

The Role of Experience in Production and Investment Decisions and Its impact on Technological Change

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In this paper a multi-agent simulation model of a competitive market as a selection mechanism is developed. Price dynamics are modelled as a mean-reverting stochastic differential equation driven by Brownian noise. This defines the environment in which firms (the agents) operate and to which they then adapt through production and investment decisions. Aggregate learning at the level of a population of firms is studied and it is concluded that aggregate learning alone is insufficient to enable markets to act as a selection mechanism. Firms are then endowed with an adaptation mechanism in which quantity decisions are adjusted based on observed market prices. This induces some selection of firms by the market. The impact of agents experience regarding past price signals is then explored and how this impacts on the output decisions of firms and their ability to survive in the market. This is modelled in the form of a lagged integro-differential equation which captures the experience of entrepreneurs. It is demonstrated that experience provides firms with a selective advantage. Finally, technological innovation is introduced and the role it plays in reinforcing selection of firms by the market is explored. Innovation is modelled as a Poisson process with an investment dependent intensity function. Furthermore, innovations reduce the production costs of firms. An application of the model to economic policy is then provided by examining whether private or public financing of research and development increases or decreases the selective pressure of the market and what role agent experience plays in this.