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*Macroscopic Modeling of Data Breach Risk with Spatial and Temporal Autocorrelation*

Data breach risk caused by leak of private information has attracted considerable attention recently and insurers face rising necessity for predictive models to manage its risk. However, the job of modeling the risk is mainly discussed on a microscopic level in perspective of information technologies, partially due to statistically insufficient data, and it has been impeded by its unique characteristic of high correlation. This study, however, models data breach losses on a macroscopic scale in perspective of statistics, and we perform empirical analysis on their collective structure of mutual dependence in the dimension of space and time, based on the samples of data breaches in the United States during the recent decade. We discover that for data breach risk, an individual establishment or firm can be a candidate for a risk exposure unit, and we present an evidence of a medium-to-low spatial and temporal autocorrelation in the data breach events. We also find that time series of data breach events might have a covariate characterized by a market capital such as the S&P 500 index or the total private non-profit credit capitalization in the United States.