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## **THE GREEN PARADOX AND THE CAPACITY BUILDING DECISION**

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### **OVERVIEW**

A vast literature dealing with the extraction of a non-renewable resource applies the framework put forward by [4]. The focus of this literature, however, undertook an important change: while a larger number of papers that emerged during the 1970s focus on the resource scarcity problem, various recent papers deal with the topical issue of climate change. [5]’s discovery of the Green Paradox epitomizes these research efforts; recent papers including [2], [6] and [7] seize on this idea of the Green Paradox.

[5] is concerned with a resource extraction decision of carbon resource owners that are confronted with carbon taxes that increase over time - a plausible assumption, given the increasing immediacy of the climate change problem. [5] shows that a consequence of this increasing tax rate is a faster rather than a slower extraction of the carbon resource, with obvious negative consequences for the global climate. A prerequisite for this bringing forward of extraction, naturally, is that the extraction capacity is sufficiently large. This issue is, however, widely neglected in this resource extraction literature - the papers by [2] as well as [3] form notable exceptions in this regard.

### **METHODS**

The paper further develops [5]’s resource extraction model by adding an endogenous capacity building decision. [5]’s model is based on the principles of dynamic optimization and optimal intertemporal allocation of scarce resources.

### **RESULTS**

The extension leads to a two-part optimal extraction path. During the first part the extraction capacity is build and extraction is increasing over time until extraction peaks. In the second part the regular decreasing Hotelling extraction path applies. Therefore, costly over-capacities will be reduced. In consequence, a U-shaped price- and an inverse U-shaped extraction path emerges - a feature found in various theoretical as well as empirical papers. [5]’s model yields a “traditional” Hotelling-extraction path that continuously decreases over time.

This paper is concerned with the question how this capacity building decision depends on the growth rate of the carbon tax. The model suggests that the specification of the capacity building cost function is crucial. In particular, whether or not a Green Paradox arises depends on the increase of the marginal capacity building cost for an optimally chosen level of capacity. In other words, a Green Paradox does only arise if demand is sufficiently elastic and the industry is sufficiently immature which implies that capacity changes are sufficiently large. Thus, it is most likely that the taxation has the desired effect.

### **CONCLUSIONS**

In a nutshell, considering a capacity building decision clearly affects the results obtained by [5]. Sinn’s contribution, however, is of particular importance as it, first, deals with a topical issue, and, second, sparked considerable research efforts. As asserted above, this literature does not consider the capacity building decision. The results of this paper indicate that the

capacity building decision needs to be included in further developments of this literature in order to maintain its validity for the derivation of policy recommendations.

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