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Cotrending and cointegration tests for a bivariate system with joined segmented trends and stochastic trends

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We consider a bivariate system in which each variable is a sum of deterministic trend and a stochastic process. The deterministic trend is assumed to have changes in the slope at unknown dates and the stochastic process is either stationary or integrated of order one. We first develop a test that can determine whether the two variables possess the same deterministic function. The asymptotic distribution of the test is derived under various assumptions on the stochastic process of each variable. We also develop a test for the stochastic processes of the two variables. For this test, we assume that the stochastic processes are integrated of order one, and the test can determine whether the stochastic trends in the two variables are common regardless of whether the two variables share the deterministic trend or not. Some Monte Carlo simulation results are provided to assess the adequateness of our asymptotic distributions in samples with common sizes. The proposed tests are applied to the system with a global temperature series and a radiative forcing series.