

Package: epmrob (via r-universe)

August 20, 2024

Type Package

Title Robust Estimation of Probit Models with Endogeneity

Version 0.1

Date 2023-06-14

Author Mikhail Zhelonkin [aut, cre]
(<<https://orcid.org/0000-0002-6912-4074>>), Andre Bik [aut],
Andrea Naghi [aut]

Maintainer Mikhail Zhelonkin <Mikhail.Zhelonkin@gmail.com>

Description Package provides a set of tools for robust estimation and inference for probit model with endogenous covariates. The current version contains a robust two-step estimator. For technical details, see Naghi, Varadi and Zhelonkin (2022), <[doi:10.1016/j.ecosta.2022.05.001](https://doi.org/10.1016/j.ecosta.2022.05.001)>.

License GPL-2

Imports robustbase, MASS

Suggests mvtnorm

NeedsCompilation no

Repository CRAN

Date/Publication 2023-06-16 09:10:02 UTC

Contents

| | |
|--------------------------------|---|
| epmrob-package | 2 |
| coef.epmrob | 2 |
| epmrob | 3 |
| epmrob.vcov | 4 |
| IVProbitRob | 5 |
| print.epmrob | 6 |
| print.summary.epmrob | 7 |
| rob.control | 8 |
| summary.epmrob | 8 |
| xweights | 9 |

Index **10**

| | |
|----------------|--|
| epmrob-package | <i>Robust estimation of probit models with endogeneity</i> |
|----------------|--|

Description

Package provides a set of tools for robust estimation of probit models with endogeneity.

Details

Package: epmrob
Type: Package
Version: 1.0
Date: 2023-06-14
License: GPL-2

Author(s)

Mikhail Zhelonkin, Andre Bik, Andrea Naghi

Maintainer: Mikhail Zhelonkin <Mikhail.Zhelonkin@gmail.com>

References

Naghi, A. A., Varadi, M., & Zhelonkin, M. (2022). Robust Estimation of Probit Models with Endogeneity. *Econometrics and Statistics*. doi:10.1016/j.ecosta.2022.05.001

See Also

[epmrob](#), [IVProbitRob](#)

| | |
|-------------|---|
| coef.epmrob | <i>Extract Coefficients from the Robust Endogenous Probit Model Fit</i> |
|-------------|---|

Description

Returns the coefficients of the robust two-stage estimator for endogenous probit model.

Usage

```
## S3 method for class 'epmrob'  
coef(object, ...)
```


Value

Object of class "epmrob".

| | |
|--------------|---|
| coefficients | a named vector of coefficients |
| stage1 | object of class <code>rlm</code> that contains first stage robust fit |
| stage2 | object of class <code>glmrob</code> that contains second stage robust probit fit. Note that the standard errors in this object are biased, since they are not corrected for the uncertainty in the first estimation step. Use <code>vcov</code> below |
| vcov | variance matrix of the second stage |
| call | the matched call |

Author(s)

Mikhail Zhelonkin, Andre Bik, Andrea Naghi

References

Naghi, A. A., Varadi, M., and Zhelonkin, M. (2022). Robust Estimation of Probit Models with Endogeneity. *Econometrics and Statistics*. doi:10.1016/j.ecosta.2022.05.001

See Also

[rlm](#), [rob.control](#)

epmrob.vcov

Extract Asymptotic Variance Covariance Matrix

Description

Extracts the variance covariance matrix of the robust endogenous probit model fit by applying a bootstrap.

Usage

```
epmrob.vcov(object, B = 200, control = rob.control())
```

Arguments

| | |
|---------|---|
| object | object of class "epmrob". |
| B | the number of samples used in the bootstrapping process used to calculate the variance covariance matrix. |
| control | a list of parameters for controlling the fitting process. |

Details

The variance covariance matrix is estimated by applying a bootstrap

Value

Variance covariance matrix of the entire estimation procedure. Variance covariance matrix of the reduced stage or outcome stage can be extracted using the `vcov` function for the corresponding stage estimator, e.g. `vcov(epmrob.object$stage1)` or `vcov(epmrob.object$stage2)`.

Author(s)

Mikhail Zhelonkin, Andre Bik, Andrea Naghi

 IVProbitRob

Robust Probit Model with Endogeneity

Description

Compute robust two-stage estimates of probit model with endogeneity.

Usage

```
IVProbitRob(reduced, outcome, data, control = rob.control())
```

Arguments

| | |
|----------------------|--|
| <code>reduced</code> | formula, the reduced function. |
| <code>outcome</code> | formula, the outcome function. |
| <code>data</code> | an optional data fram containing the varaibles in the model. If not found in data, the variables are taken from <code>environment(formula)</code> , typically the environment from which <code>IVProbitRob</code> is called. |
| <code>control</code> | a list of parameters for controlling the fitting process. |

Details

Compute robust two-step estimates of the endogenous probit model.

Value

Object of class "epmrob".

Author(s)

Mikhail Zhelonkin, Andre Bik, Andrea Naghi

References

Naghi, A. A., Varadi, M., & Zhelonkin, M. (2022). Robust Estimation of Probit Models with Endogeneity. *Econometrics and Statistics*. doi:10.1016/j.ecosta.2022.05.001

See Also[epmrob](#)**Examples**

```

library(mvtnorm)
N <- 2000
M <- 500
cont.frac = 0.01
rho = 0.5
sigma = matrix(c(1, rho, rho, 1), 2, 2)
gamma1 = 1
gamma2 = c(0.6, 0.4)
alpha1 = c(0.5)
beta1 = 0.5

set.seed(123)
X1 = rnorm(N,0,1)
X2 = rnorm(N,0,1)
X3 = rnorm(N,0,1)
eps = rmvnorm(N, mean =rep(0,2), sigma = sigma)
Y1 = X1*gamma1 + X2*gamma2[1] + X3*gamma2[2] + eps[,1]
Y2 = ifelse(X1*beta1 + Y1*alpha1 + eps[,2] > 0, 1, 0)

dat.exmpl <- data.frame(Y2, Y1, X1, X2, X3)
names(dat.exmpl) <- c("int", "endo", "exo", "ivrb1", "ivrb12")
ivp.fit <- IVProbitRob(endo ~ exo + ivrb1 + ivrb12, int ~ endo + exo, data = dat.exmpl,
                      control = rob.control(weights.x1 = "hat", weights.x2 = "hat"))

ivp.fit

```

`print.epmrob`*Print a epmrob object*

Description

Print an object generated by [epmrob](#).

Usage

```

## S3 method for class 'epmrob'
print(x, digits = 4, ...)

```

Arguments

| | |
|---------------------|---|
| <code>x</code> | object of epmrob class. |
| <code>digits</code> | number of significant digits to be printed. |
| <code>...</code> | currently not used. |

Value

No return value.

Author(s)

Mikhail Zhelonkin, Andre Bik, Andrea Naghi

See Also

[epmrob](#)

`print.summary.epmrob` *Print Function for summary.epmrob*

Description

Print a [summary.epmrob](#) object.

Usage

```
## S3 method for class 'summary.epmrob'  
print(x, digits = 4, ...)
```

Arguments

| | |
|---------------------|---|
| <code>x</code> | object of class <code>summary.epmrob</code> returned by a summary function. |
| <code>digits</code> | number of nonzero digits after comma. |
| <code>...</code> | currently not used. |

Value

No return value.

Author(s)

Mikhail Zhelonkin, Andre Bik, Andrea Naghi

| | |
|-------------|---|
| rob.control | <i>Auxiliary for Controlling Robust Fitting</i> |
|-------------|---|

Description

Auxiliary function used for fitting the endogenous probit models. Contains control sequences, tuning constants and robustness weight functions.

Usage

```
rob.control(acc = 1e-04, maxit = 50, weights.x1 = c("none", "hat", "robCov", "covMcd"),
           weights.x2 = c("none", "hat", "robCov", "covMcd"), clevel1 = 0.95, tcc = 1.345)
```

Arguments

| | |
|------------|---|
| acc | positive convergence level. |
| maxit | integer giving the maximum number of iterations. |
| weights.x1 | vector of robustness weights controlling for the leverage effect in the reduced equation. |
| weights.x2 | vector of robustness weights controlling for the leverage effect in the outcome equation. |
| clevel1 | value for the critical level for the first stage. |
| tcc | tuning constant c for Huber's psi-function for the first, reduced, stage. |

Value

A list with the arguments as components.

Author(s)

Mikhail Zhelonkin, Andre Bik, Andrea Naghi

| | |
|----------------|--|
| summary.epmrob | <i>Summarizing Robust Fits of Endogenous Probit Models</i> |
|----------------|--|

Description

Summarizes robust fit of endogenous probit models.

Usage

```
## S3 method for class 'epmrob'
summary(object, ...)
```


Index

- * **Endogeneity**
 - epmrob, 3
 - IVProbitRob, 5
- * **Endogenous variable**
 - epmrob-package, 2
- * **Probit model**
 - epmrob, 3
 - epmrob-package, 2
 - IVProbitRob, 5
- * **Robust estimation**
 - epmrob-package, 2
- * **Robust estimator**
 - epmrob, 3
 - IVProbitRob, 5
- * **Robust weights**
 - rob.control, 8
- * **Tuning Constant**
 - rob.control, 8

coef.epmrob, 2
cov.rob, 9

epmrob, 2, 3, 3, 4, 6, 7, 9
epmrob-package, 2
epmrob.vcov, 4

IVProbitRob, 2, 5

print.epmrob, 6
print.summary.epmrob, 7

r1m, 4
rob.control, 3, 4, 8

summary.epmrob, 7, 8

xweights, 9