

# Estimation of a quarterly model with annual sample selection

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## Abstract

This work aims at developing a semi-parametric methodology for the estimation of a non-linear quarterly panel data model with annual sample selection.

A random annual sample is used to build a semi-parametric sample selection model that allows consistent estimation of the quarterly parameters from the non-random samples. The correction of the quarterly estimates is achieved through an extension of the model introduced by Kiriazidou (1997).

The extension is two-fold. First, the non-negative nature of the data leads to the development of a non-linear model. In fact, as pointed out in Silva and Tenreiro (2006), applying a linear model to the log-transformed data, despite being common practice, is not recommended as induces inconsistency of the estimates of at least the intercept parameter. The second extension is necessary due to the selection mechanism, since the non-random selection of the quarterly observations is done annually, therefore the frequency of the data and of the selection do not coincide.

The proposed estimator is obtained through a two-step procedure with semi-parametric weights, where the selection equation is based on a continuous random variable, allowing for unobserved heterogeneity. The methodology is applied to the estimation of a quarterly model for sales, using a Portuguese quarterly firms panel survey.

## Keywords

Sample selection, Nonlinear models, Panel data, Semiparametric estimation.

## References

- Kiriazidou, E. (1997). Estimation of a panel data sample selection model. *Econometrica* 65, 1335–1364.
- Santos Silva, J.M.C. and Tenreiro, S. (2006). The log of gravity. *Review of Economics and Statistics* 88, 641–658.