

Quantile Granger causality in the presence of instability

We propose a new framework for assessing Granger causality in quantiles in unstable environments, for a fixed quantile or over a continuum of quantile levels. Our proposed test statistics are consistent against fixed alternatives, they have nontrivial power against local alternatives, and they are pivotal in certain important special cases. In addition, we show the validity of a bootstrap procedure when asymptotic distributions depend on nuisance parameters. Monte Carlo simulations reveal that the proposed test statistics have correct empirical size and high power, even in absence of structural breaks. Moreover, a procedure providing additional insight into the timing of Granger causal regimes based on our new tests is proposed. Finally, an empirical application in energy economics highlights the applicability of our method as the new tests provide stronger evidence of Granger causality.