

Guide to Supplemental Material for:
*Productivity and Quality in Health Care:
Evidence from the Dialysis Industry*

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This document describes the supplemental material needed to reproduce the calculations appearing in the main text. All the data and code discussed below is included in the supplemental directory.

1 Data and Output Files

The data and output files contained in the directory are:

- `prodEstData.csv`: Contains the center-level data on dialysis centers scrapped from CMS reports available at <http://projects.propublica.org/dialysis/>. The reports were systematically downloaded in the summer of 2011 and converted from PDF into text files.
- `finalSample.csv`: Is produced by `GenSumStats.m` and contains a cleaned version of the data (dropping observations with missing variables) to be used in the STATA estimation for table 4.
- `bootRes.mat`: Is produced by `runBoot.m` and contains the primary estimation results (Section 6.1) as well as results from the robustness checks in Section 6.2.
- `bootFlexRes.mat`: Is produced by `runFlexBoot.m` and contains the estimation results for the flexible frontier model (Section 6.3).

2 MATLAB code files

These files were run to produce the output files and tables for the draft using MATLAB version r2016a on a Mac Pro with 12-cores (parallel and optimization toolboxes are required). Full estimation of the model with bootstrapped standard errors takes roughly 8 hours to compute; estimation of the baseline model can be run by calling the `runBoot.m` script from this directory. The following is a description of the MATLAB code files in alphabetical order.

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- `backEnvelopeCalcs.m`: Based on computed results, constructs several back of the envelope calculations (e.g., the distribution of elasticities and the cost of infection calculations from the conclusion. A subset of these calculations appear in the body of the paper.
- `cleanCols.m`: Based on the specified specification, removes observations with missing data. This may vary based on which variables are included in the specification.
- `convertToFull.m`: Expands the vector of estimates $\hat{\Phi}$ from the length of observations included in the nonparametric estimation (i.e., those with non-zero hiring) to the full set of observations, using NaN to pad the dropped variables.
- `dec2bigbase.m`: Convert an integer to base B vector, used in `genBasis.m` to construct sieves.
- `GenSumStats.m`: Computes summary statistics, and formatted Tables for Tables 1 and 3 in the main paper. Additional tables also included. Also produces `finalSample.csv` for STATA regression analysis appearing in Section 5.2.
- `getQuality.m`: Computes the quality proxy as described in Section 5.1, also computes the proxy based on the death ratio to be used as an instrument.
- `GMMObj.m`: GMM Objective function for second stage estimation of β parameters when the productivity process is non-parametric (either baseline case or non-parametric robustness check).
- `GMMObjPara.m`: GMM Objective function for second stage estimation of β parameters when the productivity process is $\omega_{jt} = \delta_p + g(\omega_{jt-1}) + \xi_{jt}$.
- `locLin.m`: Locally linear non-parametric estimator used to construct,

$$\hat{E}[y|h_{jt}, i_{jt}, k_{jt}, \ell_{jt}, x_{jt}]$$

and other expectations for Robinson estimator.

- `mainEst.m`: Runs estimator for a single dataset (either full dataset or bootstrap dataset based on arguments) based on specification described by the structure `op`. Also computes ols and fixed effects estimators and returns all results in the matrix `coeff_table`.
- `opFirst.m`: Computes first stage estimate of α_q using sieve approximation for expectations. Legacy code which is not used, use `opFistLL.m` instead.
- `opFirstLL.m`: Computes first-stage estimate of α_q following partially linear estimation procedure describe in Section 5.3.

- `opSecond.m`: Computes second stage estimator of β following procedure described in Section 5.3, calls objective function is `GMMObj.m` or `GMMObjPara.m` based on specification controls.
- `printCoeffTable.m`: Use stored results in `BootRes.mat` to print Table 5.
- `printCoeffTable_flex.m`: Use stored results in `BootFlexRes.mat` to print Table 8.
- `printCoeffTable_gspec.m`: Use stored results in `BootRes.mat` to print Table 7 and additional un-included table on average productivity by type.
- `printCoeffTable_robust.m`: Use stored results in `BootRes.mat` to print Table 6.
- `runBoot.m` Main script for primary estimation and bootstrap inference. Coefficient estimates estimated by calling `runMainEst`. Parallel bootstrap in main body. Output saved to `bootRes.mat`.
- `runFlexBoot.m` Main script for flexible frontier estimation and bootstrap inference. Coefficient estimates estimated by calling `runFlexEst`. Parallel bootstrap in main body. Output saved to `bootFlexRes.mat`.
- `runFlexEst.m` : Computes estimates of the flexible frontier estimation without performing bootstrap inference. Also used as initial call in `runFlexBoot.m` for consistent setup. Essentially a wrapper script for `mainEst.m` setting the appropriate specification flags.
- `runMainEst.m` : Computes estimates of the primary estimation without performing bootstrap inference. Also used as initial call in `runBoot.m` for consistent setup. Essentially a wrapper script for `mainEst.m` setting the appropriate specification flags.
- `setupDialysis.m` : Reads in data from `prodEstData.csv` and sets up data structures for the variables and the specification flags.

3 STATA Files

The following files are used for calculations in Table 2 and the regression analysis presented in Section 5.2 and Table 4.

- `sumStats.do` : Reads in data from `finalSample.csv` and generates the summary statistics in Table 2.
- `regressions.do` : Reads in data from `finalSample.csv` and generates the regressions in Table 4.