

# 2025 SBA Colloquium

## Large Scale Regression and Generalized Method of Moments

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**Venue: 114-503**

### Abstract

Big data analytics has opened new avenues in economic research, but the challenge of analyzing datasets with tens of millions of observations is substantial. Conventional econometric methods based on extreme estimators require large amounts of computing resources and memory, which are often not readily available. In this paper, we focus on linear quantile regression applied to “ultra-large” datasets, such as U.S. decennial censuses. A fast inference framework is presented, utilizing stochastic subgradient descent (S-subGD) updates. The inference procedure handles cross-sectional data sequentially: (i) updating the parameter estimate with each incoming “new observation”, (ii) aggregating it as a Polyak–Ruppert average, and (iii) computing a pivotal statistic for inference using only a solution path. The methodology draws from time-series regression to create an asymptotically pivotal statistic through random scaling. Our proposed test statistic is calculated in a fully online fashion and critical values are calculated without resampling.

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