FORECASTING REGIONAL EMPLOYMENT IN GERMANY: A REVIEW OF NEURAL NETWORK APPROACHES

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Abstract

This paper aims to offer a review of various experiments – and inherent results – based on Neural Network (NN) to forecast regional employment variations in Germany. In this context, NN models providing forecasts two years ahead have been developed. NNs are employed in this study because of their flexible specification structure. In fact, economic variables, such as employment, are often characterized by complex underlying causal relationships, that is, non-linear dynamics, difficult to specify correctly and predict. NNs are statistical optimization tools inspired by the functioning of actual biological neural networks. Their main characteristics are their non-linear and multiple-unit simultaneous data processing, as well as their ability to find functional relationships within the data without these relationships being previously specified. Because of these features, NNs have shown fascinating strands of theoretical developments, as well as of applications in various research fields.

In particular, the present paper – after a synthetic introduction and a methodological review on NNs – illustrates the results obtained, for a set of NN models, on regional data sets concerning full-time employment in Germany. The data sets used in our experiments consist of two panels of 326 and 113 NUTS 3 districts, which represent West and East Germany, respectively. Since the data sets display different time spans, West and East German NN models were developed separately. Two years, 2001 and 2003, have been firstly used to test the models' statistical performance, based on single estimates of employment growth rates computed for each German district.

Next, additional – and more recent – forecasts are presented, for the years 2004, 2005, and 2006. New NN models, embedding shift-share analysis components, are also adopted and evaluated, by means of appropriate statistical indicators and maps visualisations. The paper concludes with theoretical/methodological/empirical observations in the light of future research developments.