

Firm growth by product innovation in the presence of product life cycle

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Abstract

In this paper, we present a model which enables us to look into the process of R&D for product innovation in the presence of product life cycle and the resultant firm or economic growth. Specifically, we describe R&D for product innovation as an activity to control the birth rate of a new product, which measures the probability of product innovation, derive the optimal birth rate of a new product, which determines the size of R&D expenditure and examine the growth rate of the (representative) firm('s expected total revenue) along the optimal R&D plan. We then find that the growth rate of the firm converges to the optimal birth rate of a new product in the long run. Furthermore, we allow for population changes in this context and examine the effects of population changes. Consequently, we confirm that the growth rate of population affect positively the optimal birth rate of a new product and the long run growth rate of the firm. Finally, we verify that the growth rate of the firm may be positive even if the growth rate of population is negative unless it is less than some negative threshold value.

JEL Classification: J11; O31; O32; O41

Keywords: Firm growth; Optimal birth rate of products; Product innovation; Product life cycle

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