

Gini coefficient and lorenz curve

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3. Usage:
 - `*calc_gini GINI0`
 - `*plot_gini GINI0`
4. Numerical formula

$$G = 1 - ((X_1 - X_0)(Y_1 + Y_0) + (X_2 - X_1)(Y_2 + Y_1) + \dots + (X_n - X_{n-1})(Y_n + Y_{n-1}))$$

$$= 1 - \sum (X_i - X_{i-1})(Y_i + Y_{i-1})$$

5. Example data: Income Share (5 grade) in USA

GINI0

| Grade | X | Y = 1966 | 1980 | 1990 | 2005 |
|-------|-----|----------|------|------|------|
| 1 | 0.2 | 5.6 | 5.3 | 4.6 | 4 |
| 2 | 0.4 | 12.4 | 11.6 | 10.7 | 9.6 |
| 3 | 0.6 | 17.7 | 17.6 | 16.6 | 15.3 |
| 4 | 0.8 | 23.8 | 24.4 | 23.8 | 23 |
| 5 | 1 | 40.4 | 41.1 | 44.3 | 48.1 |

unit is percent

(issue SHIRASAGO)

6. progress

- make cumurative distribution each years

```
a=. gini_sub GINI0
```

```
+-----+-----+
|0.2 0.4 0.6 0.8 1|0.056 0.053 0.046 0.04|
|                   | 0.18 0.169 0.153 0.136|
|                   |0.357 0.345 0.319 0.289|
|                   |0.595 0.589 0.557 0.519|
|                   |0.999      1      1      1|
+-----+-----+
```

```
a=(>{.a},.{"1">{"1 a
```

- (1966) pick up with lapping (each 2)

```
]b=. |. L:0 > 2<\L:0 {|:a
```

```
+-----+-----+-----+-----+
|0.4 0.2 |0.6 0.4 |0.8 0.6 |1 0.8 |
+-----+-----+-----+-----+
|0.18 0.056|0.357 0.18|0.595 0.357|0.999 0.595|
+-----+-----+-----+-----+
```

- -/X and +/Y

```
c=. ({.a), (> -/ L:0 { . b),. >+/ L:0 {: b
```

```
0.2 0.056
```

```
0.2 0.236
```

```
0.2 0.537
```

```
0.2 0.952
```

```
0.2 1.594
```

- $X \times Y$

```
*/"1 c
```

```
0.0112 0.0472 0.1074 0.1904 0.3188
```

- $1 - X \times Y$

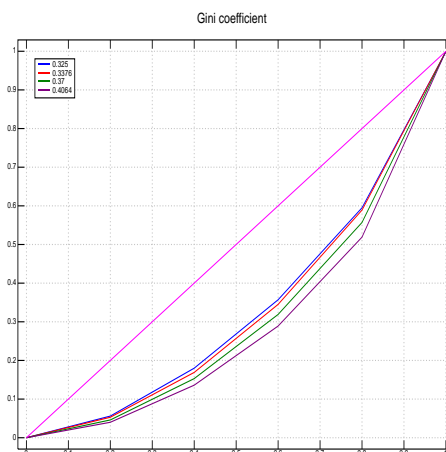
```
1-+/*/"1 c
```

```
0.325
```

7. Calc

```
calc_gini GINI0
```

```
0.325 0.3376 0.37 0.4064
```



8. References

Shirasago Tetsuya "Econometrics"(2nd Edition) Nippon Hyoronsha 1998/2007

9. Miscellance

Sourcecode(J 602) download available

<http://www.japla.sakura.ne.jp>

J language →Library