

Title

persuasio4ytz2lpr — Conduct causal inference on the local persuasion rate for binary outcomes y , binary treatments t and binary instruments z

Syntax

```
persuasio4ytz2lpr depvar treatvar instrvar [covariates] [if] [in]  
[, level(#) model(string) method(string) nboot(#) title(string)]
```

Options

| <i>option</i> | <i>Description</i> |
|---------------------------------|---|
| level (#) | Set confidence level; default is level (95) |
| model (<i>string</i>) | Regression model when <i>covariates</i> are present |
| method (<i>string</i>) | Inference method; default is method ("normal") |
| nboot (#) | Perform # bootstrap replications |
| title (<i>string</i>) | Title of estimation |

Description

persuasio4ytz2lpr conducts causal inference on causal inference on the local persuasion rate.

It is assumed that binary outcomes y , binary treatments t , and binary instruments z are observed. This command is for the case when persuasive treatment (t) is observed, using estimates of the local persuasion rate (LPR) via this package's command **lpr4ytz**.

varlist should include *depvar treatvar instrvar covariates* in order. Here, *depvar* is binary outcome (y), *treatvar* is binary treatment, *instrvar* is binary instrument (z), and *covariates* (x) are optional.

There are two cases: (i) *covariates* are absent and (ii) *covariates* are present.

- Without x , the LPR is defined by

$$\mathbf{LPR} = \{\Pr(y=1|z=1) - \Pr(y=1|z=0)\} / \{\Pr[y=0, t=0|z=0] - \Pr[y=0, t=0|z=1]\}.$$

The estimate and its standard error are obtained by the following procedure:

1. The numerator of the LPR is estimated by regressing y on z .
2. The denominator is estimated by regressing $(1-y)*(1-t)$ on z .
3. The LPR is obtained as the ratio.
4. The standard error is computed via STATA command **nlcom**.
5. Then, a confidence interval for the LPR is obtained via the usual normal approximation.

- With x , the LPR is defined by

$$\mathbf{LPR} = E[\mathbf{LPR}(x)\{e(1|x) - e(0|x)\}] / E[e(1|x) - e(0|x)]$$

where

$$\mathbf{LPR}(x) = \{\Pr(y=1|z=1, x) - \Pr(y=1|z=0, x)\} / \{\Pr[y=0, t=0|z=0, x] - \Pr[y=0, t=0|z=1, x]\},$$

$$e(1|x) = \Pr(t=1|z=1, x), \text{ and } e(0|x) = \Pr(t=1|z=0, x).$$

The estimate is obtained by the following procedure.

If **model**("no_interaction") is selected (default choice),

1. The numerator of the LPR is estimated by regressing y on z and x .
2. The denominator is estimated by regressing $(1-y)*(1-t)$ on z and x .
3. The LPR is obtained as the ratio.
4. The standard error is computed via STATA command **nlcom**.
5. Then, a confidence interval for the LPR is obtained via the usual normal approximation.

Note that in this case, $\mathbf{LPR}(x)$ does not depend on x because of the linear regression model specification.

Alternatively, if **model**("interaction") is selected,

1. $\Pr(y=1|z, x)$ is estimated by regressing y on x given $z = 0, 1$.
2. $\Pr[y=0, t=0|z, x]$ is estimated by regressing $(1-y)*(1-t)$ on x given $z = 0, 1$.
3. $\Pr(t=1|z, x)$ is estimated by regressing t on x given $z = 0, 1$.
4. For each x in the estimation sample, both $\mathbf{LPR}(x)$ and $\{e(1|x) - e(0|x)\}$ are evaluated.

5. Then, the sample analog of **LPR** is constructed.
6. Finally, the bootstrap procedure is implemented via STATA command **bootstrap**.

Options

model(*string*) specifies a regression model of *y* on *z* and *x*.

This option is only relevant when *x* is present. The default option is "no_interaction" between *z* and *x*. When "interaction" is selected, full interactions between *z* and *x* are allowed.

level(#) sets confidence level; default is **level**(95).

method(*string*) refers the method for inference.

The default option is **method**("normal"). Since the LPR is point-identified, usual two-sided confidence intervals are produced.

1. When **model**("interaction") is chosen as an option, it needs to be set as **method**("bootstrap"); otherwise, the confidence interval will be missing.

nboot(#) chooses the number of bootstrap replications.

The default option is **nboot**(50). It is only relevant when **method**("bootstrap") is selected.

title(*string*) specifies the title of estimation.

Remarks

It is recommended to use **nboot**(#) with # at least 1000. A default choice of 50 is meant to check the code initially because it may take a long time to run the bootstrap part. The bootstrap confidence interval is based on percentile bootstrap. A use of normality-based bootstrap confidence interval is not recommended because bootstrap standard errors can be unreasonably large in applications.

Examples

We first call the dataset included in the package.

```
. use GKB, clear
```

The first example conducts inference on the LPR without covariates, using normal approximation.

```
. persuasio4ytz2lpr voteddem_all readsome post, level(80)  
method("normal")
```

The second example conducts bootstrap inference on the LPR.

```
. persuasio4ytz2lpr voteddem_all readsome post, level(80)  
method("bootstrap") nboot(1000)
```

The third example conducts bootstrap inference on the LPR with a covariate, MZwave2, interacting with the instrument, post.

```
. persuasio4ytz2lpr voteddem_all readsome post MZwave2, level(80)  
model("interaction") method("bootstrap") nboot(1000)
```

Stored results

Matrices

e(lpr_est): (1*1 matrix) estimate of the local persuasion rate

e(lpr_ci): (1*2 matrix) confidence interval for the local persuasion rate in the form of [lb_ci, ub_ci]

Macros

e(cilevel): confidence level

e(inference_method): inference method: "normal" or "bootstrap"

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References

Sung Jae Jun and Sokbae Lee (2019), Identifying the Effect of Persuasion, [arXiv:1812.02276](https://arxiv.org/abs/1812.02276) [[econ.EM](#)]