

Dynamic economic systems with time delays

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This lecture demonstrates how the presence of information delays affects the local asymptotical ability and global behavior of nonlinear dynamic systems. A cobweb model and a two-market model are used to illustrate the methodology. The cobweb model is locally asymptotically stable without delays, however if a single delay reaches a certain threshold, then stability is lost and it cannot be regained later. In the cases of two delays the stability switching curves can be analytically determined and verified by simulation. By fixing the length of one of the delays and gradually increasing the other, stability is lost at a certain threshold, however stability might be regained with the further increase of that delay. The stability switching curves are two straight lines in the case of the two-market model, where no stability regain is possible.

The stability switching thresholds and curves are analytically determined and illustrated with computer simulations, and the global behavior of the systems is shown by using bifurcation diagrams.