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Ulrich Hounyo

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Bootstrapping integrated covariance matrix estimators in noisy jump-diffusion models with non-synchronous trading*

Ulrich Hounyo†
Department of Economics and Business Economics, Aarhus University,
CREATES, Aarhus University,

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Abstract

We propose a bootstrap method for estimating the distribution (and functionals of it such as the variance) of various integrated covariance matrix estimators. In particular, we first adapt the wild blocks of blocks bootstrap method suggested for the pre-averaged realized volatility estimator to a general class of estimators of integrated covolatility. We then show the first-order asymptotic validity of this method in the multivariate context with a potential presence of jumps, dependent microstructure noise, irregularly spaced and non-synchronous data. Our results justify using the bootstrap to estimate the covariance matrix of a broad class of covolatility estimators. The bootstrap variance estimator is positive semi-definite by construction, an appealing feature that is not always shared by existing variance estimators of the integrated covariance estimator. As an application of our results, we also consider the bootstrap for regression coefficients. We show that the wild blocks of blocks bootstrap, appropriately centered, is able to mimic both the dependence and heterogeneity of the scores. We provide a proof of construction of bootstrap percentile and percentile-t intervals as well as variance estimates in this context. This contrasts with the traditional pairs bootstrap which is not able to mimic the score heterogeneity even in the simple case where no microstructure noise is present. Our Monte Carlo simulations show that the

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†Department of Economics and Business Economics, Aarhus University, 8210 Aarhus V., Denmark. Email: uhounyo@econ.au.dk.