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The Impact of Lead Time on Capital Investments

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Abstract

We study equilibrium investment strategies of firms competing in stochastic dynamic market settings and facing two types of investment structures: investment with significant lead time (or time-to-build) and investment without (or minor) lead time. We investigate how investment behavior changes when investment is subject to time-to-build versus when it is not. We characterize equilibrium investment strategies under several information structures and compare results to the social optimum. We offer some new results. The model predicts that, controlling for demand, and production and investment costs, investments and outputs can be higher in progressive industries (which often exhibit time-to-build) than in fast-paced industries (where time-to-build is insignificant). Furthermore, for both investment types (investment with or without time-to-build) we offer a novel equilibrium in which firms incrementally invest. This behavior is driven by demand uncertainty and capacity constraints. Also, expected outputs are lower than Cournot outputs as firms face uncertainty. Moreover, the amount of uncertainty has different effects over investment types.

Key Words: Capacity Investment; Capacity Constraints; Progressive Industry; Fast-paced Industry; Demand uncertainty; Time-to-build; Markov perfect Equilibrium; Open-loop Equilibrium.

JEL Codes: C73; D92; E22; G31.

1 Introduction

Some capital investment projects can be completed with alternative production technologies. First, consider a market where firms run technologies which are highly capital intensive and firm invest-

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