

## Accepted Manuscript

Stochastic tail index model for high frequency financial data with Bayesian analysis

Guangyu Mao, Zhengjun Zhang

PII: S0304-4076(18)30067-8

DOI: <https://doi.org/10.1016/j.jeconom.2018.03.019>

Reference: ECONOM 4501

To appear in: *Journal of Econometrics*

Received date: 17 February 2017

Revised date: 16 December 2017

Accepted date: 23 March 2018

Please cite this article as: Mao G., Zhang Z., Stochastic tail index model for high frequency financial data with Bayesian analysis. *Journal of Econometrics* (2018), <https://doi.org/10.1016/j.jeconom.2018.03.019>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



# Stochastic Tail Index Model for High Frequency Financial Data with Bayesian Analysis

Guangyu Mao\*

*School of Economics and Management, Beijing Jiaotong University, China*

Zhengjun Zhang†

*Department of Statistics, University of Wisconsin-Madison, USA*

**Abstract:** This paper proposes a new dynamic model called *Stochastic Tail Index* (STI) model to analyze time-varying tail index for financial asset using high frequency return data. Bayesian tools are developed to estimate the model, make related inferences, and perform model selection. To construct efficient posterior sampler for the STI model by an approximation approach, a new algorithm called ALSO (Auxiliary Least Squares Optimization) is introduced, which can quickly make sufficient approximation to a given random variable using Gaussian mixture variables. The posterior sampler takes advantages of the BFGS optimization method to tailor the proposal densities in Metropolis-Hastings chains, and is computationally faster than the existing samplers in literature. Simulation shows that the proposed posterior sampler works well for the STI model. To illustrate the use of the STI model in the real world, we analyze two real high frequency data sets associated with two markets. It is found that the estimated daily tail indexes generally follow a time-varying pattern and tend to fall when large negative events occur. Besides, they significantly drop below 2 during some periods, which implies that the variances of the return distributions during those periods may be infinite, and hence any variance-based risk management for the two markets may be questionable.

**Keywords:** Bayesian Statistics, Extreme Values, High Frequency, State Space Model, Tail Index.

**JEL Codes:** C11, C22, G32.

## 1 Introduction

Over the past two decades, extreme financial events have repeatedly shown their dramatic and negative effects on global economy, which include the Asian financial crisis of 1997–1998, the bursting of dot-com bubble in 2001, the global financial crisis of 2007–2009 triggered by US subprime mortgage crisis, and the European sovereign debt crisis in 2010, to name a few.

---

\*Email: [gymao@bjtu.edu.cn](mailto:gymao@bjtu.edu.cn).

†Corresponding author. Email: [zjz@stat.wisc.edu](mailto:zjz@stat.wisc.edu).

Download English Version:

<https://daneshyari.com/en/article/7357855>

Download Persian Version:

<https://daneshyari.com/article/7357855>

[Daneshyari.com](https://daneshyari.com)