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2008 financial crisis and income distribution in Turkey

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Abstract
This study provides some new evidence for the 2008–2009 Global Financial Crisis on income inequality in Turkey. Two methodologies were used in the study. The first methodology put forward by Jenkins and Van Kerm (Oxf Econ Pap 58(3):531–548, 2006) uses micro-level data to estimate the relationship of income inequality changes with the pattern of progressive income growth and reshuffling across the income quartiles before and after the crisis. Second, using macro level data across Turkey's regions, a panel data analysis is conducted to examine if the relationship among income inequality, poverty, and income growth has changed after the financial crisis. The panel data model in the double log form for inequality has been estimated for Turkey between 2005 and 2012. The panel data model results show that differential intercept coefficients were statistically not significant, implying that the effect of growth and poverty on inequality has not changed in the crisis period. The fact that the financial crisis has only lasted for two years in Turkey might be the reason for not observing fundamental changes in the pattern of the relationship between income inequality, poverty, and income growth.

Keywords Inequality · Financial crisis · Economic growth · Poverty · Turkey

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1 Introduction

The global financial crisis of 2008, which originated in the U.S., has spread around the world. Both the advanced and developing countries have suffered from its impacts on the labor market, earnings, and income inequality in varying degrees. This financial crisis was associated with a sharp decline in output, trade, and financial wealth and has been the most severe economic slowdown since the Great Depression (Atkinsonc et al. 2013). The crisis also hit harder the poor people globally and deepened income inequalities for mostly the low-skilled workers, young people, and women. Chen and Ravallion (2008) estimated that 53 million fewer poor people live below $1.25 a day and 64 million fewer poor people live under $2 a day if the crisis did not happen. Given current growth projections, they estimated further aggravation in 2010 by a rise in the number of poor people, albeit they expect aggregate headcount poverty to fall over time.

Turkey enjoyed an average GDP growth rate of 5.4% from 2002 until 2008. Negative GDP growth rates were recorded in Turkey for 2008 and 2009. Despite this contraction, the Turkish economy quickly recovered from the global financial crisis and continued to grow. However, despite this economic growth, Turkey has the 3rd highest income inequality level and the 3rd most elevated level of relative poverty among OECD member countries. The rural population has continued to migrate to urban areas in search of better livelihoods since the 1950s.

If the share of incomes of the top and bottom quintiles changes disproportionally due to the financial crisis, the income distribution effects in an economy can be seen. How hard the economic crisis hit different quintiles will determine the rise or fall in inequality to a great extent. If the crisis reduces the mean income level, as theoretically expected, the proportion of the population whose income falls below the poverty line increases with or without a change in the size distribution.

This paper has six main sections. The following section provides a macroeconomic view of Turkey. The Sect. 3 summarizes the literature review. The Sect. 4 describes the data used in the estimation and methodology. The Sect. 5 summarizes the empirical results and Sect. 6 provides the conclusions.

2 Macroeconomic indicators

The 2008 global financial crisis disrupted Turkey's steady long-run economic growth since 2002. Table 1 shows the trends in the leading macroeconomic indicators before and after the crisis for Turkey. GDP growth, investment, and inflation gradually decelerated before the crisis, while foreign trade increased moderately in 2007. When the crisis hit Turkey in 2008, investment, household consumption expenditures per capita and imports had negative growth rates, unemployment rates have soared, and the current account balance has worsened. However, the leading economic indicators show that the economic downturn due to the crisis has lasted only two years. Starting from 2010, growth rates of GDP, investment, unemployment, exports, imports, and improvement in current account balance show that the Turkish economy quickly recovered from the crisis due to tight financial regulations and growing domestic demand in the pre-crisis period (Kılınç et al. 2012).

Another issue is that a financial crisis deepens poverty and increases income inequality, especially in developing countries. Loss of job and or loss of income in a poor household

Table 1 Macroeconomic developments before and after the crisis (Annual growth rates)

Series	2005	2006	2007	2008	2009	2010	2011	2012	2013
CPI	8.60	9.60	8.76	10.44	6.25	8.57	6.47	8.89	7.49
GGFCE	2.49	8.44	6.53	1.75	7.78	1.98	4.68	6.15	6.50
GFCE	17.39	13.26	3.10	− 6.16	− 19.0	30.54	18.03	− 2.70	4.37
EX	14,06	19,45	23,03	22,12	− 22,12	10,26	17,69	13,73	3,36
IM	22,10	20,84	20,45	19,49	− 30,61	31,84	30,59	− 1,83	9,66
GDP	8.90	6.94	5.04	0.81	− 4.83	8.42	11.2	4.78	8.48
CONS	6.44	3.36	4.27	− 1.49	− 3.54	5.12	6.38	− 1.68	3.85
UN	− 1.85	− 3.77	0.98	6.80	27.27	− 15.00	− 17.6	− 6.12	− 5.43
CA	− 47.77	48.53	− 18.56	− 6.71	71.19	− 292.78	− 66.75	35.54	− 16.5

Own calculations based on the data from World Bank, World Development Indicators. CPI is a consumer price index, GGFCE is general government final consumption expenditure, GFCE is gross fixed capital formation, EX is exports of goods and services, IM is imports of goods and services, GDP is GDP growth, CONS is household final consumption expenditure, UN is unemployment, and CA is the current account balance

Table 2 Distribution of cash and in-kind social benefits by needs groups (Annual growth rates)

Benefits	2006	2007	2008	2009	2010	2011	2012
Total social protection benefits	19.81	15.91	15.73	18.75	10.40	15.47	13.68
Sickness/health care	23.30	8.58	21.27	19.76	3.82	13.34	7.81
Disabled/veteran	20.17	31.58	20.01	38.43	20.16	26.61	17.89
Retired/old	18.60	19.03	16.25	19.56	13.43	11.70	14.58
Widow/orphan	18.50	17.99	0.30	− 0.91	21.72	36.18	18.62
Family/children	9.24	43.31	5.10	16.04	7.68	24.95	23.26
Unemployment	17.78	9.01	19.52	160.87	− 1.60	2.71	25.88
Social exclusion n. e. c	4.10	15.94	10.30	15.59	− 3.56	32.94	48.89

Author's calculation using data from http://www.tuik.gov.tr/PreHaberBultenleri.do?id=16167

increases poverty. Changes in food prices and other essential supplies make poor people exceptionally vulnerable to a global financial crisis. The social protection policy plays a vital role in reducing the impact of the crisis on poverty, accordingly on inequality. Generally, marginal increases in existing social programs are observed as a response to the crisis. The government, non-governmental organizations, and private sectors help the poor by offering them cash and food, holding the crisis's impact at manageable levels. Thus, during an economic downturn, social spending is likely to increase to fulfill a greater need for social support.

The number of people in poverty had been falling in most recent years before the crisis in Turkey. The number of people with less than $1.25 a day income increased to 180,000 in 2009 and 169,000 in 2010. Table 2 shows the social protection benefits given to various groups in need. Full social protection benefits are mainly allocated to old persons, widows, orphans with low- or no income. There were no unusual changes during the crisis period in most of the social benefits. Unemployment benefits, however, increased by about 161% in 2009. The total amount of social services rose significantly in 2008 and 2009 but grew at lower rates starting in 2010. The social protection response of the Turkish government to

the crisis has, in general, taken the form of adding marginal increases into existing social programs.

3 Literature review

The literature on the effect of the crisis on inequality does not provide definitive conclusions. Bazillier and Hericourt (2014) review the literature for the relationship between inequality, leverage, and financial crisis and reach no definite conclusion on the impact of the financial crisis on income inequality. Similarly, Knowles et al. (1999) assessed the social impact of the Asian financial crisis by drawing on the six countries' results in the region. They found that while the size distribution became more unequal for the five countries, it became more equal for one of the countries under study. Atkinson and Morelli (2010) examined the existence of causality from a crisis to income inequality for a hundred-year data (1911–2010) for 25 countries. They did not find an identifiable pattern of the impact of a systematic banking crisis on inequality across countries.

Similarly, Galbraith and Lu (1999) investigated the currency crisis and their impact on 20 selected countries' income inequality in Asia, Europe, and Latin America. They found that crises tended to raise income inequality. But the effect of crises depends on the extent of labor market regulation: the more regulated labor markets, the less inequality. Thus, the Latin American workers were affected worse than Asian laborers, and the Asian laborers were affected worse than European countries with more organized and politically powerful labor unions.

The other strand of literature emphasizes the effect of the crisis on the income distribution of different subsamples in a population. Easterly (1999) argues that economic expansion or contraction will affect the poor less because of their lower share in an economy. Easterly argued that the adjustment programs by the IMF or World Bank decrease the sensitivity of poverty to economic growth. A similar conclusion is reached by Baldacci et al. (2002), who investigated the impact of crises on poverty and income distribution. They defined four channels through which financial crises affect poverty and income distribution: a slowdown in economic activity, relative price changes, fiscal reduction, and changes in asset and real asset prices. Baldacci et al. used cross-country macroeconomic data and Mexican micro-data for the 1994–1995 crises. They found that poverty increased due to a financial crisis for both macro and micro-level data. Based on the Mexican data, they found the poverty gap widened, leading to an increase in poverty after the crisis. However, income and expenditure inequality did not arise in the aftermath of the crisis.

The literature so far shows that the impact of economic crises on the distribution of income is ambiguous. The effects mainly depend on labor market conditions, tax structures, and government social spending on the poor. This study examines changes in inequality among different income groups in Turkey before and after the 2008 crisis for pro-poor income growth and income re-ranking following the line by Easterly (1999) and Baldacci et al. (2002). Comparing the results before and after the 2008 crisis for Turkey is hardly an adequate basis for generalization. We, therefore, elaborate the comparison along two dimensions. First, the micro-level data was used for comparison, which allows for a more in-depth analysis of household characteristics. Second, using macro-level data of twelve regions in Turkey, a panel data model is used to investigate the relationship among income inequality, poverty, and economic growth for the crisis's effect.

In the first dimension, this study used micro-level longitudinal data of Turkey between 2005–2008 and 2008–2011 and mainly applied decomposition techniques developed by Jenkins and Van Kerm (2006). The change in inequality of real disposable incomes is divided into progressivity and mobility components. Their methodology is especially novel in capturing the contribution of re-ranking between individuals to change income inequality. They found a consistent pattern of decreasing inequality, starting from the poorest quartile and a rise in income inequality of the wealthiest quartile before the crisis. This pattern disappeared after the crisis. The size of income mobility and progressive income growth have decreased after the crisis for the poor and mid-income quartiles. After the crisis, the richest have enjoyed doubled progressive income growth with a modest decrease in income re-ranking and experienced lower income inequality. Besides, re-ranking contributions and progressive income growth to inequality have decreased for the total population and most quartiles. These changes indicate slowing economic activities following the crisis. In the second dimension, to assess the relative importance of growth and poverty in inequality, an econometric model in the double log form for inequality has been estimated for Turkey between 2005 and 2012. The analysis results show that differential intercept coefficients are not statistically significant, implying that the effect of growth and poverty on inequality has not changed in the crisis period.

This study has several academic contributions. This study will contribute to the current literature by providing more evidence on the distributional effects of crisis for different subsamples in the population. There are very few studies in the literature on the impact of a financial crisis on income distribution. Second, this paper will be the first to apply Jenkins and Van Kerm's (2006) methodology to study income dynamics in the aftermath of the crisis for different population segments by considering changes in income re-ranking and progressive income growth. The framework allows us to evaluate and understand the effects of faster income growth among poor and rich income segments. Third, it gives us important policy implications to governments in the aftermath of the crisis to alleviate its adverse effects on different income segments of the population. Fourth, although poverty and inequality topics using Turkish data have been the subject of various studies, the impact of a financial crisis on economic growth, income inequality, and poverty reduction, however, has not been elaborately quantified before (Şeker and Dayıoğlu 2015; Selim et al. 2014).

4 Data and methodology

The Turkish Statistical Institute (TURKSTAT) collects data similar to the European Union Statistics (EUROSTAT) on Income and Living Conditions (EU-SILC) with face-to-face interviews. EUROSTAT conducts EU-SILC surveys to collect timely and comparable cross-sectional and longitudinal multidimensional microdata on income, poverty, social exclusion, and living conditions for the households, using a panel survey methodology.

The first step in panel data analysis is the selection of the sample. The participants partake in the surveys for four years. The sampling universe covers all households in the country. However, the sample excludes individuals in retirement homes, elderly care centers, prisons, military barracks, private hospitals, hotels, childcare centers, and the immigrant population. The panel survey applications use a rotational design, 75% of the sample stays as participants, and 25% change each year.

This methodology uses the total annual household income declared by the head of the household. Net disposable yearly household income is the total of the individual gross

income of all members of the household, including payment in cash or social support, such as salaries, wages, business income, pension, widowed-orphan and old-age benefits, grants, etc., plus the income from real estate, social services, and salaries earned by household members less than age 15, etc. minus the taxes paid during the year and regular transfers to other households or persons.[1]

In these surveys, annual disposable household income is the income earned the previous year. For example, income for 2016 refers to the income earned in 2015. Therefore, to obtain real values, the total disposable household income is adjusted by the previous year's Consumer Price Index (CPI), published by the Central Bank of Turkey (CPI for 2005 = 100). The OECD's modified equivalence scale is used to estimate average income per person since the standard of living of households depends on income, composition, and household size. The OECD scale assigns the value of 1 for the head of the household, 0.5 for the other household members 14 years old or older and over, and 0.3 for the minors (younger than 14 years of age). Regional differences in the cost of living are not accounted for in our analyses. The sample includes equalized income in real values for 25.822 households between 2005 and 2008 and 33.053 households between 2008 and 2011.[2]

Two methodologies were used to investigate the impact of the global financial crisis of 2008 on income inequality. The first methodology put forward by Jenkins and Van Kerm (2006) uses micro-level data to estimate the relationship of income inequality changes with the pattern of progressive income growth and individuals' reshuffling across the income quartiles before and after the crisis. Second, using macro-level data across Turkey's regions, a panel data analysis is conducted to examine if the relationship between income inequality, poverty, and income growth has changed after the financial crisis.

Income inequality has two components: within-group component, differences in personal characteristics in a given occupation, and between-group component, differences between subgroups or regions.[3] Jenkins and Van Kerm (2006) offer a decomposition framework that allows ranking individuals in pecking order over time.[4] Jenkins and Van Kerm decomposed change in inequality into the progressivity of income growth (pro-poorness) and income mobility (reshuffling of individuals in the income distribution over time) components using information about the joint distribution of income in two time periods.

Inequality is measured using generalized Gini (or single parameter Gini, S-Gini for short) class of indices (Donaldson and Weymark 1980). The S-Gini coefficient is a weighted average difference between the Lorenz curve of the income distribution (L) and the perfect equality line. Jenkins and Van Kerm use the Gini Inequality Index as the inequality measure, the total difference between population shares *(p),* and the Lorenz curve. The cumulative percentage of total income held by any bottom p of the population, $L(p)$:

$$GINI = 2\int_0^1 (p - L(p))dp = 1 - \int_0^1 (p - L(p))dp \tag{1}$$

[1] In this study the TURKSTAT code, HG110, is used for total household annual disposable income.

[2] TURKSTAT publishes the SILC data in CDs. Data for 2008 year exists in both 2006–2009 wave and 2009–2012 wave. Therefore, the year 2008 is used in both 2005–2008 and 2008–2011 waves.

[3] Bourguignon et al. (2005) state fundamental sources income inequality changes over time. For accessible discussion, see Haughton and Khandker (2009, p. 111).

[4] For a thorough review of previous decomposition of income inequality methodologies, see Heshmati (2004).

However, employing the covariance-based formulation of the Gini coefficient is significantly more convenient to explain the methodology of Jenkins and Van Kerm (2006).

A single-parameter Gini coefficient (S-Gini) is the covariance between an income variation and its cumulative distribution (Van Kerm 2009; Yitzhaki and Schechtman 2005):

$$GINI(X,v) = -vCOV\left[\frac{X}{\mu(X)}, \left(1 - F_X(X)\right)^{v-1}\right] \tag{2}$$

where X is a random income variable with a mean $\mu(X)$ at a point in time, and $F_X(X)$ is the cumulative distribution function of income, $v > 0$ is a parameter to determine the degree of inequality aversion. Notice that this measure of inequality takes the distribution of mean normalized incomes instead of the distribution of income levels. The standard Gini corresponds to $v = 2$. Higher (lower) values of v give greater (lower) weight to inequality differences among poorer individuals in a group.

The Gini coefficient uses the Lorenz curve, the concentration curve for income (Kakwani 1977). The area between the concentration curve and the line of equality is twice as much is called the concentration index. The index is between − 1 and 1. The index takes negative values when the curve lies above the line of equality, displaying that the income variable is disproportionately concentrated among the poor, and takes positive values when it lies below the line of equality.

The generalized concentration index is:

$$CI(X,Y;v) = -vCOV\left[\frac{X}{\mu(X)}, (1 - G(Y))^{v-1}\right] \tag{3}$$

where $G(Y)$ is the cumulative distribution function of Y. The index depends only on the relationship between the mean-normalized income variable and the rank of the living standards variable, income in this case.

Jenkins and Van Kerm (2006) have shown that change in income inequality between period 0 and period 1:

$$\Delta GINI(v) = G\left(X^1;v\right) - G\left(X^0;v\right) \tag{4}$$

where $G\left(X^i;v\right)$ is the generalized Gini coefficient at the period i. $R(v)$ is income mobility in the form of re-ranking, and $P(v)$ is the progressivity of income growth and the pro-poorness of income growth. $R(v)$ and $P(v)$ can be defined as:

$$R(v) = G\left(X^1;v\right) - CI\left(X^0, X^1;v\right)$$

and

$$P(v) = G\left(X^0;v\right) - CI\left(X^0, X^1;v\right) \tag{5}$$

where, $CI\left(X^0, X^1;v\right)$ is the generalized concentration coefficient of period 1 incomes against period 0 ranking. $R(v)$ captures how much progressive income growth has caused to re-ranking between individuals. Therefore, it can be explained as a measure of income mobility. $P(v)$ captures how much change has benefited disproportionally to poor people with the weights determined by the period 0 ranking. Therefore, it can be interpreted as a measure of pro-poorness of economic growth. Then, the difference between income re-ranking and progressive income growth indicates the net reduction in inequality (Van Kerm 2009):

Table 3 Decomposition of changes in income inequality, 2005–2008

Quartiles	Initial Gini	Final Gini	Change in Gini	Reranking *R(2)*	Progressivity *P(2)*
I	230.3 (7.4)	187.9 (7.3)	− 42.4 (9.7)	135.3 (11.4)	177.7 (13.0)
II	87.1 (3.3)	76.8 (4.4)	− 10.3 (5.3)	76.9 (9.2)	87.2 (8.9)
III	78 (3.6)	72.6 (3.1)	− 5.4 (4.1)	69 (9.6)	74.4 (9.8)
IV	280.5 (17.2)	304.2 (22.0)	23.7 (15.8)	87.3 (10.1)	63.7 (18.4)
All	429.6 (8.4)	425.2 (9.9)	− 4.4 (7.5)	82.4 (4.5)	86.8 (8.3)

Authors' calculations from the SILC survey by TURKSTAT. Estimates and bootstrap standard errors in parentheses are multiplied by 1000. The numbers of households in the panel are determined by dividing the number of households in the survey into four equal groups after ranking their incomes. Quartile 1 includes 304 households, Quartile II consists of 94 households, Quartile III consists of 98 households, and Quartile IV consists of 312 households in the panel

$$\Delta GINI(v) = R(v) - P(v) \tag{6}$$

When $P(v) > 0$, the poor benefit more from income growth. Hence, the higher $P(v)$ leads to a larger reduction in inequality, pro-poor growth. By contrast, if wealthier individuals gain more income over time than poorer individuals, $P(v)$ becomes negative, and inequality increases, which is anti-pro-poor growth. On the other hand, if initially poor people catch up with wealthier people in time, $R(v) > 0$, and inequality will increase by re-ranking individuals due to further income increases.

The estimation of these two components requires panel data of individuals or households. $P(v)$ is a measure of *β-convergence*, the case of relatively faster growth of the less developed economies, and the overall change in inequality ($\Delta GINI(v)$) is a measure of *σ-convergence*, decreasing dispersion of GDP levels over time (O'Neill and Van Kerm 2008).

The changes in the Gini coefficient and its components can be estimated over time across countries, regions, or different income groups. In our case, this framework examines the impact of the 2008 global financial crisis on income distribution for different segments of the population in Turkey. Household incomes in the two SILC surveys, 2006–2009 and 2009–2012, by TURKSTAT, were designed as a panel and grouped as quartiles, instead of quintiles, due to data constraints.

5 Empirical results

Table 3 shows estimates of the inequality change decompositions for quartiles in Turkey before the 2008 crisis. For the whole sample, inequality decreased by about 0.4 percentage points. There is a consistent pattern in inequality across quartiles: inequality decreased by more than four percentage points for the first quartile, and inequality changes were smaller for the second and third quartiles. In contrast, inequality rose by more than two percentage points for the fourth quartile, the highest income group.

Income growth over four years was progressive: $P(2) > 0$ for each group. Income growth was for the pro-poor proportionately more significant for the relatively poor than the relatively rich in that group. The pro-poorness ranks from the lowest quartile to the highest quartile and the results for the entire data set shows that income growth is pro-poor in

the period before the crisis. It means that income growth is higher for the relatively poor people in the first quartile than income growth for the relatively poor in the fourth quartile. These results conform to the expectations that relative income growth was more significant for the poorest than for the rich, primarily due to the government's social spending expenditures on the poor.

There was substantial re-ranking in the distribution of quartiles and the distribution as a whole in the pre-crisis period. It means that an individual at the first quartile in 2005, for example, was unlikely to be at the first quartile again in 2008. This reshuffling was more extensive within the first and fourth quartile but smaller in mid-income quartiles. Thus, while inequality was rising due to the reshuffling of positions, this effect was offset by a larger equalizing impact of progressive income growth in varying degrees for the first three quartiles and the whole sample. However, the reshuffling of positions in the fourth quartile is higher than the equalizing effect of progressive income growth. So, the Gini rises over time for the wealthiest group.

Table 4 shows that these patterns are different after the crisis. There is a substantial reshuffling of positions and progressive income growth again. However, the Gini coefficient changes do not follow a descending pattern as in the pre-crisis period. The fourth quartile has a negative and largest change in the Gini, followed by the first quartile. Interestingly, an increase in Gini for the second quartile is observed. While the magnitudes of *R(2)* and *(P2)* are lower for the poor and mid-income groups, the progressive income growth has doubled in size for the wealthiest group. In other words, while the effects of both income mobility and progressive income growth on inequality were less for the first three quartiles, the rich have enjoyed more from higher progressive income growth after the crisis. Thus, income inequality has decreased for the wealthiest people by doubling progressive income growth and a modest decrease in income mobility.[5]

After the crisis, the equalizing effect of progressive income growth again dominates the dis-equalizing effect of re-ranking for the lowest income group, primarily due to the government's social spending expenditures on these groups. On the other hand, change in Gini is also positive for the wealthiest group. While the economic growth made some individuals, who were less rich in the initial year, move into a wealthier segment in the group, this effect has been dominated by increasing incomes of relatively fewer wealthy people in the wealthiest group.

Following Jenkins and Van Kerm's (2006) analyses, contributions of pro-poor income growth and income mobility to inequality across quartiles are compared before and after the crisis. Each of these two components has been normalized by dividing the corresponding initial year Gini. Figure 1 shows the bar graphic of normalized income mobility across quartiles. The contribution of income mobility on inequality is relatively higher for the second and third quartiles and lowest for the rich group. If there had been no progressive income growth and other things held constant, income re-ranking would have raised inequality by about 90% in the second quartile and 85% in the third quartile. These contributions have decreased after the crisis for all quartiles, excluding the second quartile. However, a definite systematic pattern in these contributions after the crisis is not observed.[6]

[5] The income growth rates of households for the whole data before and after the crisis follow the same trends with the growth rate of GDP of Turkey which confirms that data satisfactorily represent Turkey. The income growth rates of households have not shown here but can be presented upon the request.

[6] The contribution of re-ranking to inequality and size of re-ranking have decreased for the whole sample after the crisis. The calculations are not shown here but available upon the request.

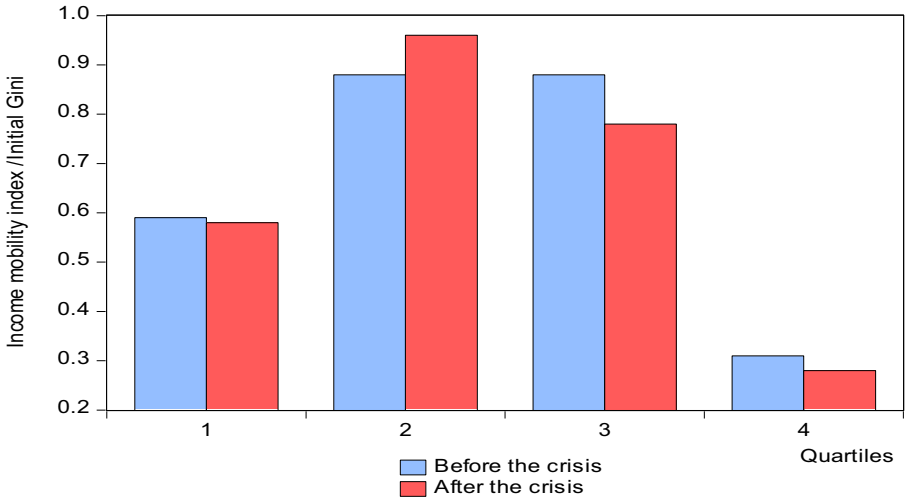

Fig. 1 Changes in re-rankings across quartiles

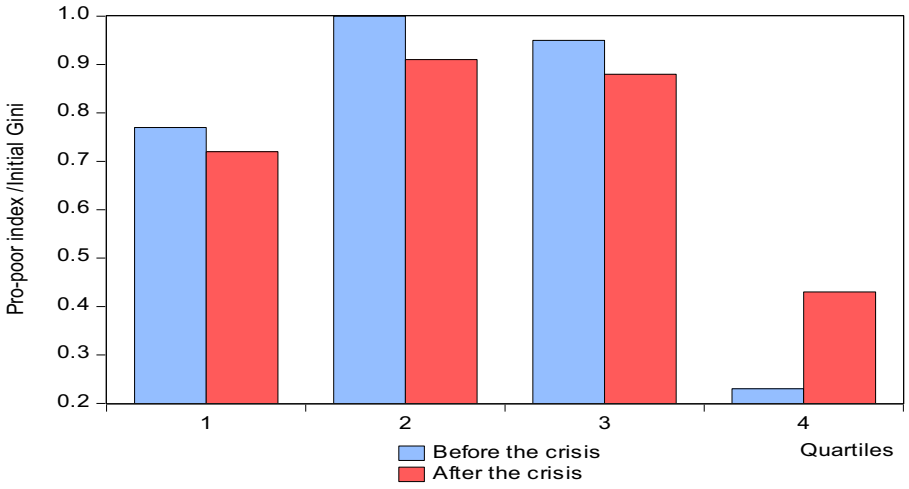

Fig. 2 Changes in progressivity across quartiles

Figure 2 presents the contributions of pro-poor income growth to inequality changes across quartiles. These contributions' relative sizes are higher than re-rankings for the whole quartiles in two periods except the fourth quartile after the crisis. If there had been no re-ranking and other things were held constant, progressive income growth would have reduced inequality by about 75% for the poorest group and about 30% for the wealthiest group. These contributions decreased for the first three quartiles. However, the pro-poor income growth contribution to inequality has increased for the wealthiest group after the crisis. Thus, the equalizing effect of pro-poor income growth

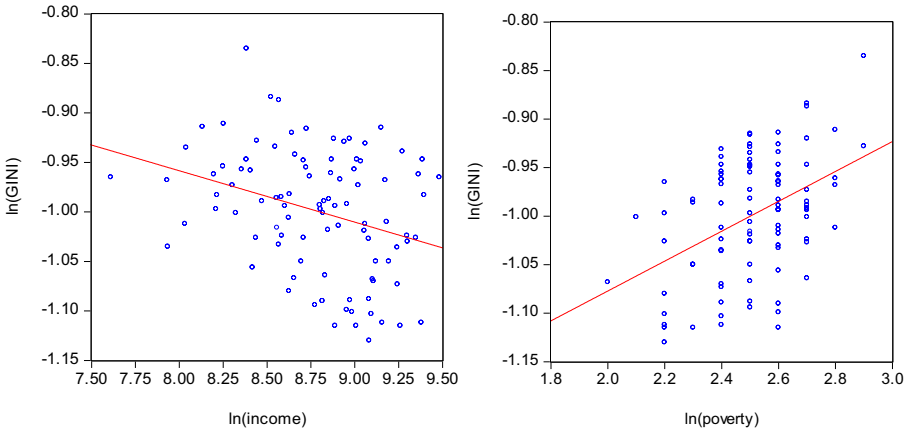

Fig. 3 The relationship between income inequality and poverty and income

Table 4 Decomposition of changes in income inequality, 2008–2011

Quartiles	Initial Gini	Final Gini	Change in Gini	Reranking R(2)	Progressivity P(2)
I	216.4 (7.4)	187.0 (7.0)	− 29.4 (8.6)	125.9 (9.7)	155.3 (11.1)
II	68.9 (2.8)	72.4 (3.1)	3.5 (4.5)	66.0 (7.0)	62.5 (6.7)
III	72.7 (2.9)	65.2 (2.8)	− 7.5 (3.9)	56.7 (6.2)	64.2 (6.0)
IV	287.6 (17.2)	242.8 (13.4)	− 44.8 (14.7)	80.0 (8.1)	124.8 (15.9)
All	520.9 (12.1)	486.7 (9.1)	− 34.1 (8.4)	27.8 (2.4)	61.9 (8.3)

Authors' calculations from the SILC survey by TURKSTAT. Estimates and bootstrap standard errors in parentheses are multiplied by 1000. The numbers of households in the panel are determined by dividing the number of households in the survey into four equal groups after ranking their incomes. Quartile 1 includes 304 households, Quartile II consists of 94 households, Quartile III consists of 98 households, and Quartile IV consists of 312 households in the panel

has been more than balanced by the dis-equalizing impact of re-ranking the wealthiest group.[7]

For three of four quartiles, both income mobility and pro-poor income growth declined after the crisis. This decline might be an indication of slowing economic activity after the crisis. Also, inequality continued to decrease for the poorest individuals after the crisis. This result is in line with the study by Baldacci et al. (2002) and Easterly (1999). For the wealthiest subsample, the income of the less rich in this subsample disproportionally increased more after the crisis. However, the reshuffling of income almost remained the same, and inequality decreased for this group.

Comparing income mobility and pro-poor income growth before and after the crisis using the micro-level data can mostly answer the question of identifying the effect of the

[7] The contribution of progressive income growth to inequality and size of pro-poor income growth have also decreased for the whole sample after the crisis. The calculations are not shown here but available upon the request.

2008 crisis on Turkey's income distribution. The least-squares methodology is used with data from TURKSTAT's Level 1 classification for Turkey's regions between 2005 and 2012 for the panel data model.[8,9]

Figure 3 shows the individual relationships between inequality and poverty and inequality and income. As theoretically expected, inequality has an inverse relationship with income growth and a positive one with poverty. An econometric model in the double log form was used to assess the relative importance of economic growth and poverty on inequality.

The model used to estimate the impact of changes in income and poverty rates on inequality is as follows:

$$\ln(Gini)_{it} = \alpha_i + \alpha_1 \ln(income)_{it} + \alpha_2 \ln(poverty)_{it} + \varepsilon_{it} \tag{7}$$

where *poverty* is a poverty rate, which is the proportion of the poor within the total population, income is the median income of the regions. *Gini* is the Gini coefficient by disposable household incomes.[10] The available data requires that the relationship be estimated by forming panel data, combining a cross-section with a time-series dimension.

There are four kinds of panel data estimators: the pooled OLS (POLS), the fixed effect (FE), the first difference (FD), and the random effects (RE) depending on the assumptions which are related to the intercept term. In the POLS estimator, the intercept term is assumed to be constant across all cross-sectional units. In the FE estimator, the intercepts are allowed to vary between cross-section units. The RE estimator also enables the intercepts to vary between cross-section units, but the variation is randomly determined. The FD estimator eliminates the unobserved heterogeneity by differencing variables across time.

The appropriate model is selected depending on the assumptions made. If the unobserved individual effects are correlated with the explanatory variables, the FE and FD estimators should be used. When the individual effects are uncorrelated with the explanatory variables, the RE estimator is the most efficient. The most common test for the presence of an unobserved effect is the Lagrange multiplier (LM) test due to Breusch and Pagan (1980). The Hausman test for correlation between an unobserved effect and the explanatory variables (Hausman 1978).[11]

Table 5 shows the estimation results of Eq. 1. The *LM* test results reveal that the unobserved effects vary across regions. The Hausman test result indicates that the

[8] Further information about data can be obtained from http://www.tuik.gov.tr/PreTablo.do?alt_id=1013

[9] The list of the regions in TURKSTAT's Level 1 classification are; TR1: Istanbul, TR2: West Marmara, TR3: Aegean, TR4: East Marmara, TR5: West Anatolia, TR6: Mediterranean, TR7: Central West Anatolia, TR8:West Black Sea, TR9: East Black Sea, TRA: North East Anatolia, TRB: Central East Anatolia, TRC: South East Anatolia.

[10] The literature shows that three variables are mathematically linked. For example, Kakwani (1993, p.18) decomposes proportionate changes in poverty as due to changes in average income and income inequality: $\frac{dP_\alpha}{P_\alpha} = \eta_{\alpha,\mu}\left(\frac{d\mu}{\mu}\right) + \eta_{\alpha,G}\left(\frac{dG}{G}\right) + \varepsilon$ where, P, μ, and G shows poverty measure, average income and Gini coefficient, and $\eta_{\alpha,\mu}$, $\eta_{\alpha,G}$ is growth and inequality elasticity of poverty, respectively. While the effect of changes in the mean income on poverty is denoted by the first term, the effect of changes in the Gini index on poverty is measured by the second term. See also the Ravallion (2001) who offers a global summary of the historical relationship between growth and changes in poverty and inequality using household survey data for 47 developing countries in1980s and 1990s.

[11] The details for these tests are not given because they have been standard procedures in any panel data model selection. The reader can consult econometrics textbooks for further details.

Table 5 Estimation results of double log model

Variables	Coefficient	Std. Error	z	$p>\|z\|$
Dependent variable: *ln(Gini)*				
ln(income)	− 0.041	0.019	− 2.12	0.034
ln(poverty)	0.096	0.035	2.72	0.007
constant	− 0.879	0.217	− 4.05	0.000
Diagnostic test and statistics				

Number of Observations: 96, R^2: 0.20	*Wald-Chi-square*: 18.36 (0.00)
Hausman[a]: 1.58 (0.45)	*LM*[b]: 22.01 (0.00)
Homoscedasticity[c]: W0: 1.16(0.32), W50: 0.75 (0.68), W10: 1.16 (0.32)	*S.ALM*[d]: 14.85 (0.00), *JT.LM*[e]: 36.86 (0.00)
Friedman[f]: 3.91 (0.97), *Pesaran*[f]: − 0.372 (1.29)	*Jarque–Bera*: 2.93 (0.23)

The poverty line is formed by using 50% of equivalized individual median income. The numbers in parentheses demonstrate probability values which are the lowest significance level at which the null hypothesis is rejected

[a]Hausman is used for testing if unobserved effects are uncorrelated with explanatory variables

[b]LM is the chi-square value with one degree of freedom to test the null hypothesis of the unobserved effect's variance is equal to zero

[c]W0 is a test statistic by Levene (1961), and W50 and W10 are test statistics by Brown and Forsythe (1974) to test the homoscedasticity assumption in the residuals of the random-effects model

[d]S.ALM is a test statistic distributed with chi-square value with one degree of freedom developed by Baltagi and Li (1995) to test whether the autocorrelation coefficient is zero

[e]JT.LM is a test statistic by Baltagi and Li (1991) to test whether the variance of unobserved effects and autocorrelation coefficient are jointly zero

[f]Friedman is a test statistic by Friedman (1937) to check for cross-sectional independence with a null hypothesis of no cross-sectional effects. Pesaran (2004) test the null hypothesis of no cross-sectional dependence

random-effects model is an appropriate estimator. The Wald Chi-square statistic and z values reveal that all the model coefficients are different from zero. The null hypothesis cannot be rejected for the random-effects model's residuals' homoscedasticity by W0, W10, and W50 test results. There is no cross-sectional dependence, and the residuals are normally distributed. However, the null hypothesis is that there is no serial correlation, according to S.ALM and JT.LM test results can be rejected. The existence of first-order serial correlations in the residuals is the only assumption that is not met. However, since serial correlation tests are applied to panels with long times series (over 20 years), this is not a problem in micro panels with fewer years, as in our case with eight years.

The estimations reveal that inequality changes can be related to two sources: mean income changes and poverty rate changes. While a 100% increase in median income coefficient decreases inequality by 4%, a 100% increase in the poverty rate of the regions increases inequality by about 10%. These results suggest that reducing poverty is more effective in reducing income inequality than mean income growth. In other words, inequality is more responsive to changes in poverty rates than economic growth. The relationship is stronger between income inequality and poverty than the relationship between inequality and economic growth. It also implies that it is challenging to achieve poverty reduction solely through income distribution without economic growth.

Table 6 Estimation results of double log model including the slope drifter

Variables	Coefficient	Std. Error	z	$p > \|z\|$
Dependent variable: ln(Gini)				
ln(income)	− 0.048	0.029	− 1.69	0.092
ln(poverty)	0.100	0.038	2.63	0.008
D ln(income)*	0.006	0.013	0.44	0.663
*D*In(poverty)*	− 0.018	0.044	− 0.42	0.678
constant	− 0.829	0.283	− 2.93	0.003
Diagnostic test and statistics				
Number of Observations: 96, R^2: 0.20		*Wald-Chi-square*: 18.35 (0.00)		
Hausman[a]: 4.59 (0.33)		*LM*[b]: 21.95 (0.00)		
Homoscedasticity[c]: W0: 1.32(0.22), W50: 0.83 (0.61), W10: 1.33 (0.22)		*S.ALM*[d]: 15.07 (0.00), *JT.LM*[e]: 37.02 (0.00)		
Friedman[f]: 3.83 (0.97), *Pesaran*[f]: − 0.49 (1.37)		*Jarque–Bera*: 3.15 (0.20)		

The poverty line is formed by using 50% of equivalized individual median income. The numbers in parentheses demonstrate probability values which are the lowest significance level at which the null hypothesis is rejected

[a]Hausman is used for testing if unobserved effects are uncorrelated with explanatory variables

[b]LM is the chi-square value with one degree of freedom to test the null hypothesis of the unobserved effect's variance is equal to zero

[c]W0 is a test statistic by Levene (1961), and W50 and W10 are test statistics by Brown and Forsythe (1974) to test the homoscedasticity assumption in the residuals of the random-effects model

[d]S.ALM is a test statistic distributed with chi-square value with one degree of freedom developed by Baltagi and Li (1995) to test whether the autocorrelation coefficient is zero

[e]JT.LM is a test statistic by Baltagi and Li (1991) to test whether the variance of unobserved effects and autocorrelation coefficient are jointly zero

[f]Friedman is a test statistic by Friedman (1937) to check for cross-sectional independence with a null hypothesis of no cross-sectional effects. Pesaran (2004) test the null hypothesis of no cross-sectional dependence

This evidence for Turkey reveals that economic growth associated with progressive distributional changes reduces poverty more than growth and leaves the income distribution unchanged. As Bourguignon (2004) emphasized, changing the distribution is probably more critical for reducing poverty for middle-income and relatively inequitable countries like Turkey. Thus, redistribution policies may be more effective in reducing poverty in Turkey.

The same model was estimated with differential slope coefficients to examine whether this relationship has changed after the crisis:

$$\ln(Gini)_{it} = \alpha_i + \alpha_1 \ln(income)_{it} + \alpha_2 \ln(poverty)_{it} + \alpha_3 D^* \ln(income)_{it} + \alpha_4 D^* \ln(poverty)_{it} + \varepsilon_{it} \quad (8)$$

where the dummy variable, *D,* takes the value 1 after the crisis and 0 otherwise. The new coefficients, α_3 and α_4, indicate how much slope coefficients of the crisis period's Gini function differ from earlier.

Table 6 demonstrates the estimation results. Similar test results are obtained for the validity of assumptions. The differential intercept coefficients, however, are not

statistically significant. The hypothesis that two regressions have the same slope implies that growth and poverty on inequality have not changed after the crisis may be accepted.

6 Conclusions

The literature about the distributional effects of financial crises is scarce and does not provide a clear-cut conclusion. Although most studies conclude that inequality increases after the financial crisis, some other findings imply decreasing inequality. The other strand of literature emphasizes the impact of a financial crisis on the income inequality of different population subsamples. It concludes that the lowest income segment in the sample was not affected much by the crisis.

This study aimed to show how the 2008 global financial crisis hit selected subsamples particularly hard by investigating trends in income inequality, pro-poor income growth, and income mobility across different subsamples of Turkey's population. The financial crisis halted Turkey's uninterrupted long-run economic growth since 2002. However, The Turkish economy quickly recovered from the crisis due to banking regulations instituted after the financial crisis in 2001 and efforts to keep domestic demand alive and investments. In general, Turkey's social protection response to the crisis has taken the form of adding marginal increases into existing social programs.

Micro-level longitudinal data of Turkey between 2005–2008 and 2008–2011 were used to study the 2008–2009 global financial crisis's impact on the selected subsamples in the population. Decomposition techniques developed by Jenkins and Van Kerm (2006) were applied. The change in income inequality is decomposed into progressivity and mobility components. The results show that the overall Gini coefficient decreased further after the crisis. This finding is consistent with earlier studies. There was a consistent reduction in income inequality for the poorest quartile and increased income inequality for the wealthiest quartile before the crisis. This pattern disappeared after the crisis. The size of income mobility and progressive income growth have decreased after the crisis for the poor and mid-income quartiles. The richest have enjoyed doubled progressive income growth with a modest decrease in income re-ranking and experienced lower income inequality. This change might lead to a more considerable reduction in the overall Gini coefficient after the crisis. Contributions of re-ranking and progressive income growth to inequality have decreased for the whole sample and most quartiles after the crisis, indicating a slowdown in economic activity. Besides, the decrease in the levels and contributions of progressive income growth to inequality for the poorest quartile in the aftermath of the crisis shows that marginal increases in Turkey's social benefit expenditures for the poorest during the crisis could not offset the aggravating effects of the crisis.

In addition to micro-level data, macro-level data for twelve different regions in Turkey is used to estimate the relative importance of growth and poverty in inequality and changes in the relationship among these variables due to the crisis. The panel data model in the double log form for inequality has been estimated for Turkey between 2005 and 2012. The panel data model results show that differential intercept coefficients were statistically not significant, implying that the effect of growth and poverty on inequality has not changed in the crisis period. The fact that the financial crisis has only lasted for two years in Turkey might be the reason for not observing fundamental changes in the pattern of the relationship between income inequality, poverty, and income growth.

Economic policies can help to reduce inequality and address poverty without slowing economic growth in Turkey. Increasing the minimum wage and reducing the tax rates for low-income families, providing low-cost housing for the poor, investing in the education of the less privileged, and directing more investment to less developed regions of the country are some of the policies that resulted in improvements in the lives of the lower quartiles of the society in other countries.

Different economies respond to the financial crises differently since cross-national differences in the concepts discussed here are related to differences in the labor market, social insurance, and social protection expenditures, changes in the way of income inequality, income mobility, and progressive income growth. Therefore, more empirical studies are needed to shed more light on this topic.

Author contributions All authors contributed to the study within the framework of ethical rules. A fully joint study was carried out to collect the data, test the data, and evaluate econometric results.

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Data availability The data will be presented when it is needed.

Declarations

Conflict of interest The authors declare that they have no conflict of interest.

Ethical approval and consent to participate In this study, scientific content and ethical rules have been obeyed.

Consent for publication All authors give their consent for the publication.

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