

# OPTIMAL R&D POLICIES UNDER PROCESS AND PRODUCT R&D

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## Abstract

*This study explores governments' optimal R&D policies when firms invest in both process and product R&D, simultaneously. The previous empirical works show that usually firms conduct both product R&D and process R&D at the same instance rather than only one of them. However, in the previous theoretical papers such as Rosenkranz (1995), Bonnano and Haworth (1998), and Bacchiega, Lambertini and Mantovaini (2011), among others, a few studies took into account both R&Ds. Even in these studies, they do not consider endogenous choice of governments' optimal R&D policies. To deal with this question, we consider following model. The world is composed of two countries with export firms and one import country in which only consumers exist. These export firms compete in quantity and price. The game consists of three stages. In the first stage, the governments of both export countries determine their optimal R&D policies. In the second stage, the firms determine their qualities and the fraction of process and product R&D. In this second stage, the following two cases are considered. The first case is that the firms endogenously determine their product quality and cost. The second case is that they endogenously decide both quality, cost and the fraction of process and product R&D, simultaneously. In the third stage, the firms compete in quantity or price in the third country. Under this framework, we show that the governments have incentives to subsidize their domestic firms' R&D investment irrespective of the proportion of process and product R&D. We also show that this result is maintained under both Cournot and Bertrand competition.*

**Keywords:** product R&D, process R&D, government's optimal R&D policy.