Estimation and Inference with a (Nearly) Singular Jacobian: Description of the Matlab Files for Replications

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This Draft: February 4, 2019

Abstract

This document describes the Matlab files used to produce the simulation and empirical results of Han and McCloskey (2018) that are contained in the "Code and Data" supplement to the paper. The files are organized into seven separate folders. Each folder's contents is described below. The m-files beginning with an asterik (*) denote the main replication files within each folder. The other files within each folder are either associated function files or data files used as inputs.

Finite-Sample Distributions: The file "*FS_dist_simulator.m" simulates draws from the finite-sample distributions of the estimators and one-dimensional Wald statistics of the parameters of the threshold crossing model with a dummy endogenous variable (Example 2.3) analyzed in the paper. These simulation draws were used to construct the finite-sample density functions of the parameter estimators and Wald statistics in Sections 7.1 and 7.2 of the paper, respectively.

Local Limit Distributions: The file "*local_lim_dist_simulator.m" simulates draws from the weak-identification asymptotic distributions of the estimators and one-dimensional Wald statistics of the parameters of the threshold crossing model with a dummy endogenous variable (Example 2.3) analyzed in the paper. These simulation draws were used to construct the asymptotic density functions of the parameter estimators and Wald statistics in Sections 7.1 and 7.2 of the paper, respectively.

Histogram Generators: The file "*histo_grapher_est.m" was used to construct the finite-sample and weak-identification asymptotic density functions of the parameter estimators of the parameters of the threshold crossing model with a dummy endogenous variable (Example 2.3) analyzed in the paper. These density functions of the estimators appear in Section 7.1 of the paper. The file uses the finite-sample and asymptotic simulation draws that are output of "*FS_dist_simulator.m" and "*local_lim_dist_simulator.m" to construct the density functions. These simulation draws are stored as ".mat" files under the names "fs_est....mat" and "loc_lim_est....mat" in this folder.

The file "*histo_grapher_Wald.m" was used to construct the finite-sample and weak-identification asymptotic density functions of the Wald statistics for the parameters of the threshold crossing model with a dummy endogenous variable (Example 2.3) analyzed in the paper. These density functions of Wald statistics appear in Section 7.2 of the paper. The file uses the finite-sample and asymptotic simulation draws that are output of "*FS_dist_simulator.m" (in the Finite-Sample Distributions folder) and "*local_lim_dist_simulator.m" (in the Local Limit Distributions folder) to construct the density functions. These simulation draws are stored as ".mat" files under the names "fs_Wald....mat" and "loc_lim_Wald....mat" in this folder.

Local Quantile Generator: The file "*local_lim_quant_gen.m" was used to compute grids of local quantiles that pertain to the weak-identification asymptotic null distribution of the one-dimensional Wald statistic for the parameter $\boldsymbol{\pi}_2$ of the threshold crossing model with a dummy endogenous variable (Example 2.3) analyzed in the paper. The grids are computed over a range of b (indexing identification strength) and π_0 values. These local quantile grids are used in the construction of the (modified and) adjusted-Bonferroni critical values for the robust Wald tests analyzed in the power analysis of Section 7.3 of the paper and in the construction of a robust confidence interval in Section 8 of the paper.

Size-Correction Factor Computation: The file "*SC_factor_gen.m" was used to compute the size-correction factors used in the construction of the (modified and) adjusted-Bonferroni critical values for the robust Wald tests analyzed in the power analysis of Section 7.3 of the paper and in the construction of a robust confidence interval in Section 8 of the paper. The file uses grids of local quantiles of the one-dimensional Wald statistic for the parameter $\boldsymbol{\pi}_2$ of the threshold crossing model with a dummy endogenous variable (Example 2.3) analyzed in the paper. These grids of local quantiles are output of "*local_lim_quant_gen.m" (in the Local Quantile Generator folder) and are stored in this folder as ".mat" files under the names "local_quant.mat", corresponding to the power analysis of Seciton 7.3 of the paper, and "local_quant_emp.mat", corresponding to the robust confidence interval construction in Section 8 of the paper.

Power Functions: The file "*SR-AR_power_comp.m" was used to compute the finite-sample power curves for the robust one-dimensional Wald test using (modified and) adjusted-Bonferroni critical values and the projected one-dimensional subvector singularity-robust Anderson-Rubin test of Andrews and Guggenberger (2014) in the threshold crossing model with a dummy endogenous variable (Example 2.3) analyzed in the paper. These power curves can be found in Section 7.3 of the paper. The file uses a grid of local quantiles of the one-dimensional Wald statistic for the parameter $\boldsymbol{\pi}_2$. This grid of local quantiles is output of "*local_lim_quant_gen.m" (in the Local Quantile Generator folder) and is stored in this folder as a ".mat" file under the name "local_quant.mat". The file also uses a size-correction factor computed as output of "*SC_factor_gen.m" (in the Size-Correction Factor Computation folder). This size-correction factor appears as the variable "SCF_Wald" in the file "*SR-AR_power_comp.m".

Empirical Estimation: The file "*param_estimator.m" estimates the parameters of the threshold crossing model with a dummy endogenous variable (Example 2.3) analyzed in the paper from the data described in Section 8 of the paper. These data inputs are stored in this folder as ".mat" files under the names "ca11_black_BvB.mat", "drop_black_BvB.mat" and "prison_black_BvB.mat". The parameter estimates appear in Section 8 of the paper. The function file "*var_theta_fn.m" was used to compute the estimator of the asymptotic variance-covariance matrix of the parameter estimator. Both the parameter and variance-covariance matrix estimates were used, in conjunction with a local quantile grid (generated by "*local_lim_quant_gen.m" in the Local Quantile Generator folder) and size-correction factor (generated by "*SC_factor_gen.m" in the Size-Correction Factor Computation folder), to compute the robust confidence interval for the parameter $\boldsymbol{\pi}_2$ appearing in Section 8 of the paper.

References

Han, S., McCloskey, A., 2018. Estimation and inference with a (nearly) singular jacobian, Unpublished Manuscript, University of Texas at Austin and University of Colorado. (document)