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Additive nonparametric models with time variable and both stationary and nonstationary regressors

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Abstract

This paper considers nonparametric additive models that have a deterministic time trend and both stationary and integrated variables as components. The diverse nature of the regressors caters for applications in a variety of settings. In addition, we extend the analysis to allow the stationary regressor to be instead locally stationary, and we allow the models to include a linear form of the integrated variable. Heteroscedasticity is allowed for in all models. We propose an estimation strategy based on orthogonal series expansion that takes account of the different type of stationarity/nonstationarity possessed by each covariate. We establish pointwise asymptotic distribution theory jointly for all estimators of unknown functions and also show the conventional optimal convergence rates jointly in the L_2 sense. In spite of the entanglement of different kinds of regressors, we can separate out the distribution theory for each estimator. We provide Monte Carlo simulations that establish the favourable properties of our procedures in moderate sized samples. Finally, we apply our techniques to the study of a pairs trading strategy.

Key words: Additive nonparametric models, deterministic trend, pairs trading, series estimator, stationary and locally stationary processes, unit root process

JEL Classification Numbers: C13; G14; C22.

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