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ESTIMATION OF PARAMETERS IN REGRESSION MODEL WITH HIGHLY CORRELATED DATA

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ABSTRACT

This paper introduces an estimator, WPC, which is the weighted sum of the ordinary least squares estimator and the principal component estimator because when we are dealing with highly correlated data, the OLS estimator is often unsuitable due to its large MSE. WPC is compared with the OLS estimator and another weighted estimator recently introduced for use with highly correlated data. WPC is shown to have smaller MSE under condition that commonly occur in econometric studies.

INTRODUCTION

When substaintial multicollinearity exists among the explanatory variables in regression analysis, the OLS estimator may not be the best choice for estimating the parameters. The multicollinearity will cause the OLS estimator to have large MSE. More specifically,

let $Y_i = \beta_1 X_{1i} + \beta_2 X_{2i} + U_i$

where X_{1i} and X_{2i} are nonstochastic variables and U_i is an independent random disturbance term. We consider the problem of estimating β_1 when X_{1i} and X_{2i} are highly correloated and the MSE is the criteria for comparing estimators.

A number of investigators have proposed using biased estimators as alternatives to OLS estimators in the presence of multicollinearity. Kendall [1] suggested regression on principal components. Hoerl and Kennard [2] proposed ridge regression for estimation of parameters. Maquardt [3] discussed an estimator employing generalized inverese. Hawkins [4] and Webster, Gunst and Mason [5] developed Latent root regression analysis.

Feldstein [6] introduced OV estimator as an alternative to the OLS estimator, and a weighted average of the OLS estimator,