Microeconomic Analysis with R

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Since its first public release in 1993, the free open source statistical language and development environment "R" (R Development Core Team, 2005) has been increasingly used for statistical analysis. While it has been prelevant in many scientific disciplines for a long time, it was not very widespread in economics in the first years. However, this situation has changed in recent years. Consequently, the number of extension packages for R that are suitable for economists has strongly increased in the last few years. One of these packages is called "**micEcon**" (Henningsen and Toomet, 2005) and provides tools for microeconomic analysis.

Initially, the **micEcon** package included only tools for microeconomic modeling. For example, it provides functions for demand analysis with the "Almost Ideal Demand System" (AIDS) (Deaton and Muellbauer, 1980). These functions enable the econometric estimation, calculation of demand (price and income/expenditure) elasticities and checks for theoretical consistency by one single R command. Second, **micEcon** contains tools for production analysis with the "Symmetric Normalized Quadratic" (SNQ) profit function (Diewert and Wales, 1987, 1992; Kohli, 1993). Additionally to the econometric estimation and calculation of price elasticities, it includes a function that imposes convexity on the estimated profit function using a new sophisticated method proposed by Koebel *et al.* (2003). Third, this package provides a convenient interface to "FRONTIER 4.1", Tim Coelli's software for stochastic frontier analysis (Coelli, 1996). Furthermore, **micEcon** includes tools for other functional forms, namely translog and quadratic functions.

About a year ago, we have added tools for sample selection models that are also often applied in microeconomic analyses. The **micEcon** package now includes functions to estimate these models using the two-step Heckman or an efficient maximum likelihood procedure. Furthermore, tools to calculate selectivity terms ("inverse Mill's ratios") even from bivariate probit models have been added.

On the useR! conference, we would like to present the capabilities of the **micEcon** package. Applied economists interested in microeconomic modeling will be invited to join our team and contribute to this package by providing tools for other types of microeconomic analyses.

References

Coelli TJ (1996). "A Guide to FRONTIER Version 4.1: A Computer Program for Stochastic Frontier Production and Cost Function Estimation." CEPA Working Paper 96/7, Department of Econometrics, University of New England, Armidale NSW Australia.

Deaton A, Muellbauer J (1980). "An Almost Ideal Demand System." *The American Economic Review*, **70**, 312–326.

Diewert WE, Wales TJ (1987). "Flexible Functional Forms and Global Curvature Conditions." *Econometrica*, **55**(1), 43–68.

Diewert WE, Wales TJ (1992). "Quadratic Spline Models for Producer's Supply and Demand Functions." *International Economic Review*, **33**, 705–722.

Henningsen A, Toomet O (2005). *micEcon: Tools for Microeconomic Analysis and Microeconomic Modeling*. R package version 0.2-1, `http://cran.r-project.org`.

Koebel B, Falk M, Laisney F (2003). "Imposing and Testing Curvature Conditions on a Box-Cox Cost Function." *Journal of Business and Economic Statistics*, **21**(2), 319–335.

Kohli UR (1993). "A symmetric normalized quadratic GNP function and the US demand for imports and supply of exports." *International Economic Review*, **34**(1), 243–255.

R Development Core Team (2005). *R: A language and environment for statistical computing*. R Foundation for Statistical Computing, Vienna, Austria. ISBN 3-900051-07-0, URL `http://www.R-project.org`.