

# Experimentation and Learning in R&D Competition

Heidrun C. Hoppe-Wewetzer and Georgios Katsenos\*

25.05.2011

## Abstract

We analyze the effects of competition upon R&D experimentation and learning, using a stopping game in which the players face uncertainty about the distribution of their potential payoffs. The decision to remain in the game offers the players the opportunity, first, to enhance their payoffs, and second, to acquire information about their distribution. Assuming that the players can observe one another's experimentation results, we construct equilibria in which the players remain in the game until their beliefs about the additional value of experimentation become too pessimistic. The timing of their exit and, consequently, the total amount of experimentation depend on the intensity of the players' competition. When the two players can stop, in total, only one time, so that the first player to stop destroys the possibility of additional value, preemption incentives lead to shorter than optimal experimentation; surprisingly, a player is not willing to experiment longer when his opponent's stopping value is lower and, therefore, his preemption incentives are weaker. On the contrary, if each player can stop once, the player remaining longer in the game engages in excessive, compared to the socially optimal outcome, experimentation. Finally, when the competition between the players is eliminated, by placing no constraint upon the number of times a player can stop, the total amount of experimentation is optimal.

**Keywords:** R&D competition, stopping game, experimentation, learning, preemption, multi-armed bandit problem.

**JEL Classification:** D83, O31.

---

\*Hoppe-Wewetzer, Katsenos: Leibniz University of Hannover, Department of Economics.  
*Email Address:* hoppe@mik.uni-hannover.de, katsenos@mik.uni-hannover.de.