

UNBIASEDNESS OF THE THEIL-SEN ESTIMATOR

Xueqin Wang

Department of Mathematics
The University of Mississippi

ABSTRACT In this talk, we shall introduce the Theil-Sen estimator in a simple linear regression model. It has many nice properties, which could be found in several classical textbooks on nonparametric statistics (see, *e.g.*, Sprent (1993) and Hollander and Wolfe (1973 and 1999)). Sen (1968) claimed that the Theil-Sen estimator is symmetric and unbiased under the assumption that the error distribution is continuous. The statement is incorrect. We construct several counterexamples. Furthermore, we show that the continuity assumption on the error distribution is not important to unbiasedness. In particular, if the sample size $n = 2$ or 3 , then the Theil-Sen estimator is unbiased. Moreover, if either the error distribution or the covariates have certain symmetry, then the Theil-Sen estimator is also unbiased.