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Title Computing the Gini-Based Coefficients for Weighted and Negative Attributes

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Description Gini-based coefficients and plot of the ordinary and generalized curve of maximum inequality in the presence of weighted and negative attributes.

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GiniWegNeg-package *Computing the Gini-Based Coefficients for Weighted and Negative Attributes*

Description

This package was born to extend the Gini-based coefficients to non-traditional scenarios, i.e. in the case of negative data. The computation of the Gini coefficient in the case of negative weighted data involves, in addition to the vector of attributes (typically incomes), the vector of weights associated with each statistical unit. Two functions are made available for the computation of the Gini coefficient in the case of negative attributes. A first function is based on the contribution by Chen, Tasur and Rhai (1982), further improved by Berebbei and Silber (1985). Recently, a more appropriate normalization factor was introduced by Raffinetti, Siletti and Vernizzi (2015), who specified a new definition of the "polarized" scenario, where the total negative attribute amount is assigned to one unit, the total positive attribute amount to another unit, while all the other units have a zero amount of attribute. Also the plot of the corresponding curve of maximum inequality (RSV curve), both by considering the attribute values in absolute and relative terms, is provided. Moreover, even the function for the computation of the pseudo-Gini (concentration) coefficient is given, as proposed by Raffinetti, Siletti and Vernizzi (2016).

Details

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Version:	1.0.1
Date:	2016-05-20
License:	GPL-3

Author(s)

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References

C.N. Chen, T.W. Tsaur, T.S. Rhai (1982), The Gini coefficient and negative income, Oxford Economic Papers 34, 473–478

Z.M. Berrebi, J. Silber (1985), The Gini coefficient and negative income: a comment, Oxford Economic Papers 37, 525–526

E. Raffinetti, E. Siletti, A. Vernizzi (2014), Inequality measures and the issue of negative income. Italian Statistical Society Conference (SIS), Book of Short Papers: "SIS 2014. 47th Scientific

Meeting of the Italian Statistical Society", CUEC (Cooperativa Universitaria Editrice Cagliaritana), 11-13 June 2014

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E. Raffinetti, E. Siletti, A. Vernizzi (2016), Analyzing the effects of negative and non-negative values on income inequality. Evidence from the Survey of Household Income and Wealth of the Bank of Italy (2012), Social Indicators Research (published on line http://link.springer.com/article/10.1007

See Also

Gini_CTR_BS, Gini_RSV, GRSVc, PGini_RSV, RSVc

BI2012 *A Sample of Income Data from the Bank of Italy (2012)*

Description

A sample of data collected by the Survey on Household Income and Wealth (SHIW) of the Bank of Italy in 2012 (Banca d'Italia, 2012).

Usage

```
data("BI2012")
```

Format

A data frame with 200 observations on the following 8 variables:

`weight` weights associated with each household

`Y` total net income (all non-negative values)

`YL` income from employment (all non-negative values)

`YTP` income from pensions (all non-negative values)

`YTA` income from transfers (some negative values)

`YM` income from self-employment (all non-negative values)

`YCA` income from capital gain (all non-negative values)

`YCF` income from financial capital gain (some negative values)

Details

The Survey on Household Income and Wealth (SHIW) includes wealth and other aspects of households' economic and financial behaviour such as, for instance, which payment methods are used. The original 2012 survey covers 8,151 households and 20,022 units, distributed over about 300 Italian municipalities. Here, a sample of 200 randomly selected units from the original 2012 survey is considered. We remark that the weight associated with each selected household is defined by the replication weight provided by the Bank of Italy. Note that the total net income Y corresponds to the sum of the six income sources: YL, YTP, YTA, YM, YCA, YCF.

Source

Survey on Household Income and Wealth (SHIW) of the Bank of Italy in 2012: https://www.bancaditalia.it/statistiche/tematiche/indagini-famiglie-imprese/bilanci-famiglie/distribuzione-microdati/documenti/ind12_ascii.zip, where also the whole dataset may be obtained.

`Gini_CTR_BS` *The Gini coefficient adjusted for negative attributes (Chen, Tsaur and Rhai, 1982, Berebbi and Silber, 1985)*

Description

computes the Gini coefficient adjusted for negative (even weighted) data.

Usage

```
Gini_CTR_BS(y,w)
```

Arguments

`y`	a vector of attributes containing even negative elements
`w`	a vector containing the weights associated with the elements of the attribute vector

Details

`Gini_CTR_BS(y,w)` is the Gini coefficient for negative data proposed by Chen, Tsaur and Rhai (1982) and subsequenty improved by Berebbi and Silber (1985). It is based on a normalization factor adding the part of the concentration area lying below the x-axis and provides a value always included into the close range [0,1].

Value

the value of the Gini coefficient adjusted for negative attributes.

Note

If the vector `w` contains unitary elements, compute `Gini_CTR_BS` as `Gini_CTR_BS(y)`.

Author(s)

Emanuela Raffinetti, Fabio Aimar

References

C.N. Chen, T.W. Tsaur, T.S. Rhai (1982), The Gini coefficient and negative income, Oxford Economic Papers 34, 473–478

Z.M. Berrebi, J. Silber (1985), The Gini coefficient and negative income: a comment, Oxford Economic Papers 37, 525–526

See Also

ineq, IC2

Examples

```
# generate the vector of attributes with even negative elements
y<-c(-7,-15,11,-10,2,4,40)
# generate the vector of weights
w<-c(2.5,1.1,3.6,4.4,0.8,2.7,1.9)
# compute the Gini coefficient adjusted for negative values
Gini_CTR_BS(y,w)

data(BI2012)
# define the vector of weights
w<-BI2012$weight

# select the vector of incomes (e.g., the incomes from transfers YTA)
y<-BI2012$YTA
# compute the Gini coefficient adjusted for negative values
Gini_CTR_BS(y,w)

# select the vector of incomes (e.g., the incomes from financial capital gain YCF)
y<-BI2012$YCF
# compute the Gini coefficient adjusted for negative values
Gini_CTR_BS(y,w)
```

Gini_RSV *The Gini coefficient adjusted for negative attributes (Raffinetti, Siletti and Vernizzi, 2015)*

Description

computes the Gini coefficient adjusted for negative (even weighted) data.

Usage

```
Gini_RSV(y,w)
```

Arguments

y	a vector of attributes containing even negative elements
w	a vector containing the weights associated with the elements of the attribute vector

Details

`Gini_RSV(y,w)` is the Gini coefficient for negative income data proposed by Raffinetti, Siletti and Vernizzi (2015) and based on a new definition of the "polarized" scenario, where the total negative attribute amount is assigned to one unit, the total positive amount to another unit, while all the other units have a zero amount of attribute. It provides a value always included into the close range [0,1].

Value

the value of the Gini coefficient adjusted for negative attributes.

Note

If the vector `w` contains unitary elements, compute `Gini_RSV` as `Gini_RSV(y)`.

Author(s)

Emanuela Raffinetti, Fabio Aimar

References

E. Raffinetti, E. Siletti, A. Vernizzi (2014), Inequality measures and the issue of negative income. Italian Statistical Society Conference (SIS), Book of Short Papers: "SIS2014. 47th Scientific Meeting of the Italian Statistical Society", CUEC (Cooperativa Universitaria Editrice Cagliaritana), 11-13 June 2014

E. Raffinetti, E. Siletti, A. Vernizzi (2015), On the Gini coefficient normalization when incomes with negative values are considered, Statistical Methods & Applications, 24(3), 507-521

E. Raffinetti, E. Siletti, A. Vernizzi (2016), Analyzing the effects of negative and non-negative values on income inequality. Evidence from the Survey of Household Income and Wealth of the Bank of Italy (2012), Social Indicators Research (published on line http://link.springer.com/article/10.1007

See Also

ineq,IC2

Examples

```
# generate the vector of attributes with even negative elements
y<-c(-7,-15,11,-10,2,4,40)
# generate the vector of weights
w<-c(2.5,1.1,3.6,4.4,0.8,2.7,1.9)
# compute the Gini coefficient adjusted for negative values
Gini_RSV(y,w)
```

```
data(BI2012)
# define the vector of weights
w<-BI2012$weight

# select the vector of incomes (e.g., the incomes from transfers YTA)
y<-BI2012$YTA
# compute the Gini coefficient adjusted for negative values
Gini_RSV(y,w)

# select the vector of incomes (e.g., the incomes from financial capital gain YCF)
y<-BI2012$YCF
# compute the Gini coefficient adjusted for negative values
Gini_RSV(y,w)
```

GRSVc *Generalized RSV (Raffinetti, Siletti and Vernizzi, 2015) curve of maximum inequality for negative attributes*

Description

computes the x-axis and y-axis values of the generalized RSV curve of maximum inequality for negative attributes.

Usage

```
GRSVc(z,w=rep(1,length(z)),plot=FALSE)
```

Arguments

z	a vector of attributes containing negative elements
w	a vector containing the weights associated with the elements of the attribute vector
plot	logical. If TRUE the generalized RSV curve of maximum inequality is plotted

Details

GRSVc(z,w) provides the points of the generalized RSV curve of maximum inequality.

Value

A list of class GRSVc with the following components:

Generalized RSV (maximum inequality) x-axis points
: vector with the x-axis values of the generalized RSV curve of maximum inequality

Generalized RSV (maximum inequality) y-axis points
: vector with the y-axis values of the generalized RSV curve of maximum inequality.

Note

If the vector `w` contains unitary elements, the plot of the generalized RSV curve of maximum inequality is obtained as `GRSVc(z,plot=TRUE)`.

Author(s)

Emanuela Raffinetti, Fabio Aimar

References

E. Raffinetti, E. Siletti, A. Vernizzi (2014), Inequality measures and the issue of negative income. Italian Statistical Society Conference (SIS), Book of Short Papers: "SIS2014. 47th Scientific Meeting of the Italian Statistical Society", CUEC (Cooperativa Universitaria Editrice Cagliaritana), 11-13 June 2014

E. Raffinetti, E. Siletti, A. Vernizzi (2015), On the Gini coefficient normalization when incomes with negative values are considered, Statistical Methods & Applications, 24(3), 507-521

See Also

`ineq`, `IC2`

Examples

```
# generate the vector of attributes with even negative elements
z<-c(-7,-15,11,-10,2,4,40)
# plot the generalized RSV curve of maximum inequality
GRSVc(z,plot=TRUE)

# generate the vector of attributes with even negative elements
z<-c(10,-25,-12,3,2,-5,45)
# generate the vector of non-unitary weights
w<-c(1.5,2.2,1.9,3.8,4.7,5,2.3)
# plot the generalized RSV curve of maximum inequality
GRSVc(z,w,plot=TRUE)

data(BI2012)
# define the vector of non-unitary weights
w<-BI2012$weight

# select the vector of incomes (e.g., the incomes from transfers YTA)
z<-BI2012$YTA
# plot the generalized RSV curve of maximum inequality
GRSVc(z,w,plot=TRUE)

# select the vector of incomes (e.g., the incomes from financial capital gain YCF)
z<-BI2012$YCF
# plot the generalized RSV curve of maximum inequality
GRSVc(z,w,plot=TRUE)
```

PGini_RSV *The pseudo-Gini (concentration) coefficient adjusted for negative attributes (Raffinetti, Siletti and Vernizzi, 2016)*

Description

computes the pseudo-Gini (concentration) coefficient adjusted for negative data.

Usage

```
PGini_RSV(y,s,w)
```

Arguments

y	a vector of attributes usually corresponding to the vector of total incomes
s	a vector of attributes containing even negative elements, usually corresponding to one of the income sources composing the total income
w	a vector containing the weights associated with the elements of the two attribute vectors

Details

`PGini_RSV(y,s,w)` is the pseudo-Gini (concentration) coefficient for negative income data proposed by Raffinetti, Siletti and Vernizzi (2016) and based on the Raffinetti, Siletti and Vernizzi (2015) normalization. It provides a value always included into the close range [-1,+1]. The pseudo-Gini (concentration) coefficient is built by ordering the values of vector s according to the values of vector y sorted in non-decreasing order.

Value

the value of the pseudo-Gini (concentration) coefficient adjusted for negative attributes.

Note

If the vector `w` contains unitary elements, compute `PGini_RSV` as `PGini_RSV(y,s)`.

Author(s)

Emanuela Raffinetti, Fabio Aimar

References

E. Raffinetti, E. Siletti, A. Vernizzi (2016), Analyzing the effects of negative and non-negative values on income inequality. Evidence from the Survey of Household Income and Wealth of the Bank of Italy (2012), Social Indicators Research (published on line http://link.springer.com/article/10.1007

See Also

IC2

Examples

```
# generate the vector of total incomes
y<-c(-7,-15,11,-10,2,4,40)
# generate the vector of one of the income sources composing the total income
s<-c(-3,6,-5,9,5,-1,-15)
# generate the vector of weights
w<-c(2.5,1.1,3.6,4.4,0.8,2.7,1.9)
# compute the pseudo-Gini (concentration) coefficient
PGini_RSV(y,s,w)

data(BI2012)
# define the vector of weights
w<-BI2012$weight
# select the vector of the total net income Y
y<-BI2012$Y

# select the vector of the income source (e.g., the incomes from transfers YTA)
s<-BI2012$YTA
# compute the pseudo-Gini (concentration) coefficient
PGini_RSV(y,s,w)

# select the vector of the income source (e.g., the incomes from financial capital gain YCF)
s<-BI2012$YCF
# compute the pseudo-Gini (concentration) coefficient
PGini_RSV(y,s,w)
```

RSVc *Ordinary (empirical) RSV (Raffinetti, Siletti and Vernizzi, 2015) curve of maximum inequality for negative attributes*

Description

computes the x-axis and y-axis values of the ordinary (empirical) RSV curve of maximum inequality for negative attributes.

Usage

```
RSVc(z,w=rep(1,length(z)),plot=FALSE)
```

Arguments

z	a vector of attributes containing negative elements
w	a vector containing the weights associated with the elements of the attribute vector
plot	logical. If TRUE the ordinary (empirical) RSV curve of maximum inequality is plotted

Details

`RSVc(z,w)` provides the points of the ordinary (empirical) RSV curve of maximum inequality.

Value

A list of class `RSVc` with the following components:

`RSV (maximum inequality) x-axis points`
: vector with the x-axis values of the ordinary (empirical) RSV curve of maximum inequality

`RSV (maximum inequality) y-axis points`
: vector with the y-axis values of the ordinary (empirical) RSV curve of maximum inequality.

Note

If the vector `w` contains unitary elements, the plot of the ordinary (empirical) RSV curve of maximum inequality is obtained as `RSVc(z,plot=TRUE)`.

Author(s)

Emanuela Raffinetti, Fabio Aimar

References

E. Raffinetti, E. Siletti, A. Vernizzi (2014), Inequality measures and the issue of negative income. Italian Statistical Society Conference (SIS), Book of Short Papers: "SIS 2014. 47th Scientific Meeting of the Italian Statistical Society", CUEC (Cooperativa Universitaria Editrice Cagliaritana), 11-13 June 2014

E. Raffinetti, E. Siletti, A. Vernizzi (2015), On the Gini coefficient normalization when incomes with negative values are considered, Statistical Methods & Applications, 24(3), 507-521

See Also

`ineq`, `IC2`

Examples

```
# generate the vector of attributes with even negative elements
z<-c(-8,-11,9,-12,7,6,35)
# plot the ordinary (empirical) RSV curve of maximum inequality
RSVc(z,plot=TRUE)

# generate the vector of attributes with even negative elements
z<-c(12,-21,-10,6,1,-3,40)
# generate the vector of non-unitary weights
w<-c(1.2,2.3,1.6,3.5,4.7,4,2.2)
# plot the ordinary (empirical) RSV curve of maximum inequality
RSVc(z,w,plot=TRUE)
```

```
data(BI2012)
# define the vector of non-unitary weights
w<-BI2012$weight

# select the vector of incomes (e.g., the incomes from transfers YTA)
z<-BI2012$YTA
# plot the ordinary (empirical) RSV curve of maximum inequality
RSVc(z,w,plot=TRUE)

# select the vector of incomes (e.g., the incomes from financial capital gain YCF)
z<-BI2012$YCF
# plot the ordinary (empirical) RSV curve of maximum inequality
RSVc(z,w,plot=TRUE)
```

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