

# Package ‘GiniWegNeg’

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**Type** Package

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

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**Imports** graphics

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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.

**License** GPL-3

**NeedsCompilation** no

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

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## 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

Package: GiniWegNeg  
Type: Package  
Version: 1.0.1  
Date: 2016-05-20  
License: GPL-3

## Author(s)

Emanuela Raffinetti, Fabio Aimar  
Maintainer: Emanuela Raffinetti <emanuela.raffinetti@unimi.it>

## 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 Cagliaritano), 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

[Gini\\_CTR\\_BS](#), [Gini\\_RSV](#), [GRSVc](#), [PGini\\_RSV](#), [RSVc](#)

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BI2012

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

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### 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-impres/bilanci-famiglie/distribuzione-microdati/documenti/ind12\\_ascii.zip](https://www.bancaditalia.it/statistiche/tematiche/indagini-famiglie-impres/bilanci-famiglie/distribuzione-microdati/documenti/ind12_ascii.zip), where also the whole dataset may be obtained.

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

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Gini\_RSV

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

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**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 Cagliariitana), 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)

```

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GRSVc	<i>Generalized RSV (Raffinetti, Siletti and Vernizzi, 2015) curve of maximum inequality for negative attributes</i>
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### 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 Cagliariitana), 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)
```



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

<code>z</code>	a vector of attributes containing negative elements
<code>w</code>	a vector containing the weights associated with the elements of the attribute vector
<code>plot</code>	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 Cagliariitana), 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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