help ball dialog: ball
also see: CI2D

Title

ball — Creates a ball in R^2 to be used to create two-dimensional confidence regions in CI2D

Syntax

ball [**,** *options* **radius(#) number(#)**]

options	description
radius	Create a ball in R^2 with radius #; default is radius(1).
number	Create a ball in R^2 with # angle divisions; default is number(360).

Description

ball creates a ball in R^2 with the radius specified in the radius option and the number of angle divisions specified in the number option. The ball is assumed to be centered at the origin and the resulting coordinates are ordered with the smallest y-value first (smallest x-value in the case of a tie) and continues counter-clockwise.

This command is called by CI2D which implements estimation and inference of the two-dimensional identification regions of BLP coefficients from Beresteanu and Molinari (Econometrica, 2008).

Examples

A ball in R^2 with radius of 2 and 60 divisions requested

```
. ball, radius(2) number(60)
```

Saved results

ball saves the following in **r()**:

Matrices

r(B)	Matrix of coordinates for ball in R^2

Also see

Help: CI2D

help BLPcalculator dialog: BLPcalculator
also see: twoDproj minksum

Title

BLPcalculator — Computes the estimated two-dimensional identification regions of the BLP coefficients used with inputs derived in twoDproj based on results from Beresteanu and Molinari (Econometrica, 2008)

Syntax

BLPcalculator var1 var2 var3 var4

Description

BLPcalculator computes the estimated two-dimensional identification regions of the BLP coefficients based on results from Beresteanu and Molinari (Econometrica, 2008). This command is called by twoDproj which creates the correct inputs for **BLPcalculator** to implement estimation of the two-dimensional identification regions of BLP coefficients. This command also uses minksum.

Saved results

BLPcalculator saves the following in **e()**:

Matrices
e(Thetahat) Matrix of coordinates for the estimated two-dimensional identification region of specified BLP coefficients

Also see

Help: twoDproj , minksum

help CI1D dialog: CI1D
also see: oneDproj

Title

CI1D —— Implements estimation and inference of the one-dimensional identification regions of BLP coefficients from Beresteanu and Molinari (Econometrica, 2008) using the method described in Algorithm 4.2

Syntax

CI1D Ylow Yhigh XProj1 XProj2 ... XOther1 XOther2 ... [, *options* **nointercept reps(#) level(#) nocc nodu testnull(M) predict(M) contrast(M)**]

options	description
nointercept	Suppress estimation and inference of the identification region for the intercept.
reps	Perform # bootstrap replications; default is reps(50).
level	Set confidence level; default is level(.95).
nocc	Suppress estimation of confidence collections based on the Hausdorff distance.
nodu	Suppress estimation of confidence set based on the directed Hausdorff distance.
predict(*M*)	Implements inference for the estimated identification region for the BLP with covariate values specified in matrix M.
contrast(*M*)	Implements inference for the the estimated identification region for the contrast of BLPs with covariate values specified in matrix M.
testnull(*M*)	Implements hypothesis tests of inclusion/equality of test set M of BLP coefficient intervals with the estimated identification region for the BLP coefficients.

Description

CI1D implements estimation and inference of the one-dimensional identification regions for specified components of the BLP coefficient vector as described in Beresteanu and Molinari (Econometrica, 2008). Typing

. **CI1D** Ylow Yhigh XProj1 XProj2

executes the estimation procedure based on two X variables, displaying lower and upper bounds for the projections of both X variables specified as XProj1 and XProj2. Note that the Ylow variable contains the lower bounds on the dependent variable and the Yhigh variable contains the upper bounds on the dependent variable.

This command also implements inference using nonparameteric bootstrap to obtain the following statistics:

(1) Critical values to use for inference regarding the identification region of each component of the BLP coefficient vector based on the Hausdorff and directed Hausdorff distances.

(2) Confidence collections for the estimated identification region of each BLP coefficient based on the Hausdorff distance (CC). The confidence collection is the collection of all sets that cannot be rejected by the equality test.

(3) Confidence sets for the estimated identification region of each BLP coefficient based on the directed Hausdorff distance (DU). The confidence set, the union of all sets that cannot be rejected by the inclusion test, represents the largest set that cannot be rejected by the inclusion test.

(4) Conclusion from hypothesis tests of the BLP coefficient set specified in the test option with the estimated identification region for the BLP coefficents.

(5) (1) - (3) for BLP with covariate values specified in matrix M of the predict option.

(6) (1) - (3) for contrast of BLPs with covariate values specified in matrix M of the contrast option.

This command is an extension of **oneDproj**. If you are only interested in estimation and not inference of the identification regions, then use **oneDproj** since the bootstrap method in **CI1D** would require unnecessary computing time.

Options

Let p be the number of covariates in the model, including the intercept.

predict implements inference for the identification region for the BLP with the values of covariates specified in matrix M. M must be specified as a Stata matrix, must be a p-1 x 1 matrix of covariate values, and must be ordered in the same manner as the covariates are listed in the original **CI1D** command. Note that the intercept should not be specified by the user in matrix M.

contrast implements inference for the identification region for the difference between the BLPs at the values of covariates specified in the first column of matrix M and the values of covariates specified in the second column of matrix M. M must be specified as a Stata matrix, must be a p-1 x 2 matrix of covariate values, and must be ordered in the same manner as the covariates are listed in the original **CI1D** command. Note that the intercept should not be specified by the user in matrix M.

testnull implements hypothesis tests for inclusion/equality of the test set, specified in matrix M, with the estimated identification region for the BLP coefficients via the critical values based on the directed Hausdorff/Hausdorff distances. M must be specified as a Stata matrix, must be a p x 2 matrix of BLP coefficient intervals to be tested, and must be ordered in the same manner as the covariates are listed in the original **CI1D** command. The first column of M must contain the lower bound of the test region for each of the BLP coefficients, while the second column of matrix M must contain the upper bound of the test region for each of the BLP coefficients. Note that the intercept test interval must be specified by the user in the first row of matrix M.

Note on **testnull**: it is not necessary to specify a test for all BLP coefficients, as these are not joint tests (each test is for a single BLP coefficient). Include a row of missing values, ".", in matrix M for those BLP coefficients that you are not interested in testing.

Examples

Two Xs, only critical values requested

```
. CI1D Ylow Yhigh X1 X2, nodu nocc
```

One X, test of BLP coefficient for X1 requested with 100 replications

```
. matrix M = [.,.\.5,1.5]
. CI1D Ylow Yhigh X1, test(M) reps(100)
```

Two Xs, BLP inference requested at 90% confidence level

```
. matrix M = [2.3\5.5]
. oneDproj Ylow Yhigh X1 X2, pred(M) lev(.90)
```

Saved results

CI1D saves the following in **e()**:

Matrices

e(Thetahat1D)	Estimated identification regions for all BLP coefficients
e(ThetahatPred)	Estimated identification regions for BLP
e(ThetahatPredCon)	Estimated identification regions for contrast of BLPs
e(cr_H)	Critical values for BLP coefficients, based on Hausdorff distance
e(cr_dH)	Critical values for BLP coefficients, based on directed Hausdorff distance
e(cr_H_pred)	Critical value for BLP, based on Hausdorff distance
e(cr_dH_pred)	Critical value for BLP, based on directed Hausdorff distance
e(cr_H_pred_con)	Critical value for contrast of BLPs, based on Hausdorff distance
e(cr_dH_pred_con)	Critical value for contrast of BLPs, based on directed Hausdorff distance
e(CC)	Confidence collection for BLP coefficients, based on Hausdorff distance
e(DU)	Confidence set for BLP coefficients, based on directed Hausdorff distance
e(CC_pred)	Confidence collection for BLP, based on Hausdorff distance
e(DU_pred)	Confidence Set for BLP, based on directed Hausdorff distance
e(CC_pred_con)	Confidence collection for contrast of BLPs, based on Hausdorff distance
e(DU_pred_con)	Confidence set for contrast of BLPs, based on directed Hausdorff distance

Also see

Help: oneDproj

help CI2D dialog: CI2D
also see: twoDproj

Title

CI2D —— Implements estimation and inference of the two-dimensional identification regions of BLP coefficients from Beresteanu and Molinari (Econometrica, 2008) using the method described in Algorithm 4.2

Syntax

CI2D Ylow Yhigh XProj1 [XProj2] XOther1 XOther2 ... [**,** *options* **nointercept reps(#) level(#) testnull(M)**]

options	description
nointercept	Estimate the two-dimensional identification region of XProj1 with XProj2; default is to estimate the two-dimensional identification region of the intercept with XProj1.
reps	Perform # bootstrap replications; default is reps(50).
level	Set confidence level; default is level(.95).
testnull(*M*)	Implements hypothesis tests of inclusion/equality of test set M of two-dimensional BLP coefficient region with the estimated two-dimensional identification region for the specified BLP coefficients.

Description

CI2D implements estimation and inference of the two-dimensional identification regions for specified components of the BLP coefficient vector as described in Beresteanu and Molinari (Econometrica, 2008). Typing

. **CI2D** Ylow Yhigh XProj1 XOther1 XOther2

executes the estimation procedure based on three X variables, displaying the estimated two-dimensional identification region of the first X variable, specified as XProj1, and the intercept. Note that the Ylow variable contains the lower bounds on the dependent variable and the Yhigh variable contains the upper bounds on the dependent variable.

This command also implements inference using nonparameteric bootstrap to obtain the following statistics:

(1) Critical values to use for inference regarding the two-dimensional identification region of the specified components of the BLP coefficient vector based on the Hausdorff and directed Hausdorff distances.

(2) Graph of confidence regions for the estimated two-dimensional identification region of the specified components of the BLP coefficient vector based on the Hausdorff and directed Hausdorff distances.

(3) Conclusion from hypothesis tests of the two-dimensional BLP coefficient set specified in the test option with the estimated two-dimensional identification region for the specified BLP coefficents.

(4) Graph of the two-dimensional BLP coefficient set specified in the test option if the test option is specified.

This command is an extension of **twoDproj**. If you are only interested in estimation and not inference of the identification regions, then use **twoDproj** since the bootstrap method in **CI2D** would require unnecessary computing time.

Options

testnull implements hypothesis tests for inclusion/equality of the test set, specified in matrix M, with the estimated two-dimensional identification region for the specified BLP coefficients via the critical values based on the directed Hausdorff/Hausdorff distances. M must be specified as a Stata matrix and must be a k x 2 matrix of coordinates of the region to be tested (where k can be any number) that are ordered counter-clockwise starting with the smallest y-value (smallest x-value in case of a tie). The first column of M must contain the coordinate for the axis corresponding to the first coefficient, while the second column of matrix M must contain the coordinate for the axis corresponding to the second coefficient.

Examples

Three Xs, two-dimensional projection of first two Xs requested at 90% confidence level

```
. CI2D Ylow Yhigh X1 X2 X3, nointercept lev(.90)
```

One X, test of set of the intercept and first BLP coefficient with 100 replications

```
. matrix M = [-1,-1\1,-1\1,1\-1,1]
. CI2D Ylow Yhigh X1, test(M) reps(100)
```

Saved results

CI2D saves the following in **e()**:

Scalars

e(cr_H)	Critical value based on Hausdorff distance
e(cr_H)	Critical value based on directed Hausdorff distance

Matrices

e(Thetahat)	Matrix of coordinates for the estimated two-dimensional identification region of specified BLP coefficients
e(ThetaCI_H)	Matrix of coordinates for the confidence region of specified BLP coefficients, based on Hausdorff distance
e(ThetaCI_dH)	Matrix of coordinates for the confidence region of specified BLP coefficients, based on directed Hausdorff distance

Also see

Help: twoDproj

help dotdist dialog: dotdist
also see: HausdorffDist CI2D

Title

dotdist — Computes the minimal distance between a point and a line segment to be used to calculate the Hausdorff and directed Hausdorff distances in HausdorffDist

Syntax

dotdist P Q R

Description

dotdist computes the minimal distance between the point, R, and the segment between P and Q. P, Q and R must be specified as Stata matrices of dimension 1 x 2.

This command is called by HausdorffDist which calculates the Hausdorff and directed Hausdorff distances of two convex sets. HausdorffDist is called by CI2D which implements estimation and inference of the two-dimensional identification regions of BLP coefficients from Beresteanu and Molinari (Econometrica, 2008).

Examples

Distance between (1,2) and the segment between (3,4) and (5,6)

```
. matrix A = [1,2]
. matrix B = [3,4]
. matrix C = [5,6]
. dotdist B C A
```

Saved results

dotdist saves the following in **r()**:

Scalers
r(dist) Minimal distance of interest

Also see

Help: HausdorffDist , CI2D

help EY dialog: EY
also see: oneDproj CI1D

Title

EY — Implements estimation and inference of the identification set for the mean from Beresteanu and Molinari (Econometrica, 2008) using the method described on page 780

Syntax

EY Ylow Yhigh [**,** *options* **reps(#) level(#) nocc nodu testnull(M) size(#)**]

options	description
reps	Perform # bootstrap replications; default is reps(50).
level	Set confidence level; default is level(.95).
nocc	Suppress estimation of confidence collections based on the Hausdorff distance.
nodu	Suppress estimation of confidence set based on the directed Hausdorff distance.
testnull(*M***)**	Implements hypothesis tests of inclusion/equality of test set M of mean intervals with the estimated identification region for the mean.
size	Perform bootstrap with sample size #; default size is the size of the original data.

Description

EY Implements estimation and inference of the identification regions for the mean as described in Beresteanu and Molinari (Econometrica, 2008) using the method described on page 780. Typing

. **EY** Ylow Yhigh

executes the estimation procedure, displaying lower and upper bounds of the estimated identification region for the mean. Note that the Ylow variable contains the lower bounds on the dependent variable and the Yhigh variable contains the upper bounds on the dependent variable.

This command also implements inference using nonparameteric bootstrap to obtain the following statistics:

(1) Critical values to use for inference regarding the identification region of the mean based on the Hausdorff and directed Hausdorff distances.

(2) Confidence collections for the estimated identification region of the mean based on the Hausdorff distance (CC). The confidence collection is the collection of all sets that cannot be rejected by the equality test.

(3) Confidence sets for the estimated identification region of the mean based on the directed Hausdorff distance (DU). The confidence set, the union of all sets that cannot be rejected by the inclusion test, represents the largest set that cannot be rejected by the inclusion test.

(4) Conclusion from hypothesis tests of the test set specified in the test option with the estimated identification region for the mean.

Use oneDproj and/or CI1D if you are interested in estimating the identification regions based on a model with covariates.

Options

testnull implements hypothesis tests for inclusion/equality of the test set, specified in matrix M, with the estimated identification region for the mean via the critical values based on the directed Hausdorff/Hausdorff distances. M must be specified as a Stata matrix and must be a 1 x 2 matrix of the mean interval to be tested. The first column of M must contain the lower bound of the test region for the mean, while the second column of matrix M must contain the upper bound of the test region for the mean.

Examples

Only critical values requested

```
. EY Ylow Yhigh, nodu nocc
```

Test of mean set requested at 90% confidence level

```
. matrix M = [1,2]
. EY Ylow Yhigh, test(M) lev(.90)
```

Saved results

EY saves the following in **e()**:

Scalars

e(lb)	Lower bound of the estimated identification region for the mean
e(ub)	Upper bound of the estimated identification region for the mean
e(cr_H)	Critical values for the mean, based on Hausdorff distance
e(cr_dH)	Critical values for the mean, based on directed Hausdorff distance
e(CC_L_1)	Lower bound of lower set of confidence collection for the mean, based on Hausdorff distance
e(CC_L_2)	Upper bound of lower set of confidence collection for the mean, based on Hausdorff distance
e(CC_U_1)	Lower bound of upper set of confidence collection for the mean, based on Hausdorff distance
e(CC_U_2)	Upper bound of upper set of confidence collection for the mean, based on Hausdorff distance
e(DU_L)	Lower bound of confidence set for the mean, based on directed Hausdorff distance
e(DU_U)	Upper bound of confidence set for the mean, based on directed Hausdorff distance

Also see

Help: oneDproj , CI1D

help HausdorffDist dialog: HausdorffDist
also see: CI2D

Title

HausdorffDist — Computes the Hausdorff and directed Hausdorff distance between two convex sets to be used to implement inference of the two-dimensional identification regions of BLP coefficients in CI2D

Syntax

HausdorffDist P Q

Description

HausdorffDist computes the Hausdorff and directed Hasudorff distance between two convex polygons P and Q. The polygons are represented by their vertices and must be ordered with the smallest y-value first (x-value in case of a tie) and continued counter-clockwise. This ordering is maintained when using twoDproj and CI2D by the conditions in BLPcalculator. P and Q must be specified as Stata matrices.

This command is called by CI2D which implements estimation and inference of the two-dimensional identification regions of BLP coefficients from Beresteanu and Molinari (Econometrica, 2008).

Examples

Hausdorff and directed Hausdorff distance between two balls in R^2 requested

```
. ball, radius(2) number(60)
. matrix A = r(B)
. ball, radius(1) number(60)
. matrix B = r(B)
. HausdorffDist A B
```

Saved results

HausdorffDist saves the following in **r()**:

Scalars

r(hausdorff)	Hausdorff distance
r(dhausdorff)	Directed Hausdorff distance

Also see

Help: CI2D

help minksum dialog: minksum
also see: BLPcalculator twoDproj CI2D

Title

minksum — Computes the Minkowski sum of two convex sets to be used to compute the BLP in BLPcalculator and to create two-dimensional confidence regions in CI2D

Syntax

minksum P Q

Description

minksum computes the Mimkowski sum of two convex polygons P and Q. The polygons are represented by their vertices and must be ordered with the smallest y-value first (smallest x-value in case of a tie) and continued counter-clockwise. This ordering is maintained when using twoDproj and CI2D by the conditions in BLPcalculator. P and Q must be specified as Stata matrices.

This command is called by CI2D which implements estimation and inference of the two-dimensional identification regions of BLP coefficients from Beresteanu and Molinari (Econometrica, 2008) and by twoDproj (via BLPcalculator) which implements estimation of the two-dimensional identification regions of BLP coefficients from Beresteanu and Molinari (Econometrica, 2008).

Examples

Minkowski sum of two balls in R^2 requested

```
. ball, radius(2) number(60)
. matrix A = r(B)
. ball, radius(1) number(60)
. matrix B = r(B)
. minksum A B
```

Saved results

minksum saves the following in **r()**:

Matrices

r(M)	Matrix of coordinates for Minkowski sum of two convex sets

Also see

Help: BLPcalculator , twoDproj , CI2D

help oneDproj dialog: oneDproj
also see: CI1D

Title

oneDproj — Implements estimation of the one-dimensional identification regions of BLP coefficients from Beresteanu and Molinari (Econometrica, 2008)

Syntax

oneDproj Ylow Yhigh XProj1 XProj2 ... XOther1 XOther2 ... [, *options* **dim(#) nointercept predict(M) contrast(M)**]

options	description
dim(#)	Number of components of the BLP coefficient vector to estimate identification regions for, not counting the intercept; default is to estimate identification regions for all components of the BLP vector.
nointercept	Suppress estimation of the identification region for the intercept.
predict(M)	Estimates the identification region for the BLP with covariate values specified in matrix M.
contrast(M)	Estimates the identification region for the contrast of BLPs with covariate values specified in matrix M.

Description

oneDproj implements estimation of the identification region for specified components of BLP coefficient vector as described in Beresteanu and Molinari (Econometrica, 2008). Typing

. **oneDproj** Ylow Yhigh XProj1 XProj2

executes the estimation procedure based on two X variables, displaying lower and upper bounds for the projections of both X variables specified as XProj1 and XProj2. Note that the Ylow variable contains the lower bounds on the dependent variable and the Yhigh variable contains the upper bounds on the dependent variable.

This command should be used with **CI1D** to calculate critical values and confidence collections/sets via nonparametric bootstrap.

Options

Let p be the number of covariates in the model, including the intercept.

predict estimates the identification region for the BLP with the values of covariates specified in matrix M. M must be specified as a Stata matrix, must be a p-1 x 1 matrix of covariate values, and must be ordered in the same manner as the covariates are listed in the original **oneDproj** command. Note that the intercept should not be specified by the user in matrix M.

contrast estimates the identification region for the difference between the BLPs at the values of covariates specified in the first column of matrix M and the values of covariates specified in the second column of matrix M. M must be specified as a Stata matrix, must be a p-1 x 2 matrix of covariate values, and must be ordered in the same manner as the covariates are listed in the original **oneDproj** command. Note that the intercept should not be specified by the user in matrix M.

Examples

Two Xs, one dimension requested without intercept

```
. oneDproj Ylow Yhigh X1 X2, dim(1) nointercept
```

Two Xs, both dimensions requested with intercept

```
. oneDproj Ylow Yhigh X1 X2
```

Two Xs, both dimensions requested with intercept, BLP requested

```
. matrix M = [1\.5]
. oneDproj Ylow Yhigh X1 X2, predict(M)
```

Two Xs, both dimensions requested with intercept, contrast BLP requested

```
. matrix M = [1,2\.5,1]
. oneDproj Ylow Yhigh X1 X2, contrast(M)
```

Saved results

oneDproj saves the following in **e()**:

Scalars

e(lb_0)	Lower bound of the estimated identification region for the Intercept
e(ub_0)	Upper bound of the estimated identification region for the Intercept
e(lb_1)	Lower bound of the estimated identification region for X1
e(ub_1)	Upper bound of the estimated identification region for X1
...	
e(lb_*d*)	Lower bound of the estimated identification region for Xd
e(ub_*d*)	Upper bound of the estimated identification region for Xd

Matrices

e(Thetahat1D)	Estimated identification regions for all BLP coefficients
e(ThetahatPred)	Estimated identification regions for BLP
e(ThetahatPredCon)	Estimated identification regions for contrast of BLPs

Also see

Help: CI1D

help twoDproj dialog: twoDproj
also see: CI2D

Title

twoDproj — Implements estimation of the two-dimensional identification regions of BLP coefficients from Beresteanu and Molinari (Econometrica, 2008)

Syntax

twoDproj Ylow Yhigh XProj1 [XProj2] XOther1 XOther2 ... [**,** *options* **nointercept nograph**]

options	description
nointercept	Estimate the two-dimensional identification region of XProj1 with XProj2; default is to estimate the two-dimensional identification region of the intercept with XProj1.
nograph	Suppress the output of the graph of the estimated identification region; results can still be accessed via **[R] ereturn**.

Description

twoDproj implements estimation of the two-dimensional identification region for two specified components of BLP coefficient vector as described in Beresteanu and Molinari (Econometrica, 2008). Typing

. twoDproj Ylow Yhigh XProj1 XOther1 XOther2

executes the estimation procedure based on three X variables, displaying the estimated two-dimensional identification region of the first X variable, specified as XProj1, and the intercept. Note that the Ylow variable contains the lower bounds on the dependent variable and the Yhigh variable contains the upper bounds on the dependent variable.

This command should be used with **CI2D** to calculate critical values and confidence collections/sets via nonparametric bootstrap.

Examples

Five Xs, 2-dimensional projection of the intercept and X4 requested
. twoDproj Ylow Yhigh X4 X1 X2 X3 X5

Seven Xs, 2-dimensional projection of X2 and X5 requested
. twoDproj Ylow Yhigh X2 X5 X1 X3 X4 X6 X7, nointercept

Saved results

twoDproj saves the following in **e()**:

Matrices

e(Thetahat)	Matrix of coordinates for the estimated 2-dimensional identification region of specified BLP coefficients

Also see

Help: CI2D

Title

xangle —— Computes the angle of the line between two points and the x-axis to be used to estimate the two-dimensional identification region in twoDproj

Syntax

xangle x1 y1 x2 y2

Description

xangle computes the angle formed by the line between two points, (x1,y1) and (x2,y2), and the positive x-axis.

This command is called by minksum which calculates the Minkowski summation of two convex sets, which in turn is called by twoDproj which implements estimation of the two-dimensional identification regions of BLP coefficients from Beresteanu and Molinari (Econometrica, 2008).

Examples

Angle between (1,2) and (2,3) requested

```
. xangle 1 2 3 4
```

Saved results

xangle saves the following in **r()**:

Scalers

r(x)	Angle of interest

Also see

Help: minksum , twoDproj