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DISSERTATION PRESENTATION AND DEFENSE

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Simultaneous Confidence Bands in Time Series Regression Models

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ABSTRACT

In this paper we consider the problem of estimating the regression function $g(\cdot)$ in a nonlinear regression model $Y_i = g(X_i) + \sigma(X_i)e_i$, where the regressor X_i can be either stationary or nonstationary $I(1)$ time series process and the error e_i is a sequence of independent and identically distributed (i.i.d.) random variables. We first present the asymptotic result for both stationary and nonstationary time series processes. It can be shown that with proper centering and scaling, the maximum deviation of our regression estimates are asymptotically Gumbel. Our results substantially extend previous work which typically requires more limited conditions. Then based on the theory, we can construct simultaneous confidence bands (SCBs) for the regression function g , which can be used to test its patterns. We provide a simulation study to illustrate the finite sample behavior of the proposed approach. Finally as an application, we construct simultaneous confidence bands for the US share price indices and the treasury bill rates data.

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