## Title

**aprlb** — Estimate the lower bound on the average persuasion rate

## Syntax

**aprlb** *depvar instrvar* [*covariates*] [*if*] [*in*] [, **model**(*string*) **title**(*string*)]

**Options**

| *option* | *Description* |
|---|---|
| **model**(*string*) | Regression model when *covariates* are present |
| **title**(*string*) | Title |

## Description

**aprlb** estimates the lower bound on the average persuasion rate (APR). *varlist* should include *depvar instrvar covariates* in order. Here, *depvar* is binary outcomes (*y*), *instrvar* is binary instruments (*z*), and *covariates* (*x*) are optional.

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

- Without *x*, the lower bound (**theta_L**) on the APR is defined by

$$\textbf{theta\_L} = \{\Pr(y=1|z=1) - \Pr(y=1|z=0)\}/\{1 - \Pr(y=1|z=0)\}.$$

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

1. $\Pr(y=1|z=1)$ and $\Pr(y=1|z=0)$ are estimated by regressing *y* on *z*.
2. **theta_L** is computed using the estimates obtained above.
3. The standard error is computed via STATA command **nlcom**.

- With *x*, the lower bound (**theta_L**) on the APR is defined by

**theta_L** = E[**theta_L_num**($x$)]/E[**theta_L_den**($x$)],

where

**theta_L_num**($x$) = Pr($y$=1|$z$=1,$x$) - Pr($y$=1|$z$=0,$x$)

and

**theta_L_den**($x$) = 1 - Pr($y$=1|$z$=0,$x$).

The estimate is obtained by the following procedure.

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

1. Pr($y$=1|$z$,$x$) is estimated by regressing $y$ on $z$ and $x$.

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

1a. Pr($y$=1|$z$=1,$x$) is estimated by regressing $y$ on $x$ given $z$ = 1.
1b. Pr($y$=1|$z$=0,$x$) is estimated by regressing $y$ on $x$ given $z$ = 0.

Ater step 1, both options are followed by:

2. For each $x$ in the estimation sample, **theta_L_num**($x$) and **theta_L_den**($x$) are evaluated.

3. The estimates of **theta_L_num**($x$) and **theta_L_den**($x$) are averaged to estimate **theta_L**.

When *covariates* are present, the standard error is missing because an analytic formula for the standard error is complex. Bootstrap inference is implemented when this package's command **persuasio** is called to conduct inference.

## 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; this is accomplished by estimating Pr($y$=1|$z$=1,$x$) and Pr($y$=1|$z$=0,$x$), separately.

**title**(*string*) specifies a title.

## Remarks

It is recommended to use this package's command **persuasio** instead of calling **aprlb** directly.

## Examples

We first call the dataset included in the package.

```
. use GKB_persuasio, clear
```

The first example estimates the lower bound on the APR without covariates.

```
. aprlb voteddem_all post
```

The second example adds a covariate.

```
. aprlb voteddem_all post MZwave2
```

The third example estimates the lower bound by the covariate.

```
    . by MZwave2, sort: aprlb voteddem_all post
```

## Stored results

### Scalars

**e(N):** sample size

**e(lb_coef):** estimate of the lower bound on the average persuasion rate

**e(lb_se):** standard error of the lower bound on the average persuasion rate

### Macros

**e(outcome):** variable name of the binary outcome variable

**e(instrument):** variable name of the binary instrumental variable

**e(covariates):** variable name(s) of the covariates if they exist

**e(model):** regression model specification ("no_interaction" or "interaction")

**Functions:**

**e(sample):** 1 if the observations are used for estimation, and 0 otherwise.

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GPL-3

## References

Sung Jae Jun and Sokbae Lee (2022), Identifying the Effect of Persuasion, arXiv:1812.02276 [econ.EM]

## Version

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