Gini coefficient analysis for pensioners in Turkey

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Abstract

One of the main objectives of economic policy is to make the fair distribution of income. To provide fair distribution of income, how the revenue is shared must be based on certain criteria. Products and services are not shared in any society indiscriminately. There is a mechanisms governing the distribution of income in every society. Production factors increase the value created for themselves and how to divide this value is complex phenomenon which has technical, economic, social and political dimensions. There are a lot of criterias about how to divide the created value like change interval, the relative mean absolute deviation, standard deviation, coefficient of variation, variance, logarithmic variance, Pareto α coefficient, Lorenz curve, Gini coefficient, Dalton Atkinson inequality measure, the poverty index, poverty difference, hunger threshold.
Injustice of the revenue distribution among pensioners is a frequently mentioned subject in Turkey and it is thought to be sourced because of the changes at social security system and salary regulation method for old age pensioners. In this study, the Gini coefficient will be calculated for old age pensioners in Turkey and the pensioners' income distribution will be analyzed by comparing with the Gini coefficient of Turkey.

Keywords: gini coefficient, pensioners.

1. Introduction

The Gini coefficient is a measure of inequality of a distribution. It is defined as a ratio with values between 0 and 1: the numerator is the area between the Lorenz curve of the distribution and the uniform distribution line; the denominator is the area under the uniform distribution line (Figure 1).It

was developed by the Italian statistician Corrado Gini and published in his 1912 paper "Variabilità e mutabilità" ("Variability and Mutability"). The Gini index is the Gini coefficient expressed as a percentage, and is equal to the Gini coefficient multiplied by 100. (The Gini coefficient is equal to half of the relative mean difference.)
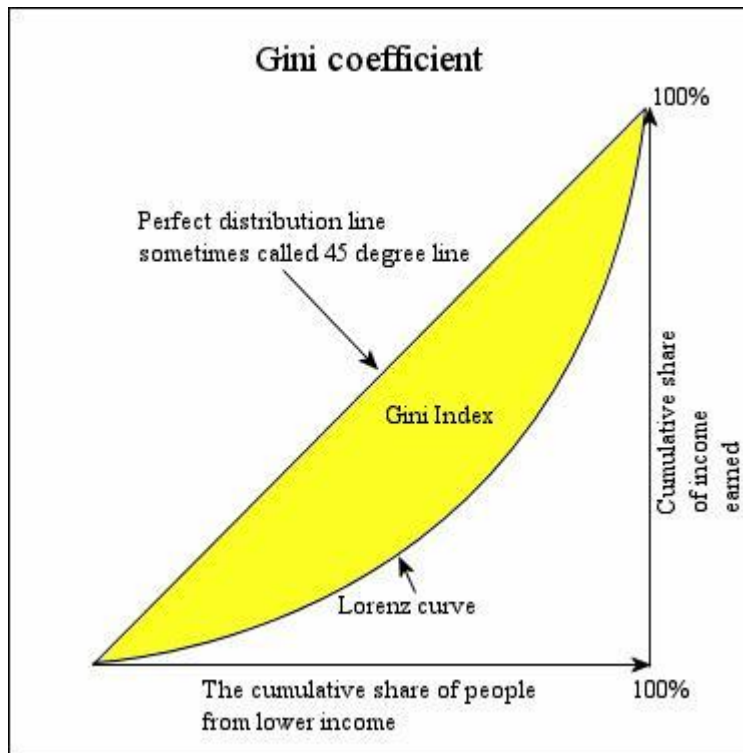

Figure 1. Lorenz Curve and Gini Coefficient

The Gini coefficient is often used to measure income inequality. Here, 0 corresponds to perfect income equality (i.e. everyone has the same income) and 1 corresponds to perfect income inequality (i.e. one person has all the income, while everyone else has zero income).

The Gini coefficient can also be used to measure wealth inequality. This use requires that no one has a negative net wealth. It is also commonly used for the measurement of discriminatory power of rating systems in the credit risk. The Gini coefficient is defined as a ratio of the areas on the Lorenz curve diagram. If the area between the line of perfect equality and Lorenz curve is A, and the area under the Lorenz curve is B, then the Gini coefficient is A/(A+B). Since A+B = 0.5, the Gini coefficient, G = 2A = 1-2B. If the Lorenz curve is represented by the function Y = L(X), the value of B can be found with integration

$$G = 1 - 2 \int_0^1 L(X)dX$$

In some cases, this equation can be applied to calculate the Gini coefficient without direct reference to the Lorenz curve. For example:

For a population with values yi, i = 1 to n, that are indexed in non-decreasing order (yi <=yi+1):

$$G = \frac{1}{n}\left(n + 1 - 2\,\frac{\sum_{i=1}^{n}(n + 1 - i)y_i}{\sum_{i=1}^{n}y_i}\right)$$

For a cumulative distribution function F(y) that is piecewise differentiable, has a mean , and is zero for all negative values of y

$$G = 1 - \frac{1}{\mu}\int_{0}^{\infty}(1 - F(y))^2\,dy$$

While most developed European nations tend to have Gini coefficients between 0.24 and 0.36, the United States Gini coefficient is above 0.4, indicating that the United States has greater inequality. Using the Gini can help quantify differences in welfare and compensation policies and philosophies. However it should be borne in mind that the Gini coefficient can be misleading when used to make political comparisons between large and small countries.

2. Gini Coefficient Of Pensioners In Turkish Social Security System

Income distribution is one of the main problems of Turkish Economy. Despite Turkey is one of the OECD member that recorded no increase or small declines in its Gini coefficient between Mid-1980s and Late-2000s, Its Gini Coefficient is still higher than approximately 0.10 points compare to OECD Average by 2012 (OECD Average: 0.308, Turkey: 0.402)*†. Besides, in Turkish social security system, pensioners are assumed as most suffered segment according to the income distribution so this study will try to calculate the Gini coefficient of the pensioners. Turkish Social Security system separates the employees in three main groups before the social security reform: Individuals working on service contract who are subject to SSK (Social Insurance Administration), Individuals working on their own names and accounts who are subject to Bag-Kur (Craftsmen And Artisans And Other Self-Employed Social Insurance Institution) and public employees or civil servants who are subject to ES (Retirement Fund General Directorate). In this study, the most crowded group of pensioners; SSK old age pensioners (declared as 4-a after the reform) will be analysed according to the Gini coefficient.

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* OECD, (2011), Divided We Stand: Why Inequality Keeps Rising, An Overview of Growing Income Inequalities in OECD Countries: Main Findings, ISBN 978-92-64-111639, Paris.

† OECD (2016), Income inequality (indicator). doi: 10.1787/459aa7f1-en

By the date of 05.08.2015; nearly 6 million pensioners from SSK getting old age income or salary is analysed. The results are seen in Table 1:

Table 1. Income and Frequency Distribution of 4-a Old Aged Pensioners

INCOME GROUPS	MID POINT(X)	FREQUENCY- NO OF EMPLOYEES(F)	%F	% CUMMULATIVE EMPLOYEES	% INCOME	CUMULATIVE INCOME %
0-99	49,5	4794	0,109733	0,1097332	0,0042016	0,0042016
100-199	149,5	4062	0,092978	0,2027111	0,0107522	0,0149538
200-299	249,5	2010	0,046008	0,2487193	0,0088794	0,0238332
300-399	349,5	978	0,022386	0,2711054	0,006052	0,0298853
400-499	449,5	816	0,018678	0,2897834	0,0064944	0,0363796
500-599	549,5	2148	0,049167	0,3389505	0,0208986	0,0572783
600-699	649,5	3300	0,075536	0,4144864	0,0379498	0,0952281
700-799	749,5	41112	0,941041	1,3555272	0,5455774	0,6408055
800-899	849,5	180024	4,120693	5,4762199	2,7077586	3,3485641
900-999	949,5	253146	5,794432	11,270652	4,2558096	7,6043737
1000-1099	1049,5	1115106	25,52443	36,795078	20,721193	28,325566
1100-1199	1149,5	842496	19,28447	56,079546	17,147191	45,472757
1200-1299	1249,5	447642	10,24638	66,325931	9,9033754	55,376132
1300-1399	1349,5	338820	7,755483	74,081414	8,0957685	63,471901
1400-1499	1449,5	231912	5,308393	79,389807	5,951927	69,423828
1500-1599	1549,5	208386	4,76989	84,159697	5,7171064	75,140934
1600-1699	1649,5	194514	4,452364	88,612061	5,6809287	80,821863
1700-1799	1749,5	118284	2,707484	91,319545	3,6640054	84,485868
1800-1899	1849,5	62754	1,436419	92,755964	2,0550004	86,540869
1900-1999	1949,5	48300	1,105572	93,861536	1,6671955	88,208064
2000-2099	2049,5	39618	0,906844	94,768379	1,4376614	89,645726
2100-2199	2149,5	34554	0,79093	95,559309	1,3150793	90,960805
2200-2299	2249,5	30504	0,698227	96,257536	1,2149515	92,175756
2300-2399	2349,5	26814	0,613764	96,8713	1,115458	93,291214
2400-2499	2449,5	24990	0,572013	97,443314	1,0838267	94,375041
2500-2599	2549,5	21906	0,501421	97,944735	0,9888587	95,3639
2600-2699	2649,5	19590	0,448409	98,393144	0,9189979	96,282898
2700-2799	2749,5	17322	0,396495	98,789639	0,8432724	97,12617
2800-2899	2849,5	13752	0,314779	99,104418	0,6938262	97,819996
2900-2999	2949,5	10554	0,241578	99,345996	0,551165	98,371161
3000-3099	3049,5	9108	0,208479	99,554475	0,4917765	98,862938
3100-3199	3149,5	6330	0,144892	99,699367	0,3529892	99,215927
3200-3299	3249,5	5340	0,122231	99,821598	0,3072373	99,523164
3300-3399	3349,5	3414	0,078145	99,899743	0,2024695	99,725634
3400-3499	3449,5	2100	0,048068	99,947812	0,1282601	99,853894
3500-3599	3549,5	1134	0,025957	99,973768	0,0712683	99,925162
3600-3699	3649,5	702	0,016069	99,989837	0,0453614	99,970524
3700-3799	3749,5	444	0,010163	100	0,0294763	100
SUM		**4368780**				

According to the results in Table 1 the Gini coefficient for old aged pensioners is calculated in Table 2. As mentioned above Gini coefficient Gini=G=A/A+B

B=1/2[(x1-x0)*(y1+y0)+(x2-x1)*(y2+y1)+……+(xk-xk-1)*(yk+yk-1)] k is the number of income groups in Table 1.

Table 2. Calculating Gini Coefficient

GINI (X1-X0)	GINI (Y1+Y0)	0,5 *(x1-x0) *(y1+y0)	GINI (X1-X0)	GINI (Y1+Y0)	0,5 *(x1-x0) *(y1+y0)
0,109733152	0,004201645	0,00023053	1,105571807	174,7489328	96,59874672
0,092977902	0,019155489	0,000890519	0,906843558	177,8537897	80,64278175
0,046008268	0,03878707	0,000892263	0,790930191	180,6065304	71,4235788
0,022386112	0,053718497	0,000601274	0,698226965	183,1365612	63,93544265
0,018677983	0,066264898	0,000618847	0,613764026	185,4669707	56,91647727
0,049167044	0,093657897	0,002302441	0,572013239	187,6662553	53,67379132
0,075535962	0,152506321	0,005759856	0,501421449	189,7389408	47,56958736
0,941040748	0,736033529	0,346318772	0,448408938	191,6467974	42,96806845
4,120692733	3,989369558	8,219483073	0,396495131	193,4090677	38,34287686
5,794432313	10,95293778	31,73302828	0,314778954	194,9461664	30,6824752
25,52442558	35,92994006	458,5455406	0,24157774	196,1911576	23,69770825
19,28446843	73,79832338	711,5807188	0,208479255	197,2340991	20,55960903
10,24638457	100,8488894	516,6682524	0,144891709	198,0788649	14,34999262
7,755483224	118,8480333	460,8619642	0,12223092	198,7390915	12,14603103
5,308392732	132,8957287	352,7313603	0,078145386	199,2487983	7,785187139
4,769889992	144,5647621	344,779006	0,048068339	199,5795279	4,796728247
4,452364276	155,9627971	347,2015932	0,025956903	199,7790563	2,592822823
2,707483554	165,3077312	223,7839818	0,016068559	199,895686	1,606017831
1,436419321	171,026737	122,8330547			

B is calculated as 4249,5835 and A is equal to 5000-B so A= 750,4164 so Gini coefficient G=A/(A+B)= 0,15008.

3. Conclusion

In this study all the old age 4-a pensioners' income and salary is analyzed according to the Gini coefficient assumption and Gini coefficient for pensioners is calculated as approximately 0,15. Table 3 demonstrates the change of the Gini coefficient between the years 2006 and 2014 and the average gini coefficient is 0,4058 so it can be asserted that the income distribution among pensioners is more equitable compared to general Turkish income distribution. There are three main reasons for this situation: Contributory minimum pension and same amount of pension rising and ceiling on pensionable earnings.

Turkey listed as one of the thirteen countries in OECD which minimum pension is significant. Minimum pension is redistributive part of mandatory pension system tiers that designed to provide minimum standard of living to pensioners. Turkey implements minimum pension not only for old age

pension but also for invalidity and survivor's pension. So, lower-wage workers can receive higher pension. Moreover; in Turkey contributory minimum pensions are set at a significantly higher level than the safety-net income. Despite this implementation have disruptive effects on social security system, lower-wage workers pension become closer to average pension.

Secondly, in Turkey, pensions generally raise by consumer price index two times a year. But, sometimes pensions are raised by government decision with fixed amount for all pensions in order to upgrade lower pension level. With this raising method pensioners who receive lower pension take more in terms of percentage when compared to pensioners who receive higher pension. This method is out of financial expectations, but has corrective effect on pension distribution. Finally, a ceiling on pensionable earnings restricts the highest pension level. In Turkey, maximum pensionable earning level is 6,5 times of minimum wage and this limitation fix the difference between the lowest and the highest pension. To wrap up, the main problem of the pensioners is the same with the Turkey, but it's not about distribution. To solve this problem the income level should be increased to the poorness level for households.

Table 3. Gini coefficient by equalized household disposable income, 2006-2014

Years	2006	2007	2008	2009	2010	2011	2012	2013	2014
Gini coefficient	0,428	0,406	0,405	0,415	0,402	0,404	0,402	0,400	0,391

TUIK, Income and Living Conditions Survey, 2006-2014

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