The social welfare indices

THE ATKINSON SOCIAL WELFARE INDEX

To compute the Atkinson index of social welfare for one distribution:
- From the main menu, choose the following item: "Welfare ⇒ Atkinson index".
- Choose the different vectors and values of parameters.

Parameters

ε	Epsilon : *social risk aversion*	Compulsory

Among the buttons, you find the following commands:

COMPUTE: to compute the Atkinson index.
GRAPH: to draw the value of the index according to a range of parameters ε.

THE S-GINI SOCIAL WELFARE INDEX

To compute the S-Gini index of social welfare.
- From the main menu, choose the following item: "Welfare ⇒ S-Gini index".
- Choose the different vectors and values of parameters.

Parameters

ρ	rho : *social risk aversion*	Compulsory

Among the buttons, you find the following commands:

COMPUTE: to compute the social welfare S-Gini index index.
GRAPH: to draw the value of the index according to a range of parameters ρ.

THE ATKINSON-GINI SOCIAL WELFARE INDEX

To compute the Atkinson-Gini index of social welfare.
- From the main menu, choose the following item: "Welfare ⇒ Atkinson-Gini index".
- Choose the different vectors and values of parameters.

Parameters

ρ	rho : *social risk aversion*	Compulsory
ε	epsilon : *social risk aversion*	Compulsory

Among the buttons, you find the following commands:

COMPUTE: to compute the social welfare Atkinson-Gini index index.

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IMPACT OF A PRICE CHANGE ON THE ATKINSON SOCIAL WELFARE INDEX

The impact of a good 1's marginal price change (denoted IMPW) on the Atkinson Social Welfare index $\xi(\varepsilon)$ is as follows:

$$\widehat{\text{IMPW}} = \frac{\partial\ \xi(\varepsilon)}{\partial\ p_l} * pc$$

$$\widehat{\text{IMPW}} = \begin{cases} -(s1)^{\frac{1}{\varepsilon-1}} * (s2)^{\frac{\varepsilon}{1-\varepsilon}} * (s3) * pc & \text{if} \quad \varepsilon \neq 1 \\ -\exp(s2/s1)*s3/s1*pc & \text{if} \quad \varepsilon \neq 1 \end{cases}$$

and

$$\begin{cases} s1 = \sum_i sw_i \quad s2 = \sum_i sw_i y_i^{1-\varepsilon} \quad s3 = \sum_i sw_i y_i^{-\varepsilon} x_i & \text{if} \quad \varepsilon \neq 1 \\ s1 = \sum_i sw_i \quad s2 = \sum_i sw_i \log(y_i) \quad s3 = \sum_i sw_i x_i / y_i & \text{if} \quad \varepsilon = 1 \end{cases}$$

where x_i^l is expenditure on commodity l by individual i, y_i is the variable of interest ("living standard"), and pc is the percentage price change for good l.

To compute the impact of the price change:

- From the main menu, choose: "Welfare ⇒ Impact of price change".
- Choose the different vectors and parameter values as follows:

Vectors		
x	Commodity	Compulsory
Parameters		
ε	epsilon	Compulsory
pc	Price change in %	Compulsory

REMARK: The computation can be made solely within a group of individuals. This is done by specifying the group number k and the group variable c.

Among the buttons, you find the following commands:

COMPUTE: to compute the impact of the price change.
GRAPH: to draw the value of the impact as a function of a range for the parameter ε.

IMPACT OF A TAX REFORM ON THE ATKINSON SOCIAL WELFARE INDEX

This tax reform consists of a variation in the prices of two commodities 1 and 2, under the constraint that it leaves unchanged total government revenue. The effect of this constraint is given by an efficiency parameter, "gamma" (γ), which is the ratio of the marginal cost of public funds (MCPF) from a tax on 2 over the MCPF from a tax on 1.

The impact of this tax reform (denoted IMWTR) on the Atkinson Social Welfare index $\xi(\varepsilon)$ is as follows:

$$\text{IMWTR} = \left[\frac{\partial \xi(\varepsilon)}{\partial p_1} - \gamma \frac{\overline{X}_1}{\overline{X}_2} \frac{\partial \xi(\varepsilon)}{\partial p_2} \right] * \text{pc}$$

where pc is the percentage price change of commodity 1, and $\overline{X}_g$ is the total expenditure on the good g. Under the government revenue constraint, the percentage price change of commodity 1 is given by $\gamma \frac{\overline{X}_1}{\overline{X}_2} \text{pc}$. The computation can be made solely within a group of individuals. This is done by specifying the group number k and the group variable c.

To compute the impact of the tax reform:

- From the main menu, choose "Welfare ⇒ Impact of tax reform".
- Choose the different vectors and parameter values as follows:

Vectors		
x_1	Commodity 1	Compulsory
x_2	Commodity 2	
Parameters		
ε	epsilon	Compulsory
γ	gamma	Compulsory
pc	1' s % price change	

Among the buttons, you find the following commands:

COMPUTE: to compute the impact of the tax reform.

IMPACT OF INCOME-COMPONENT GROWTH ON THE ATKINSON SOCIAL WELFARE INDEX

The impact of growth in the j^{th} component on the Atkinson Social Welfare index $\xi(\varepsilon)$ is as follows:

$$\frac{\partial \xi(\varepsilon)}{\partial x_j} * pc = \begin{cases} (s1)^{\frac{1}{\varepsilon-1}} * (s2)^{\frac{\varepsilon}{1-\varepsilon}} * (s3) * pc & \text{if} \quad \varepsilon \neq 1 \\ \exp(s2/s1) * s3/s1 * pc & \text{if} \quad \varepsilon \neq 1 \end{cases}$$

and

$$\begin{cases} s1 = \sum_i sw_i \quad s2 = \sum_i sw_i y_i^{1-\varepsilon} \quad s3 = \sum_i sw_i y_i^{-\varepsilon} x_i^j & \text{if} \quad \varepsilon \neq 1 \\ s1 = \sum_i sw_i \quad s2 = \sum_i sw_i \log(y_i) \quad s3 = \sum_i sw_i x_i / y_i & \text{if} \quad \varepsilon = 1 \end{cases}$$

where x_i^j is the value of component j for individual i and pc is the percentage change in that j income component. This tells us therefore by how much social welfare will change if a growth of pc is observed in a component j of total income.

To compute the impact of that change:

- From the main menu, choose the item: "Welfare ⇒ Impact of Income-component growth".
- Choose the different vectors and parameter values as follows:

Vectors		
x	Component	Compulsory
Parameters		
ε	epsilon	Compulsory
pc	Price change in %	Compulsory

Among the buttons, you find the following commands:

COMPUTE: to compute the impact of the Income-component growth.
GRAPH: to draw the value of the impact as a function of a range for parameter ε.