行政院國家科學委員會專題研究計畫　成果報告

具有 AR(1)誤差線性迴歸模型的廣義及 feasible 廣義截斷平均數

計畫類別： 個別型計畫
計畫編號： NSC92-2118-M-009-006-
執行期間： 92 年 08 月 01 日至 93 年 07 月 31 日
執行單位： 國立交通大學統計學研究所

計畫主持人： 陳鄰安
共同主持人： 楊克峻

報告類型： 精簡報告

處理方式： 本計畫可公開查詢

中　華　民　國 93 年 11 月 1 日

行政院國家科學委員會補助專題研究計畫成果報告

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計畫類別：☑個別型計畫　　□整合型計畫
計畫編號：NSC 92-2118-M-009-006-
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共同主持人：

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執行單位：國立交通大學統計研究所

中　華　民　國　90　年　10　月　31　日

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一、中文摘要

我們提出廣義及插入法廣義截斷平均數來處理具有自我相關的線性迴歸問題，我們導出大樣本理論結果，此一結果提供了穩健性估計量其具有廣義估計性質的估計量。

Abstract

We propose generalized and pseudo generalized trimmed means for the linear regression with AR(1) errors model. These will play the role of robust type generalized and pseudo generalized estimators for this regression model. Their asymptotic istributions are developed.

二、Results and Discussions

For some regression models such as linear regression with AR(1)
errors or
the seemingly unrelated regression model, the
generalized least squares estimator (GLSE) and the pseudo
generalized least squares estimator (PGLSE) have the advantage
that their variances (or asymptotic variances) are smaller than that of the
least squares estimator (LSE).
However, the GLSE and the PGLSE are sensitive to departures from normality and to the presence of outliers.
Hence, extending these concepts to robust estimation
is an interesting topic in regression analysis.
The concept of developing robust type generalized estimators in regression analysis is not new.
Koenker and Portnoy (1990) introduced
this interesting idea and developed the
generalized M-estimators for the estimation of
regression parameters of the multivariate regression
model. Although considering only generalized estimation, their approach initiated interest in robust type generalized
and pseudo generalized estimators for estimation of regression parameters.

Rather than multivariate regression, we consider the linear regression with AR(1) errors model
yi=xi' beta + epsiloni and epsiloni= rho epsiloni-1+ei
where abs(rho)<1, ei are i,i,d. variables with
mean zero and
variance sigma and xi is a known design p-vector
with value 1 in its first element.
From the regression theory on the estimation of β,
it is known that, when rho is known,
the GLSE and, when rho is unknown, the PGLSE have (or asymptotically have) the same covariance matrix, which is smaller than that of the LSE.
To see the sensitivity of the GLSE and the PGLSE, let
X'=(x1,...,xn) and Omega=Cov(epsilon) with epsilon=
(epsilon1,...,epsilonn)'. The GLSE and
the PGLSE both have a (asymptotic) covariance matrix of the form
sigma inv(X'inv(Omega)X). The sensitivity
is clear from the fact that sigma could be arbitrary large
when ei has a heavy tailed distribution.

The fact that sigma is sensitive to the error distribution
motivates us to consider robust estimators that have a
(asymptotic) covariance matrix of the form
gamma inv(X'inv(Omega)X),
where robustness means that gamma is insensitive to heavy tailed distributions.
Based on the regression quantiles of Koenker and Bassett (1978),
we will introduce the generalized trimmed mean (GTM) and the
pseudo generalized trimmed mean (PGTM)
to play the role of robust type generalized and
pseudo generalized estimators for the linear regression
with AR(1) errors model.

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Self Evaluation: Extending the concepts of BLUE and generalized
estimation for linear regression model, we propose a concept of robust type generalized estimator. This paper has been submitted for publication
and is accepted by Statistics and Probability Letter.als of Statistics, 31, 942 (2003).