Statistics/Data analysis

User: 1

[XT] xtlp — Panel local projections with fixed-effect (FE) estimator and split-panel jackknife (SPJ) estimator

Syntax

xtlp *depvar* *indepvars* [*if*] [*in*] **, method(***method_name***)** [**fe tfe** **hor(***numlist***)** **ytransf(***transf_name***)** **shock(***integer***)** **graph**]

options	Description
Estimation	
method(*method_name***)**	**fe** or **spj** (required)
fe|**tfe**	include individual fixed effects (default) or two-way fixed effects (individual and time)
Multiple Horizons	
hor(*numlist***)**	horizon(s) for impulse response functions: specify # for max horizon or *#_start #_end*
ytransf(*transf_name***)**	transform dependent variable: **level** (default), **diff**, **cmltdiff**, or **cmltsum**
shock(*integer***)**	number of leading variables in *indepvars* to treat as shocks; default is **shock(1)**
graph	graph the impulse response functions

A panel variable and a time variable must be specified using **xtset**.

depvar and *indepvars* may not contain factor variables and time-series operators; see fvvarlist and tsvarlist.

The command requires exactly one dependent variable and at least one independent variable.

Description

xtlp estimates dynamic impulse response functions (IRFs) for panel data using Local Projection (LP) method. It offers two estimators via **method()**: the standard fixed-effect estimator (**m(fe)**) and the split-panel jackknife estimator (**m(spj)**). The SPJ estimator addresses the intrinsic Nickell bias in dynamic settings (Mei, Sheng, and Shi, 2025).

When LPs are estimated with fixed effects in short panels, the dynamic structure of the predictive equation typically induces Nickell bias in the FE estimator, even when no lagged dependent variable appears explicitly among *indepvars*. This bias invalidates standard inference based on FE t-statistics. The SPJ estimator implemented here provides a simple and effective bias-correction that restores valid statistical inference in panel LPs, following Mei, Sheng, and Shi (2025).

The command performs single-equation estimation under the specified fixed-effect structure (**fe** or **tfe**). Given *depvar* and *indepvars*, **xtlp** applies the chosen estimator (**m(fe)** or **m(spj)**) to produce coefficient estimates.

For multiple horizons, **xtlp** automates IRF construction over the range specified in **hor()**. It generates horizon-specific transformed dependent variables via **ytransf()**, runs sequential regressions for each horizon, and compiles the results. The option **shock()** allows users to treat several leading regressors as shocks; **xtlp** then reports dynamic IRFs and, if requested, produces IRF plots via **graph**.

Options

Estimation

method(*method_name***)** is required and specifies the estimator.

fe requests the standard fixed-effects (within) estimator.

spj requests the split-panel jackknife (SPJ) estimator. This method splits each individual time series into two subpanels and combines the full-sample and subsample FE estimates to deliver a bias-corrected estimator for dynamic panel LPs with fixed effects; see Mei, Sheng, and Shi (2025).

fe includes individual fixed effects in the model. This is the default if **tfe** is not specified. It cannot be combined with **tfe**.

tfe includes two-way fixed effects (both individual and time fixed effects) in the model. It cannot be combined with **fe**.

Multiple horizons

hor(*numlist***)** specifies the horizons for the LPs. This option accepts either one or two integers. The default is **hor(0)**.

If **hor(0)** is specified (or implied by default), only a single estimation is performed, and horizon-specific IRF options (i.e., **ytransf()**, **shock()**, **graph**) do not apply.

If one integer *H* is specified (e.g., **hor(5)**), LPs are estimated for horizons 0 to *H*.

If two integers *S* and *H* are specified (e.g., **hor(1 5)**), LPs are estimated for horizons *S* to *H*. The start horizon *S* must be 0 or 1.

ytransf(*transf_name***)** specifies the transformation applied to the dependent variable *depvar* for the LP at each horizon *h*.

level (default) uses the level of *depvar*, $y_{i,t+h}$, as the dependent variable.

diff uses the first difference of *depvar*, $y_{i,t+h} - y_{i,t+h-1}$, as the dependent variable.

cmltdiff uses the cumulative difference of *depvar* relative to period t-1, $y_{i,t+h} - y_{i,t-1}$, as the dependent variable, which captures the cumulative response of *depvar*.

cmltsum uses the cumulative sum of *depvar*, $\Sigma_{k=0}^{h} y_{i,t+k}$, as the dependent variable.
Note: This option is typically useful when *depvar* is already a first-differenced variable (e.g., growth rate), so that the cumulative sum recovers the level impact over the horizon.

shock(*integer***)** specifies that the first # variables in *indepvars* are treated as shocks when constructing IRFs. The default is **shock(1)**. For example, **shock(2)** means the first two variables in *indepvars* are treated as separate shocks, and the command reports an IRF for each of them.

graph requests that IRFs be graphed after estimation. For each shock, the graph plots the point estimates together with 95% confidence intervals over the specified horizons.

Other

The current version of **xtlp** does not accept a user-specified **vce()** option. The variance–covariance matrix of the coefficients is computed using a panel-robust sandwich estimator with clustering at the individual level.

Examples

Download four *.dta* files from the **applications/data_preparation** folder in the replication package of Mei, Sheng, and Shi (2025)

```
./applications/data_preparation/RR_f4data.dta
./applications/data_preparation/BVX_t1data.dta
./applications/data_preparation/MSV_f2data.dta
./applications/data_preparation/CS_f3data.dta
```

Example 1: FE vs. SPJ with fe (single estimation)

```
use BVX_t1data, clear
keep if smp==1
```

Estimate using FE estimator (**m(fe)**) with individual fixed effects (**fe**)

```
xtlp Fd6y R_B L1R_B L2R_B L3R_B R_N L1R_N L2R_N L3R_N D1y L1D1y L2D1y
    L3D1y D1d_y L1D1d_y L2D1d_y L3D1d_y, fe m(fe)
```

Estimate using SPJ estimator (**m(spj)**) with individual fixed effects (**fe**)

```
xtlp Fd6y R_B L1R_B L2R_B L3R_B R_N L1R_N L2R_N L3R_N D1y L1D1y L2D1y
    L3D1y D1d_y L1D1d_y L2D1d_y L3D1d_y, fe m(spj)
```

Example 2: FE vs. SPJ with (tfe) (single estimation)

```
use RR_f4data, replace
```

Estimate using FE estimator (**m(fe)**) with two-way fixed effects (**tfe**)

```
xtlp f10LNGDP CRISIS l1LNGDP l2LNGDP l3LNGDP l4LNGDP l1CRISIS l2CRISIS
    l3CRISIS l4CRISIS, tfe m(fe)
```

Estimate using SPJ estimator (**m(spj)**) with two-way fixed effects (**tfe**)

```
xtlp f10LNGDP CRISIS l1LNGDP l2LNGDP l3LNGDP l4LNGDP l1CRISIS l2CRISIS
    l3CRISIS l4CRISIS, tfe m(spj)
```

Example 3: Estimating IRFs (multiple horizons)

```
use RR_f4data, replace
```

Estimate IRF from horizon 0 to 10 (**h(0 10)**) and plot graph (**g**)

```
xtlp f0LNGDP CRISIS l1LNGDP l2LNGDP l3LNGDP l4LNGDP l1CRISIS l2CRISIS
    l3CRISIS l4CRISIS, tfe m(fe) h(0 10) g
xtlp f0LNGDP CRISIS l1LNGDP l2LNGDP l3LNGDP l4LNGDP l1CRISIS l2CRISIS
    l3CRISIS l4CRISIS, tfe m(spj) h(0 10) g
```

Estimate IRF from horizon 1 to 10 (**h(1 10)**) and plot graph (**g**)

```
xtlp f0LNGDP CRISIS l1LNGDP l2LNGDP l3LNGDP l4LNGDP l1CRISIS l2CRISIS
    l3CRISIS l4CRISIS, tfe m(fe) h(1 10) g
xtlp f0LNGDP CRISIS l1LNGDP l2LNGDP l3LNGDP l4LNGDP l1CRISIS l2CRISIS
    l3CRISIS l4CRISIS, tfe m(spj) h(1 10) g
```

Example 4: Dependent variable transformation (multiple horizons)

```
use CS_f3data, clear
```

Using cumulative sum transformation (**cmltsum**) for growth rates

```
xtlp GRRT_WB CRISIS l1CRISIS l2CRISIS l3CRISIS l4CRISIS l1GRRT_WB
    l2GRRT_WB l3GRRT_WB l4GRRT_WB, fe m(fe) h(0 10) ytr(cmltsum) g
xtlp GRRT_WB CRISIS l1CRISIS l2CRISIS l3CRISIS l4CRISIS l1GRRT_WB
    l2GRRT_WB l3GRRT_WB l4GRRT_WB, fe m(spj) h(0 10) ytr(cmltsum) g
```

Example 5: Multiple shocks (multiple horizons)

```
use MSV_f2data, clear
keep CountryCode year F1y F2y F3y F4y F5y F6y F7y F8y F9y F10y
    L0HHD L1GDP L1HHD L1GDP L2HHD L1GDP L3HHD L1GDP L4HHD L1GDP
    L0NFD L1GDP L1NFD L1GDP L2NFD L1GDP L3NFD L1GDP L4NFD L1GDP L0y L1y
    L2y L3y L4y
```

Specifying two shock variables using **sh(2)**

```
xtlp F1y L0HHD_L1GDP L0NFD_L1GDP L1HHD_L1GDP L2HHD_L1GDP L3HHD_L1GDP
    L4HHD_L1GDP L1NFD_L1GDP L2NFD_L1GDP L3NFD_L1GDP L4NFD_L1GDP L0y L1y
    L2y L3y L4y, fe m(fe) h(0 9) sh(2) g
xtlp F1y L0HHD_L1GDP L0NFD_L1GDP L1HHD_L1GDP L2HHD_L1GDP L3HHD_L1GDP
    L4HHD_L1GDP L1NFD_L1GDP L2NFD_L1GDP L3NFD_L1GDP L4NFD_L1GDP L0y L1y
    L2y L3y L4y, fe m(spj) h(0 9) sh(2) g
```

Stored results

xtlp is an **eclass** command. The contents of **e()** depend on the **hor()** setting and the **shock()** setting.

Case 1: Single estimation

When **hor(0)** is specified (or implied by default), **xtlp** runs one FE or SPJ estimation.

xtlp posts results in a way similar to other linear regression commands.

xtlp stores the following in **e()**:

Scalars

e(N)	number of observations
e(N_g)	number of panels (individuals)
e(df_r)	residual degrees of freedom

Macros

e(cmd)	**xtlp**
e(depvar)	name of dependent variable
e(indepvars)	names of independent variables
e(properties)	**b V**

Matrices

e(b)	coefficient vector (1 × K)
e(V)	variance–covariance matrix (K × K)

Functions

e(sample)	marks estimation sample

Case 2: Multiple horizons

When **hor()** specifies multiple horizons, **xtlp** estimates the model separately for each horizon *h*.

xtlp posts a consolidated matrix of IRFs, including point estimates, standard errors, and the lower and upper bounds of 95% confidence intervals.

xtlp stores the following in **e()**:

Matrices

e(b*h*)	coefficient vector for horizon *h* (1 × K)
e(V*h*)	variance–covariance matrix for horizon *h* (K × K)
e(irf)	IRF results: estimate, standard error, lower and upper bounds (H × 4 or H × (4×#shocks))

When **shock(1)** is specified (or implied by default), the columns of **e(irf)** are named

"IRF"	IRF point estimate
"Std.Err."	standard error of IRF
"IRF LOW"	lower 95% confidence interval
"IRF UP"	upper 95% confidence interval

When **shock(#)** specifies more than one shock (i.e., # > 1), **e(irf)** is organized as blocks of four columns for each shock with names

"IRF_#"	IRF point estimate for shock #
"Std.Err._#"	standard error of IRF for shock #
"IRF LOW_#"	lower 95% confidence interval for shock #
"IRF UP_#"	upper 95% confidence interval for shock #

References

Ziwei Mei, Liugang Sheng, Zhentao Shi, 2025, *"Nickell bias in panel local projection: Financial crises are worse than you think"*, Journal of International Economics.

Replication package for Ziwei Mei, Liugang Sheng, Zhentao Shi, 2025, "*Nickell bias in panel local projection: Financial crises are worse than you think*", Journal of International Economics.

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