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LEMMA
Laboratoire d'économie mathématique et de microéconomie appliquée

SÉMINAIRE

VERTICAL STRUCTURE, RESOURCE SCARCITY, AND DYNAMIC EXPLOITATION OF RENEWABLE RESOURCES - LUCA COLOMBO

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Abstract:

In this paper, we examine how vertical structure affects the dynamic exploitation of renewable resources. We develop a continuous-time model of a vertically related industry in which an upstream resource owner supplies access to a renewable resource stock and a downstream firm harvests and processes the resource for final consumers. We compare a decentralized supply chain, characterized by a Feedback Stackelberg Equilibrium, with a vertically integrated structure that jointly determines harvesting.

Resource dynamics alter the standard effects of vertical integration. Because current extraction affects future stock availability,

organizational form influences the shadow value of the resource and firms' intertemporal harvesting incentives. We show that, when the resource stock is sufficiently scarce, vertical integration can lead to lower extraction and higher consumer prices than decentralization, so that the conventional double-marginalization argument need not apply. We also show that the decentralized structure always supports a larger steady-state resource stock.

The welfare effects of vertical integration are state dependent. While vertical integration is welfare-superior in the long run, decentralization can generate higher short-run and discounted welfare when the resource stock is sufficiently depleted. These findings highlight the importance of incorporating resource dynamics into the evaluation of vertical arrangements and competition policy in renewable-resource industries.

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