

A Markov Model of Perfect Competition under Uncertainty: Heterogeneous Firms and Technologies

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Summary

To capture the variety of real-life industries and their hystorical trajectories, the existing models of industry evolution employ firms that differ in some fundamental and measurable in practice characteristics like size, capital and labour productivity. To assess the impact of management on these dynamics, a number of production decisions have been treated by the models. Among them investment routines, learning regimes (in particular, search for innovations as well as imitation of the existing best practice), entry and exit rules.

Involving random variables, the models generate industry trajectories which are realizations of stochastic processes. Typically, the state of the industry at each time instant bears the seeds of its state in the next period. Consequently, the corresponding random process turns out to be Markovian. When the transition probabilities do not depend on time, one may find a long-run equilibrium of the industry using the averaging method.

In a situation with boundedly rational entry, the existence of a unique long-run equilibrium is proved for a variant of the stochastic model of industrial evolution introduced in Winter et al. (2003). The firms are heterogeneous in their labour and capital efficiencies as well as in their entry and investment rules. The equilibrium obtains as a rest point of a deterministic counterpart of the Markov process with time-homogeneous transition probabilities governing the dynamics of industry outputs. The predictions of the standard theory of perfect competition are compared with this structure. The extreme case of a vanishing flow of entrants is analyzed.

Key words: industrial evolution, perfect competition, market structure, sunk costs, entry, bounded rationality, aspiration level, Markov process, time homogeneous transition probability.

JEL classification: L11, O30, C60.