Accepted Manuscript

Mixed-scale jump regressions with bootstrap inference

Jia Li, Viktor Todorov, George Tauchen, Rui Chen

PII: S0304-4076(17)30169-0
DOI: http://dx.doi.org/10.1016/j.jeconom.2017.08.017
Reference: ECONOM 4423

To appear in: *Journal of Econometrics*

Please cite this article as: Li, J., Todorov, V., Tauchen, G., Chen, R., Mixed-scale jump regressions with bootstrap inference. *Journal of Econometrics* (2017), http://dx.doi.org/10.1016/j.jeconom.2017.08.017

Mixed-scale Jump Regressions with Bootstrap Inference*

Jia Li,† Viktor Todorov,‡ George Tauchen§ and Rui Chen¶

October 30, 2016

Abstract

We develop an efficient mixed-scale estimator for jump regressions using high-frequency asset returns. A fine time scale is used to accurately identify the locations of large rare jumps in the explanatory variables such as the price of the market portfolio. A coarse scale is then used in the estimation in order to attenuate the effect of trading frictions in the dependent variable such as the prices of potentially less liquid assets. The proposed estimator has a non-standard asymptotic distribution that cannot be made asymptotically pivotal via studentization. We propose a novel bootstrap procedure for feasible inference and justify its asymptotic validity. We show that the bootstrap provides an automatic higher-order asymptotic approximation by accounting for the sampling variation in estimates of nuisance quantities that are used in efficient estimation. The Monte Carlo analysis indicates good finite-sample performance of the general specification test and confidence intervals based on the bootstrap. We apply the method to a high-frequency panel of Dow stock prices together with the market index defined by the S&P 500 index futures over the period 2007–2014. We document remarkable temporal stability in the way that stocks react to market jumps. However, this relationship for many of the stocks in the sample is significantly noisier and more unstable during sector-specific jump events.

Keywords: bootstrap, high-frequency data, jumps, regression, semimartingale, specification test, stochastic volatility.

JEL classification: C51, C52, G12.

*We thank the guest editors and anonymous referees as well as Torben Andersen, Snehal Banerjee, Tim Bollerslev, Anna Cieslak, Silvia Gonçalves, Andrew Patton and Brian Weller for helpful discussions and comments. We also thank Rob Engle and other participants of the 6th French Econometrics Conference celebrating Professor Gourieroux's Contribution to Econometrics. Li's and Todorov's research have been partially supported by NSF grants SES-1326819 and SES-0957330, respectively.

†Department of Economics, Duke University, Durham, NC 27708; e-mail: jl410@duke.edu.

‡Department of Finance, Kellogg School of Management, Northwestern University, Evanston, IL 60208; e-mail: v-todorov@northwestern.edu.

§Department of Economics, Duke University, Durham, NC 27708; e-mail: george.tauchen@duke.edu.

¶Department of Economics, Duke University, Durham, NC 27708; e-mail: rui.chen@duke.edu.