

The Semi-Nonstationary Process: Model and Empirical Evidence

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Abstract

In this paper we propose a class of models in which the effect of an innovation may be permanent or transitory, depending on an unobservable state variable that follows a first order Markov chain. This model can describe stationary and non-stationary characteristics at different time periods. It also permits shifts in the deterministic trend such that different trending patterns are associated with innovations having distinct effects. The process generated from the proposed model is referred to as the *semi-nonstationary* process. We first show some properties of this process and derive an estimation algorithm. A simulation-based test is then proposed to distinguish between the proposed model and a random walk. In empirical application, we apply the proposed model to U.S. real GDP and find that 83 percent of the shocks to real GDP are likely to have permanent effects. Moreover, the periods that are likely to be in the state of permanent (transitory) shocks match closely to the expansion (recession) periods identified by NBER.

Keywords: Markov trend, permanent shock, regime switching, semi-nonstationary process, transitory shock, trend stationarity, unit root

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