



University
of Victoria

Graduate Studies

Notice of the Final Oral Examination
for the Degree of Doctor of Philosophy

of

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“Non-Global Regression Modelling”

Department of Economics

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11:00AM
Business and Economics Building
Room 371

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Dr. Judith Clarke, Department of Economics, UVic (Member)
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Abstract

In this dissertation, a new non-global regression model - the partial linear threshold regression model (PLTRM) - is proposed. Various issues related to the PLTRM are discussed.

In the first main section of the dissertation (Chapter 2), we define what is meant by the term “non-global regression model”, and we provide a brief review of the current literature associated with such models. In particular, we focus on their advantages and disadvantages in terms of their statistical properties. Because there are some weaknesses in the existing non-global regression models, we propose the PLTRM. The PLTRM combines non-parametric modelling with the traditional threshold regression models (TRMs), and hence can be thought of as an extension of the later models. We verify the performance of the PLTRM through a series of Monte Carlo simulation experiments. These experiments use a simulated data set that exhibits partial linear and partial nonlinear characteristics, and the PLTRM out-performs several competing parametric and non-parametric models in terms of the Mean Squared Error (MSE) of the within-sample fit.

In the second main section of this dissertation (Chapter 3), we propose a method of estimation for the PLTRM. This requires estimating the parameters of the parametric part of the model; estimating the threshold; and fitting the non-parametric component of the model. An “unbalanced penalized least squares” approach is used. This involves using restricted penalized regression spline and smoothing spline techniques for the non-parametric component of the model; the least squares method for the linear parametric part of the model; together with a search procedure to estimate the threshold value. This estimation procedure is discussed for three mutually exclusive situations, which are classified according to the way in which the two components of the PLTRM “join” at the threshold. Bootstrap sampling distributions of the estimators are provided using the parametric bootstrap technique. The various estimators appear to have good sampling properties in most of the situations that are considered. Inference issues such as hypothesis testing and confidence interval construction for the PLTRM are also investigated.

In the third main section of the dissertation (Chapter 4), we illustrate the usefulness of the PLTRM, and the application of the proposed estimation methods, by modelling various real-world data sets. These examples demonstrate both the good statistical performance, and the great application potential, of the PLTRM.