

Optimal Growth under Decoupling Capital Accumulation and Depletion

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Abstract

This study studies the role of a non-renewable on long run economic growth when the capital accumulation and depletion dynamics separate from each other in the long run. In that respect, the study contributes to the optimal resource depletion literature, initiated by the seminal works by Hotelling (1931) and Dasgupta and Heal (1974), by rigorously showing that the weakening dependence of capital to energy may easily overcome sustainability concerns. The first contribution of this work is the full explicit solution of all the model in terms of initial values and parameters. Hence, the work presents the full optimal paths of the non-renewable, consumption and capital stock. The second contribution is its highlight of the difference between the rental rate of capital and real interest rate on the model and to show that the price of the nonrenewable converges to a constant in an augmented AK setup. Third, the model allows for comparative dynamics, which can be rarely done in optimal depletion models. In particular, the model examines the role of population growth (positive and zero) on optimal depletion and economic growth.

Keywords: Non-renewables, Resource depletion, Hotelling's rule, The Augmented-AK model

JEL Codes: O40, O41, Q30, Q32