Oscillatory phase in an economic decision-making model

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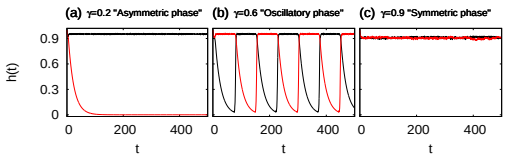
Competition is a main tenet of economics, where a perfectly competitive equilibrium is proven Pareto-efficient in the absence of externalities and public goods. Whether a product is selected in a market crucially relates to its competitiveness, but the selection in turn affects the landscape of competition. Such a feedback mechanism has been illustrated by the two-shop model [1], in which a customer's satisfaction is updated depending on the *freshness* of a purchased product. The probability for agent n to select shop i is assumed to be $p_{n,i} \propto e^{S_{n,i}/T}$, where $S_{n,i}$ is the agent's satisfaction and T is an effective temperature to introduce stochasticity. If T decreases below a critical point T_c, the system undergoes a phase transition from a symmetric phase to an asymmetric one, in which only one of the two shops is selected.
In this work, we extend the model by incorporating a simple price system. By considering a *greed factor* γ to control how the price depends on the freshness, we argue the existence of an oscillatory phase in addition to the symmetric and asymmetric ones in the (T, γ) plane, and estimate the phase boundaries through mean-field approximations. We confirm the analytic results numerically by measuring the average freshness of products as shown below.



[1] G. Lambert et al., J. Stat. Mech. P06005 (2011).