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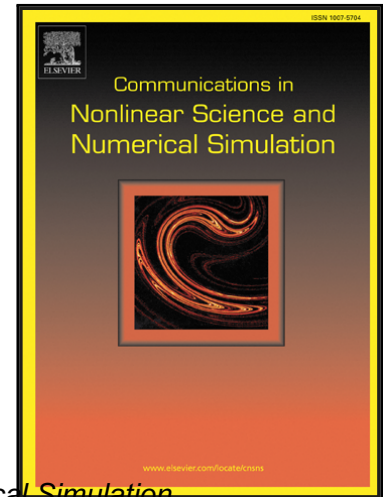
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Goodwin Accelerator Model Revisited with Fixed Time Delays*

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Abstract

Dynamics of Goodwin's accelerator business cycle model is reconsidered. The model is characterized by a nonlinear accelerator and an investment time delay. The role of the nonlinearity for the birth of persistent oscillations is fully discussed in the existing literature. On the other hand, not much of the role of the delay has yet been revealed. The purpose of this paper is to show that the delay really matters. In the original framework of Goodwin (1951), it is first demonstrated that there is a threshold value of the delay: limit cycles arise for smaller values than the threshold and so do sawtooth oscillations for larger values. In the extended framework in which a consumption or saving delay, in addition to the investment delay, is introduced, three main results are demonstrated under assumption of the identical length of investment and consumption delays. The dynamics with consumption delay is basically the same as that of the single delay model. Second, in the case of saving delay, the steady state can coexist with the stable and unstable limit cycles in the stable case. Third, in the unstable case, there is an interval of delay in which the limit cycle or the sawtooth oscillation emerges depending on the choice of the constant initial function.

Keywords: Investment delay, Nonlinear acceleration principle, Stability switch, Consumption delay, Limit cycle, Sawtooth oscillation

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