

# Optimal Adoption of Complementary Technologies\*

Boyan Jovanovic  
New York University  
jovanovi@fasecon.econ.nyu.edu

Dmitriy Stolyarov  
University of Pennsylvania  
stolyar@econ.sas.upenn.edu

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## Abstract

When the costs of adjusting inputs are not convex, a firm will sometimes wish to adopt complementary technologies at different times. The conclusion is reinforced when it takes time to learn how to operate the technologies. Complementarities

- (a) cause less “bunching” of investment
- (b) translate into *intertemporal* complementarities in investment.

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## 1 Introduction

If a firm faces no costs of adjusting its production inputs, anything that induces it to adjust one input will generally induce it to adjust all its other inputs too. If two inputs are complements, the firm will adjust them in the same direction, at the same time. This is the conventional wisdom, and it has been applied to a diverse set of questions:

- (i) Milgrom and Roberts (1990) say that when a plant retools, or when a firm reorganizes, its complementary inputs will be readjusted at the same time.
- (ii) Kremer (1993) says that when different tasks are complements in production, plants will segregate on the basis of the qualities of all their inputs.
- (iii) Sheshinski and Weiss (1992) say that when two *products* are complements in the firm's profit function, their costly price changes will be synchronized.
- (iv) Cooper and Haltiwanger (1993) say that complementarity causes agents' actions to be positively correlated, and investment to be “bunched” at certain dates.

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