様式８

学位論文内容の要旨

博士の専攻分野の名称：　博士（経済学）　　氏名：曽　小強

学位論文題名

Asymptotic Properties of Estimators
in Some Nonnegative Integer-Valued Time Series Models

（非負整数値時系列モデルにおける推定量の漸近的性質）

The analysis of count time series has made rapid progress during the last few decades. There has been a huge literature about the formulations of models. Among them, we focus on nonnegative integer-valued autoregressive process of the first-order (INAR(1)) and alternative dependent counting nonnegative INAR process of the first-order (ADCINAR(1)) under a general innovation. Both statistical models are semi-parametric in the sense that we do not impose any distributional assumption about the innovation. The primary contribution of this thesis is to give the closed-form expressions for higher autocumulant functions and propose the bias-corrections of the commonly used estimators for the parameter α.

The first part of this thesis is concerned with stationary INAR(1) process under a general innovation. The third, fourth, fifth, and sixth autocumulant functions of the stationary INAR(1) process are derived explicitly. An analytical bias-correction of a class of estimators for the parameter α is proposed. Asymptotic theory about the Whittle likelihood estimation for the parameter α and the innovation mean

and variance is presented. Also, the Wald-type test about the equidispersion is constructed, on the basis of the estimators for the innovation mean and variance.

On the other hand, the second part of this thesis is concerned with stationary ADCINAR(1) process under a general innovation. The third and fourth autocumulant functions of the stationary ADCINAR(1) process are derived explicitly, together with the structure about arbitrary higher autocumulant functions. The two-step conditional least squares (CLS) estimator for the new parameter in the stationary ADCINAR(1) process is revisited. Also, a nonparametric (lag window-type) bias-correction and an analytical bias-correction of the commonly used Yule-Walker and CLS estimators for the parameter α are developed for not only the stationary INAR(1) process but also the stationary ADCINAR(1) process. The merit of using the lag window-type bias-correction is that we do not need the closed-form expression for the asymptotic expansion of the bias. Indeed, the analytical bias-correction is complicated for the ADCINAR(1) case, involving its new parameter.

We conduct some simulation experiments to confirm the theoretical results. We also analyze two real datasets; the IP count data and the Download count data, available in Weiß (2018).

論文の題名が外国語の場合には，日本語訳を（　）を付して記入すること。

要旨は，３，０００字以内にまとめること。