## Gini coefficient (in practice)

– One way (of different ways) to calculate the Gini:
 Line everyone up from poorest to richest
 $Y_i$ is person i's income
 $F(Y_i)$ is the share of people with income at or less than $Y_i$
 $\mu$ is mean income

$$Gini = \frac{2cov(Y_i, F(Y_i))}{\mu}$$

**Table 5.1 A Hypothetical Income Distribution**

| Person | Income ($Y_i$) | $F(Y_i)$ |
|---|---|---|
| 1 | 79.6 | 0.1 |
| 2 | 128.7 | 0.2 |
| 3 | 153.1 | 0.3 |
| 4 | 177.8 | 0.4 |
| 5 | 200.3 | 0.5 |
| 6 | 223.6 | 0.6 |
| 7 | 249.4 | 0.7 |
| 8 | 284.2 | 0.8 |
| 9 | 332.8 | 0.9 |
| 10 | 587.9 | 1 |
| | Cov(Y,F(Y)) | 34.48 |
| | Mean Income | 241.74 |
| | Gini Coefficient | 0.29 |

– (Deaton, 1997) Another definition: Gini is the ratio to the mean of half the average across over all pairs of the absolute deviations between people

$$Gini = \frac{1}{\mu N(N-1)} \sum_{i>j} \sum_i |y_i - y_j|,$$

where $\mu$ = mean of income distribution

– The Gini coefficient is good at picking up increasing or decreasing income inequality. For example, transfers of income from a ***low-income person to a high-income person*** would mean that the ***income differential*** between these two persons would increase, meaning the ***Gini coefficient would increase*** reflecting ***increasing income inequality***.

**Stata code for Gini coefficicent**
- To install
ssc install ineqdeco

```
use lfs2013q3_sample.dta
ineqdeco mwage [aw= weight], by(region)
```

Percentile ratios

| All obs | p90/p10 | p90/p50 | p10/p50 | p75/p25 |
|---|---|---|---|---|
| | 4.600 | 2.556 | 0.556 | 1.929 |

Generalized Entropy indices GE(a), where a = income difference sensitivity parameter, and Gini coefficient

| All obs | GE(-1) | GE(0) | GE(1) | GE(2) | Gini |
|---|---|---|---|---|---|
| | 0.20978 | 0.18891 | 0.20452 | 0.26298 | 0.33954 |

Atkinson indices, A(e), where e > 0 is the inequality aversion parameter

| All obs | A(0.5) | A(1) | A(2) |
|---|---|---|---|
| | 0.09386 | 0.17214 | 0.29556 |

Subgroup summary statistics, for each subgroup k = 1,...,K:

| Region | Popn. share | Mean | Relative mean | Income share | log(mean) |
|---|---|---|---|---|---|
| Bangkok | 0.14971 | 17133.53609 | 1.46108 | 0.21874 | 9.74879 |
| Central | 0.33426 | 11653.61452 | 0.99378 | 0.33218 | 9.36337 |
| North | 0.16058 | 9906.23703 | 0.84477 | 0.13565 | 9.20092 |
| Northeast | 0.23846 | 10063.46573 | 0.85817 | 0.20464 | 9.21667 |
| South | 0.11698 | 10904.52618 | 0.92990 | 0.10878 | 9.29693 |

Subgroup indices: GE_k(a) and Gini_k

| Region | GE(-1) | GE(0) | GE(1) | GE(2) | Gini |
|---|---|---|---|---|---|
| Bangkok | 0.17811 | 0.16449 | 0.17028 | 0.19739 | 0.32310 |
| Central | 0.15372 | 0.14630 | 0.16260 | 0.20949 | 0.29766 |
| North | 0.21802 | 0.19768 | 0.21857 | 0.29377 | 0.34600 |
| Northeast | 0.21134 | 0.19419 | 0.21851 | 0.30004 | 0.34066 |
| South | 0.18573 | 0.17056 | 0.18491 | 0.23567 | 0.32382 |

Within-group inequality, GE_W(a)

| All obs | GE(-1) | GE(0) | GE(1) | GE(2) |
|---|---|---|---|---|
| | 0.19349 | 0.17153 | 0.18574 | 0.24244 |

Between-group inequality, GE_B(a):

| All obs | GE(-1) | GE(0) | GE(1) | GE(2) |
|---|---|---|---|---|
| | 0.01629 | 0.01738 | 0.01878 | 0.02054 |

Subgroup Atkinson indices, A_k(e)

| Region | A(0.5) | A(1) | A(2) |
|---|---|---|---|
| Bangkok | 0.08080 | 0.15167 | 0.26265 |
| Central | 0.07428 | 0.13610 | 0.23515 |
| North | 0.09888 | 0.17936 | 0.30364 |

```
Northeast |    0.09796     0.17650     0.29710
    South |    0.08514     0.15680     0.27085
----------------------------------------------

Within-group inequality, A_W(e)
----------------------------------------------
  All obs |     A(0.5)        A(1)        A(2)
----------+-----------------------------------
          |    0.08507     0.15589     0.26702
----------------------------------------------

Between-group inequality, A_B(e)
----------------------------------------------
  All obs |     A(0.5)        A(1)        A(2)
----------+-----------------------------------
          |    0.00960     0.01925     0.03894
----------------------------------------------
```

## More measures:

- **Generalized Entropy Measures**

$$GE(\alpha) = \frac{1}{\alpha(\alpha-1)}\left[\frac{1}{N}\sum_{i=1}^{N}\left(\frac{y_i}{\bar{y}}\right)^{\alpha} - 1\right],$$

Where $\bar{y}$ = mean income per person

$\alpha$ represents the weight given to distances between incomes at different parts of the income distribution, and can take any real value. The most common values of $\alpha$ used are 0, 1, and 2.

- GE(0) is Theil's L index (mean log deviation measure):

$$GE(0) = \frac{1}{N}\sum_{i=1}^{N} ln\left(\frac{\bar{y}}{y_i}\right)$$

>> more sensitive to differences at the lower end of the distribution

- GE(1) is Theil's T index:

$$GE(1) = \frac{1}{N}\sum_{i=1}^{N}\frac{y_i}{\bar{y}} ln\left(\frac{y_i}{\bar{y}}\right)$$

>> more sensitive to differences at the top of the distribution

- **Atkinson's inequality measures**

- Atkinson (1970) proposed another class of inequality measures that has a weighting parameter $\epsilon$ , which measures aversion to inequality >> the degree to which social welfare trades off mean living standards on the one hand for equality of the distribution on the other: $\frac{\partial W/\partial y_i}{\partial W/\partial y_j} = \left(\frac{y_j}{y_i}\right)^{\epsilon}$

$$A_{\epsilon} = 1 - \left[\frac{1}{N}\sum_{i=1}^{N}\left(\frac{y_i}{\bar{y}}\right)^{1-\epsilon}\right]^{\frac{1}{1-\epsilon}}, \epsilon \neq 1$$

$$A_1 = 1 - \frac{1}{\bar{y}}\prod_{i=1}^{N} y_i^{1/N}, \epsilon = 1$$