



Univariate versus multivariate modeling of panel data, specification issues and goodness of fit testing

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Panel data can be arranged into a matrix in two ways, called ‘long’ and ‘wide’ formats (LF and WF). The two formats suggest two alternative model approaches for analyzing panel data: (i) univariate regression with varying intercept; and (ii) multivariate regression with latent variables (a particular case of structural equation model, SEM). The present paper compares the two approaches showing in which circumstances they yield equivalent—in some cases, even numerically equal—results. We show that the univariate approach gives results equivalent to the multivariate approach when restrictions of time invariance (in the paper, the TI assumption) are imposed on the parameters of the multivariate model. The multivariate perspective we offer makes visible the implicit restrictions implied by the univariate approach and reinterprets a classical in the econometric literature of fixed versus random effects model as identification issues in a structural equation model (SEM) framework. The setting side by side the univariate versus multivariate perspectives to panel data shows the easy way of the multivariate approach to tackle the dynamics into the model. It is shown that the restrictions implicit in the univariate approach can be assessed by chi-square difference testing of two nested multivariate models. In addition, common tests encountered in the econometric analysis of panel data, such as the Hausman test, are shown to have an equivalent representation as chi-square difference tests. Commonalities and differences between the univariate and multivariate approaches are illustrated using an empirical panel data set of firms’ profitability as well as a simulated panel data.