Programs for running the examples in EMW 2014

This note describes the supplementary materials to "Nearly Optimal Tests when a Nuisance Parameter is Present Under the Null Hypothesis", Elliott Mueller and Watson. Note that this is an updated (and final) version of the programs to accompany the published paper.

The supplemetary materials consist of:

(a) EMW_Weightmatrices.xlsx. This file contains all of the weight matrices used in the examples in spreadsheet format.

(b) A triplet of MATLAB files for each example. In each case there is a .MAT file which contains the weights and is read by a procedure that constructs the test outlined in EMW. In addition there is a Monte Carlo file that runs a Monte Carlo for chosen parameters (β, δ, ρ) that calls the procedure file. For the BF problem an additional procedure is required, called by the procedure file in the numerical integration step.

(c) Many of the programs use the function CRLK.M which is used to select (or interpolate) rows of the weight matrix based on the first element of the row. This needs to be available for each of the programs to construct the weights from matrices of weights, named below.

All of the procedure files that construct the test return a one for rejection, zero for acceptance.

1 Behrens-Fisher Problem

BehrensFisher.m.

This program takes the data for x_1 and x_2 where the length of x_1 is at least as large as the length of x_2, and returns a one for a rejection and a zero for a fail to reject. The null hypothesis is that the means of the two series are equivalent.

bffn.m.

This program computes the likelihood at a given delta, and is used by the numerical integration procedure in BehrensFisher.m. There is no need to change anything in this program. Note that the numerical integration is undertaken in matlab using the command 'integral' which is different from the Gauss-Legendre quadrature discussed in the paper.

BehrensFisher_mc.m.

This program is a Monte Carlo (MC) program that calls BehrensFisher.m for various models. It returns as a first argument rejf which equals one for a rejection, zero for acceptance. The second return is a flag equal to one if the test switches.

bfmat.mat.

Matlab matrix of weights called by BehrensFisher.m

(complete)

2 Break Date Test

BREAKDATE.M

This program works for $\beta_0 \in [0.15, 0.5]$ (for $\beta_0 > 0.5$, reverse series). Using prescaled y_t (by the variance) it asks for y_t and the null break date. Constructs our test. There is no switching.

BREAKDATE_MC.m

This program is a MC program that calls BREAKDATE.M.

BREAKM.MAT

Matlab matrix of weights called by BREAKDATE.M.

(complete)

3 Prediction Regression

PREDREG1SIDE.M This is the main program to compute the test based on the approximate least favourable distribution. Inputs are the four sufficient statistics $Y_1, ..., Y_4$ and ρ. Returns $\{rejf\}$ where $rejf = 1$ denotes a rejection and a zero an acceptance of H_0.

PREDASY_MC. This program computes asymptotic size and power of the test through Monte Carlo simulation. Outcomes for the integrals in $Y_1, ..., Y_4$ are drawn from approximations with steps (total = nobs).

PREDLAMBDA1.MAT. Matlab matrix containing weights for construction of the test statistic (called by Predreg1side.m).

(complete)

4 Manski/Imbens Problem

PARTIALID_MC.m

This program is a Monte Carlo program that allows for a selected ρ the construction of size and power results (set various β and δ in the matrix 'models').

IMBMAN.m

Routine that computes the outcome of the test from the paper. Inputs are $\{y1, y2, \rho\} = \{Y_\beta, Y_\delta, \rho\}$ as per the paper. Returns $\{rejf\}$ where $rejf = 1$ if we reject, zero otherwise.

PARTIALM.MAT

Matlab matrix of weights as a function of delta (columns) for a range of ρ. If the value for ρ selected in IMBMAN.M is not equal to one of the values for ρ in the table the weights are linearly interpolated.

(complete)

5 Regression Selection Problem

PRETEST_MC.M

This program is a Monte Carlo program that allows for a selected ρ the construction of size and power results (set various β and δ in the matrix 'models').

REGSEL1.m This program computes the test based on the least favourable distribution.

REGSELM.MAT

Matlab matrix of weights as a function of delta (columns) for a range of ρ.

FIG7.M This program replicates the power curves in Figure 7 (does not compute the power envelope)

(complete)

6 Running Example: Known Sign of Nuisance Parameter

KNOWPOWER.M

This program is a Monte Carlo program that allows for a selected ρ the construction of size and power results (set various β and δ in the matrix 'models'). It also computes size and power for the test that ignores the restriction on δ.

RUNNEX.m

This program computes the test of the paper. It takes as inputs {Y1,Y2,rho}={Y_β, Y_δ, ρ} from the notation in the paper. The program returns {rejf} where rejf is a flag=1 for rejection, zero for fail to reject and tst is the likelihood ratio test statistic.

RUNNEXM.MAT

Matlab matrix of weights for constructing the test.

(complete)