

Abstract

Climate change and weather-related variables like snowfall, temperature, rainfall, and humidity have extensively been studied and used to predict health outcomes, labor outcomes, and agricultural outcomes. However, several models do not control for all weather variables. Moreover, the weather dataset is a multi-dimensional panel dataset where the dimensions include time, location, and weather variables like temperature, precipitation, rainfall, and snowfall. Factor modeling is an approach that addresses the high dimensionality of the dataset and captures its essential information. Traditionally, factor modeling is used in macroeconomics and finance analysis. Thus, this paper aims to achieve two main goals using the climate dataset. Firstly, it aims to study the causal effects of two key weather variables on a birth outcome like gestational age. Moreover, this thesis aims to control for several weather variables using a novel method called tensor principal component analysis (PCA) to avoid omitted variable bias. As a result, existing studies could improve predictions of other health, agriculture, and labor outcomes affected by climate through the use of tensor PCA.