BASIC INFORMATION ON SUB-PROJECT

NAME OF PROGRAMME/FUND	Scholarship Fund - Sciex NMS^{ch}
RESEARCH FIELD AND OTHER RESEARCH FIELDS INVOLVED (if applicable)	Mathematics
TITLE OF THE SUB-PROJECT	Finite sample properties of statistical procedures
REGION OF THE CZECH REPUBLIC (according to the location of the home institution)	Prague
GRANT AMOUNT SPENT	33 589,37 CHF
INTERMEDIATE BODY	Swissuniversities
HOME INSTITUTION	Charles University in Prague, Faculty of Mathematics and Physics
HOST INSTITUTION	University of Geneva Econometrics
NAME OF THE FELLOW	Radka Sabolová

ABSTRACT OF THE SUB-PROJECT	Let X1, ..., Xn be independent identically distributed observations with the distribution F and the underlying density f. We want to estimate the density fn of a statistic Tn = T(X1, ..., Xn). As it is not always possible to express fn analytically, one of the possible approaches is to rely on asymptotic theory and with the help of central limit theorems try to derive the asymptotic distribution of the statistic Tn. Although this method works well for large number of observations, results for small to moderate sample sizes are not viable. Moreover, this approximation tends to be inaccurate in the tails of the distribution as it approximates the central part of the distribution of Tn only. Since we are often interested in calculating tail probabilities by techniques that are also reliable in the case when sample size is small or moderate, a need of other methods arises. There are several methods how to calculate or approximate fn even for small sample sizes at a surprising precision using different techniques like Edgeworth expansions, saddlepoint approximations, method of the steepest descent, conjugate densities, score functions and projection methods, using special character of Tn etc. This project will include study of already existing methods for small sample sizes and theoretical study of finite sample properties of statistical estimators and tests. Numerical study of these methods and comparison with the asymptotic results based on central limit theorems will be an essential part of the project. Also study of the possible new applications of these techniques to different problems that can appear not only in theoretical statistics but also in real world applications will be included.

MAIN RESULTS	Results can be categorised as follows: A new accurate and robust test for regression quantiles models. A new approximation for the joint density of regression quantiles estimators. A new estimator for the quantile density function. The abovementioned results were published in the PhD thesis of the fellow (defended in September 2014, title ‚Statistical inference based on saddlepoint approximations‘) and a joint paper of the fellow and her mentor was submitted to Canadian Journal of Statistics.
DATE OF REALISATION OF THE FELLOWSHIP	1.9.2011 - 29.2.2012
MORE INFORMATION ON THE PROGRAMME	**www.sciex.ch**