

# Doubly Constrained Factor Models with Applications

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## Abstract

This paper focuses on factor analysis of high-dimensional data. We propose statistical methods that enable an analyst to make use of prior knowledge or substantive information to sharpen the estimation of common factors. Specifically, we consider a doubly constrained factor model that enables analysts to specify both row and column constraints of the data matrix to improve the estimation of common factors. The row constraints may represent classifications of individual subjects whereas the column constraints may show the categories of variables. We derive both the maximum likelihood and least squares estimates of the proposed doubly constrained factor model and use simulation to study the performance of the analysis in finite samples. Akaike information criterion is used for model selection. Monthly U.S. housing starts of nine geographical divisions are used to demonstrate the application of the proposed model.