

Documentation of the NKPC plotting tools

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1 Overview

We make available two Matlab plotting tools that allow for interactive plotting of point estimates and weak identification robust confidence sets, across the many specifications in the empirical section of our paper “Empirical evidence on inflation expectations in the new Keynesian Phillips curve”.

To start the plotting tools, execute the Matlab file `plot_estimates.m` (for point estimates) or `plot_confsets.m` (for confidence sets). Make sure that the data files `estimates.mat` and `confsets.mat` are located in the same folder. A window with interactive drop-down menus and buttons will appear. Due to the large number of specifications, the plotting tools may take a few seconds to respond between clicks.

2 Point estimates

The Matlab executable `plot_estimates.m` starts the point estimate plotting tool. When the window opens, the plotting tool will display 2-step GMM and CUE point estimates (red circles) from all the specifications considered in the main paper. The γ_f and λ estimates are plotted along the horizontal and vertical axes, respectively.

The drop-down menus at the top of the plotting tool are used to select subsets of the specifications. The first row of menus yield red points on the graph, while the second row yields blue points. The blue points are only displayed if they don’t exactly coincide with a red point. Once the selections have been made, press the “Draw” button to update the graph (allow a couple of seconds of processing time). All point estimates that satisfy the selected criteria will be displayed in one figure. If no point estimates match the selection, the figure will be empty. The graph can be exported to common figure formats by clicking the “Export” button.

The various drop-down menus correspond to the following specification dimensions. In all dropdown menus, the selection “all” plots all the subsequently listed choices together.

Forcing var. Forcing variable. Either labor share or output gap. Must be the same selection for both red and blue points.

Inflation Inflation series. Abbreviations used: `pgdp` = GDP deflator, `cpi` = consumer price index (all items), `gdpcptpi` = chain-type GDP price index, `pgnp` = GNP deflator, `gnpcptpi` = chain-type GNP price index, `pgdpnfb` = non-farm business GDP deflator, `pce` = personal consumption expenditures, `xfe` = less food and energy, `inf_gap_XXX` = subtracting out the Stock-Watson

UC-SV permanent component of inflation (filtered), `inf_gap_XXX_sm` = subtracting out the Stock-Watson UC-SV permanent component (smoothed), `inf_gap_cpi_spf` = subtracting out 10-year CPI forecast from the Survey of Professional Forecasters.

Labor share Labor share series. Abbreviations used: `ls` = labor share, `nfb` = non-farm business, `ls3nfb` = Sbordone’s (2005) cointegrating relationship between real wages and labor productivity, `gap` = detrended, `hp` = Hodrick-Prescott filter (smoothing parameter 10,000), `bk` = Baxter-King filter (keeping cycles between 6 and 32 quarters), `lt` = linear detrending, `qt` = quadratic detrending, `rt0Q` = trend computed using only (current vintage) data up to the relevant quarter.

Output gap Output gap series. Abbreviations used: `ygap` = output gap, `cbo` = Congressional Budget Office estimate, `hp` = Hodrick-Prescott filter (smoothing parameter 1,600), `bk` = Baxter-King filter (keeping cycles between 6 and 32 quarters), `lt` = linear detrending, `qt` = quadratic detrending, `rt0Q` = trend computed using only *real-time* data from the relevant quarter.

Expectations Proxy for inflation expectations. “Next-period inflation” uses next-period inflation (π_{t+1}), “all survey” gives all specifications that use survey forecast proxies. The survey forecasts are current-period one-quarter-ahead ($\pi_{t+1|t}^s$) and treated as endogenous in the estimation, unless otherwise noted. Abbreviations used: `SPF` = Survey of Professional Forecasters, `GB` = the Federal Reserve’s Greenbooks, `exog` = survey treated as exogenous in estimation, `L.` = lagged two-quarter-ahead forecast ($\pi_{t+1|t-1}^s$).

No. of lags Number of inflation lags on the right-hand side of the NKPC.

Sum to 1 If “Yes”, the right-hand side inflation coefficients are restricted to sum to 1.

Oil If “Yes”, include oil shocks as explanatory variable (log change in WTI spot price deflated by GDP deflator).

Interest r. If “Yes”, include interest rate as explanatory variable (90-day Treasury rate).

VAR If “Yes”, use reduced-form VAR to proxy for inflation expectation, where the instruments determine the projection variables. See details in the main paper.

Method Estimation method. Either efficient 2-step GMM, CUE GMM or OLS.

Instruments Instrument set. See details in the main paper.

d(inf) instr. If “Yes”, use *first-differenced* inflation in instrument set.

Sample Estimation sample. “Full” means the full available sample.

3 Confidence sets

The Matlab executable `plot_confsets.m` starts the confidence set plotting tool. When the window opens, the plotting tool will display CUE point estimates (black bullets) from all the specifications considered in the main paper (which is a subset of the above point estimate specifications). The γ_f and λ estimates are plotted along the horizontal and vertical axes, respectively.

The drop-down menus at the top are used to select subsets of the specifications. The menus “Forcing var.” through “Sample” are the same as for the point estimate plotting tool (see above). The three additional menus give the user the following choices:

Wald ellipse If “5%” or “10%” is selected, draw Wald ellipses (in black) of the indicated significance level around each CUE point estimate.

S set If “5%” or “10%” is selected, draw shaded confidence sets based on the weak identification robust S test (Stock and Wright, 2000). If “5% and 10%” is selected, draw both the 5% and 10% sets (in light gray and dark gray, respectively). If “5% and 10% (+ labels)” is selected, the 5% and 10% S sets are marked with labels “0.05” and “0.1”, respectively. The confidence sets are based on a 32×32 grid. At each grid point, the *maximum* p-value across the selected specifications is used to determine whether the point is included in the confidence set or not.

CUE p-val Display the S test p-value at the CUE next to each black bullet.

Wald ellipses are computed from the estimated variance-covariance matrix of the CUE. If (Wald or S test) confidence sets are desired for a large number of specifications, Matlab may take several seconds to respond.

Note: In rare cases, the plotting tool runs into a Matlab bug in which the 5% and 10% S sets are given wrong colors. This only happens if one of the two sets is empty. The text labels at the edges of the sets reliably indicate the significance level.

4 Explanation of underlying code and data

The plotting tools have been produced with Matlab’s GUIDE tool. The raw `.fig` file and `.m` file are:

- `plot_estimates_gui.fig` and `plot_estimates_gui.m` (for point estimates).
- `plot_confsets_gui.fig` and `plot_confsets_gui.m` (for confidence sets).

They may be altered using the GUIDE tool. If you alter and later export the files, note that Matlab has a bug by which it inserts extra unwarranted line breaks in the resulting exported `.m` file. Make sure to remove these extra line breaks before executing the exported file (look for the red error lines next to the scroll bar in the Editor).

The plotting tools read off point estimate and confidence set data from the files `estimates.mat` and `confsets.mat`, respectively. In turn, these two data files are created using the executable `load_data.m` (see its inline comments). The latter imports CSV (comma-separated) data that has been created in Ox (Doornik, 2007). There are six CSV files. In each of these files, the value `−999` denotes a missing data point.

`results_ls.csv` and `results_ygap.csv` contain point estimate data for labor share and output gap specifications, respectively. Each row corresponds to a new specification (or estimator). The column headers are available in the Excel spreadsheets `columns_ls.xls` and `columns_ygap.xls`, respectively. Most of the column headers correspond to the specification choices in the plotting tool. In the CSV files, 0s and 1s are used to indicate which specification choices are made. If none of the survey forecast choices are marked with a 1, the specification uses next-period inflation.

In addition to the abbreviations mentioned previously, the following are used: $x = \lambda$, $exp = \gamma_f$, $coef$ = GMM point estimate, OLS = OLS point estimate, $sterr$ = GMM standard error, $Hansen_proj_p$ = weak identification robust Hansen J-test p-value, F = robust first-stage F statistic (Montiel Olea and Pflueger, 2012), $Keff$ = effective degrees of freedom (Montiel Olea and Pflueger, 2012), CD = Cragg-Donald test of reduced rank, KP = Kleibergen-Paap test of reduced rank, $Wald$ = individual t-test p-value, S_XXX = S-test p-value (concentrating out other parameters), S_XXX_pr = S-test p-value (projection-based), $\#_instr$ = number of instruments, $\#_pars$ = number of estimated parameters, $2STEP$ = 2-step efficient GMM is used, CUE = CUE GMM is used, VAR = reduced-form VAR is used to proxy for expectations, no_conv = estimator did not converge, $overid$ = number of overidentifying restrictions, $Dlogoildef$ = include oil shocks, $TB3MS$ = include Treasury rate, $TB3MS_restr$ = include Treasury rate (restricted to have same coefficient as labor share – not used), $start$ = start of estimation period, end = end of estimation period.

results_S_ls.csv and **results_S_ygap.csv** contain confidence set data for labor share and output gap specifications, respectively, for specifications that do not use a VAR reduced form. **results_S_var_ls.csv** and **results_S_var_ygap.csv** contain confidence set data for labor share and output gap specifications, respectively, for specifications that do use a VAR reduced form. These CSV files have the same overall structure as the point estimate CSV files, except that the number of columns is smaller. However, for these files, each row corresponds to a new point in the S test grid, so there are $32 \times 32 = 1024$ rows per specification, plus an additional row containing the CUE point estimate.

The Excel spreadsheets **columns_conf_ls.xls** and **columns_conf_ygap.xls** list the column headers in the confidence set CSV files (see the two top rows in each spreadsheet). The columns “coef_x” and “coef_exp” give the (λ, γ_f) coordinate of the relevant grid point (except for the 1025th row for each specification, which gives the CUE point estimate). The column “S” gives the S test p-value. The columns “var_x”, “cov_x_exp” and “var_exp” give the estimates of the entries in the variance-covariance matrix at the CUE. The columns “W_90” and “S_90” give the fraction of the parameter space (that is plotted in the plotting tool) covered by the 90% Wald and S sets, respectively. The column “StoW_90” gives the ratio between these two fractions. The columns “W_95”, “S_95” and “StoW_95” give the same numbers for the 95% sets.