FRIEDRICH-ALEXANDER
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FACHBEREICH WIRTSCHAFTS-
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Hypothesis Testing with Parametric Models in Social Science Experiments

Theoretical Results vs. Real Data

Master Thesis

Short description:
For students in mathematics, business mathematics, or business informatics, the Chair of Economic Policy offers a master thesis on empirical methods for social experiments. The goal is to investigate the validity of commonly used experimental methods via Monte Carlo simulations on real data.

Detailed description:
In a typical social science experiment, researchers take a group of participants and randomly split them into treatment and control group. Only the treatment group receives the treatment. Finally, researchers analyze this experimental data to estimate the effect of the treatment on a certain dependent variable of interest.

For the analysis, researchers often apply parametric models, such as the linear model:

$$Y = \beta_0 + \beta_1 x_1 + \cdots + \beta_m x_m + \beta_t T + \varepsilon$$

Here $T \in \{0,1\}$ indicates whether the participant is allocated to the treatment group (T=1) or to the control group (T=0). $x_1, \dots, x_n$ are known covariates, such as age, gender, etc., of the participants.

Testing hypothesizes (such as the classical hypothesis $\beta_t = 0$) via the linear model requires certain parametric assumptions. The statistical literature showed that a random split into treatment and control group is not enough to ensure that these assumptions are fulfilled.

In hypothesis testing, we usually want to reject a given null hypothesis at the level α, meaning the following: Suppose the null hypothesis is true and we repeat the same experiment for an infinite number of times. Then the test should reject the null hypothesis in exactly $\alpha \cdot 100\%$ of cases.

However, if the assumptions of the parametric model do not hold, we do not have any guarantee that this is the case. To get an impression about the performance of these tests in real experiments, one should ideally analyze the test on real data. The task for this master thesis is therefore to perform simulations on real data (i.e. simulations that replicate the real experiment as good as possible). In the simulation, one can ensure that the null hypothesis is true and consequently evaluate whether the test really rejects the null hypothesis in exactly $\alpha \cdot 100\%$ of cases.

Miscellaneous:
The master thesis can be written in English or German. However, English is preferred. The thesis should comprise of 30-40 pages. All further details can be discussed with the supervisor.

Applications should contain a short CV and a transcript. For application and for all kinds of questions, please contact Tobias Aufenanger (tobias.aufenanger@fau.de, 0911 5302 226).

The application deadline is 31.03.2018; an earlier start is possible.