

Econometrics at the service of society

The task of an econometrician is to quantify and model relations between economic variables using statistical methods. Today, econometric techniques are a key tool in economic and financial analysis. For example, with this tool we can analyse the impact of an economic policy or forecast macroeconomic and financial variables. The research project conducted at USI, 'New Methods in Moment Based Econometric Models', seeks to explore new methodologies in this context. The project is part of Pro*Doc, the doctoral programme promoted by the Swiss National Science Foundation (SNSF). Its aim is to refine and expand training and research at doctoral level in Switzerland.

Econometrics was born in the 1930s, out of the need to study economic phenomena using quantitative methods. This discipline first formalises economic knowledge into a process of theoretical deduction; then tests out pertinent hypotheses on the basis of real data. Hence an econometric analysis is essentially a quantitative study of an economic model, in which the relations existing between different variables are represented using empirical evidence. Modern econometric techniques find application in many contexts: from macroeconomics to microeconomics, from finance to labour economics, from management to marketing. These techniques are applied wherever it is necessary to formalise and quantify the results under scrutiny, to provide an answer to practical questions. Think, for instance, of the econometric models used by central banks to anticipate the potential impact of a given economic policy on interest rates and inflation, or the models designed to forecast trends in income and employment.

The Faculty of Economics of the University of Lugano (USI) is running several studies in econometrics; one of them, the project, 'New Methods in Moment Based Econometric



USI's research team, left to right: Prof. Fabio Trojani, PhD student Elisa Ossola, Prof. Elvezio Ronchetti, Prof. Patrick Gagliardini, and PhD student Davide La Vecchia. Not in the picture: Thomas Leirvik, PhD student.

Models', examines new econometric methods based on hypotheses that are not unduly binding on the functional relationship between economic variables. The project is part of the doctoral programme Pro*Doc of the Swiss National Science Foundation, which aims to refine and support doctoral teaching curricula and research in Switzerland. The study was launched in 2007, the first to be approved; and the Faculty of Economics of the University of St Gallen is acting as leading house.

Elvezio Ronchetti, chair of statistics at USI-Lugano and at the University of Geneva, and Patrick Gagliardini, professor of Econometrics at USI, explain that this programme has made it possible to sponsor a total of five doctoral scholarships, three of which have been awarded to PhD students of USI. The doctoral candidates of the Faculty of Economics, USI, will be free to attend PhD courses at the University of St Gallen, and vice-versa. The programme is *à la carte*, which means that one can choose lectures and seminars to suit one's interests, including econometrics, finance, microeconomics or macroeconomics. "This way, we create a pool of teaching resources and subjects rarely seen gathered in one single university", specifies Fabio Trojani, professor of finance at the University of St Gallen and visiting professor at the Faculty of Economics, USI.

The first Pro*Doc project in economics at USI

The Pro*Doc *New Methods in Moment Based Econometric Models* project, conducted at the Faculty of Economics of the University of Lugano, is headed by Professors Patrick Gagliardini, Elvezio Ronchetti, and Fabio Trojani. As a Research Module investigating the methodological aspects of econometrics, it is part of the Pro*Doc 'PhD in Economics and Finance' programme, which brings together the Faculties of Economics of the Universities of Lugano and of St Gallen, for an initial three-year period. The programme includes a second Research Module, *Causal Analysis and Econometrics*, led by Prof. Michael Lechner, University of St Gallen, covering aspects such as micro-econometrics and labour economics. Included in the same programme is also a Training Module, led by Prof. Fabio Trojani of the University of St Gallen. It is through research modules that funding can be obtained for bursaries, which help toward the teaching of advanced courses and research on specific issues. Over the next three years, other research modules may be created and launched under the same banner.

New methods to estimate econometric models

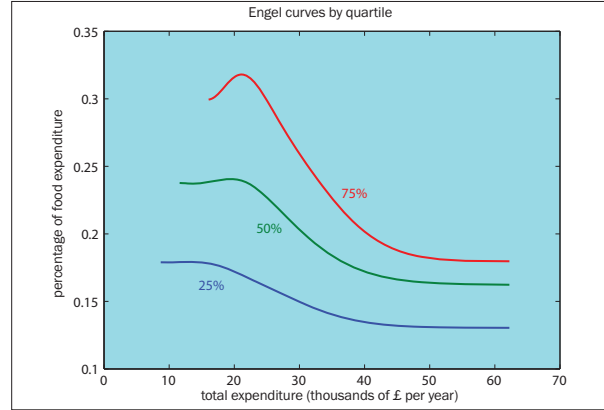
There are different ways of measuring the impact of a set of variables on another chosen variable, for example the impact of income and wealth on consumption. The choice of one estimation method rather than another depends on the structure of the model that describes the relations between these variables. A universal method (and one of the most popular) is called 'Generalised Method of Moments' (GMM). This method has proved successful on very many occasions when applied to economic and financial settings; this is because it is general and flexible, though it has two significant drawbacks, which is precisely where recent research has been concentrated. The first limitation is the fact that with a low number of observations the method produces estimates with a low degree of accuracy (as is the case in a number of macroeconomic applications). The second limitation consists in the fact that GMM is difficult to apply to cases where the relation between the economic variables analysed cannot be expressed in parametric form. If this is so, the estimation approach needs to be adjusted so as to produce a more intensive use of data. The objective of Pro*Doc 'New Methods in Moment Based Econometric Models' is to improve and further extend the GMM technique.

■ Some applications

A classical application of econometrics is the estimation of the Engel curve, which relates the share of a given head of expenditure (e.g. food, leisure time, energy, etc.) with the overall spending of a household. Engel curves are crucial for

Econometrics at USI: research and doctoral studies

Over the years, research in econometrics has flourished quite impressively at USI, as witnessed by numerous publications by professors and researchers of the University in distinguished international scientific journals. Econometrics is a vital component of PhD programmes in both economics and finance at USI. First-year candidates are taught modern econometric methods, later applied to a variety of fields and environments at the ensuing research stage. Econometrics opens up a multiplicity of career paths: in particular graduates may join research teams in the public or private sector (banking, insurance and business), as well as embark on an academic career, or teaching quantitative disciplines in secondary education. The human and social sciences may offer further opportunities, e.g. in epidemiology and health sciences, but also in interdisciplinary areas (the energy market, the environment, and quality of life).



Non parametric Engel curves.

understanding the quantitative impact of a certain economic or social policy. Traditionally, these curves are calculated from real data, using parametric models based on hypotheses that are frequently too binding. One of the objectives of Pro*Doc is to develop new non-parametric methods capable of overcoming these limitations.

The above figure shows three Engel curves, estimated non-parametrically on a homogeneous sample of households in the UK in 1995. The 25% curve, for example, reflects the ratio between the share of food expenditure and the overall expenditure in households situated in the first quarter of the distribution of spending on food. The non-parametric approach allows us to identify the different shapes of the curves in the various expenditure quartiles (25%, 50%, and 75%). This may impact significantly on the drafting and assessment of socio-economic policies. Other direct applications of the methods developed by the project include: the calculation of healthcare costs, the evaluation of the performance of investment funds, and the estimation of models used to price financial instruments.

Enquiries:

Prof. Patrick Gagliardini
 Prof. Elvezio Ronchetti
 Prof. Fabio Trojani
 USI-Facoltà di Scienze economiche
 Via G. Buffi 13; CH-6904 Lugano; Tel. +41 58 666 46 60
 e-mail: patrick.gagliardini@lu.unisi.ch
 elvezio.ronchetti@lu.unisi.ch
 fabio.trojani@unisg.ch

Web addresses:

USI: www.unisi.ch
 Faculty of Economics: www.eco.unisi.ch