine government offered \$5 billion for, the reportedly \$10 billion worth, Repsol's stake in YPF.

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