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Measuring heterogeneity with fixed effect quantile regression: Long panels and short panels

The desire to capture heterogeneity in the response of the dependent variable to covariates often forces empiricists to employ panel data quantile regression models. Very often practitioners forget the limitations of their datasets in terms of the sample size n and the length of panel T. Yet, quantile regression requires large samples, long panels and small value of the ratio n/T. So the estimator in quantile regression with short panels is biased. The paper reviews the approaches for estimating longitudinal models for quantile regression. We highlight the fact that a method of smoothed quantile regression may be viewed as a remedy for reducing the asymptotic bias of the estimator in short panels, both in case of quantile-dependent and quantile-independent fixed effect specifications.

Keywords: quantile regression; panel data.

JEL classification: C44; C61.

1. Introduction

The popularity of the OLS regression in applied economics may be attributed to the fact that "least-squares methods provide a general approach to estimating conditional mean functions" (Koenker, 2005, p. 1). However, the conditional mean function does not give the full information about the distribution of the dependent variable conditional on covariates. Indeed, in many economic applications the researcher can expect that "the partial effect of an explanatory variable can have very different effects across different segments of a population" (Wooldridge, 2010, p. 449). For instance, in case of the analysis of the loglinear production function, the value of elasticity of output with respect to capital may differ across more productive and less productive firms. Yet, mean regression only enables to obtain the estimate of elasticity for all firms in the sample.

The quantile regression offers an approach to study the impact of the covariates at the "segments" of dependent variable: the analysis is applied to the conditional τ-th quantile of the dependent variable. Instead of extrapolating the results of the mean regression to the tails of the distribution of the dependent variable, quantile regression enables obtaining independent estimates

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