

**Factor-driven Two-regime Regression**

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Title: Factor-driven Two-regime Regression

Abstract: We propose a novel two-regime regression model, where the switching between the regimes is driven by a vector of possibly unobservable factors. When the factors are not directly observable, we estimate them by the principle component analysis of a much larger panel data set. This approach has the advantage over the conventional threshold regression model in that a vector of factors may represent economy-wide shocks more realistically than a scalar observed random variable. Estimating this model brings new challenges in terms of both computation and asymptotic theory. We show that our optimization problem can be reformulated as mixed integer optimization and present two alternative computational algorithms. We also derive the asymptotic distribution of the resulting estimator under the scheme that the threshold effect shrinks to zero as the sample size tends to infinity. In particular, not only we establish the conditions on factor estimation for an oracle property, which are different from those for smooth factor augmented models, but also we analyze a non-oracle case and establish a phase transition that describes the effect of first stage factor estimation. Finally, we illustrate our methods by applying them to state-dependent government spending multipliers in the US.