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Income Mobility, Income Distribution and Economic Growth in Turkey

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INCOME MOBILITY, INCOME DISTRIBUTION AND ECONOMIC GROWTH IN TURKEY

Even though several aspects of income mobility have been examined, mobility studies for developing countries are still in their infancy. Using longitudinal data and various income inequality and income mobility indices, this study measures the level income inequality and income mobility in Turkey for the period 2006-2009 and investigates whether income mobility equalizes long-run earnings. Using relative total income mobility index by Fields and Ok (1999) and an index of mobility as an equalizer of longer term incomes by Fields (2010), income mobility is found to have equalized longer-term earnings.

Introduction

Over the last decade, Turkey has undergone a profound economic transformation. It has recorded a remarkable GDP growth rate of 5.06% in average during the period of 2002-2010, tripled its per capita income and has been the 15th largest economic power in the world. During last decade, monetary policies accomplished to balance macroeconomic variables and controlled inflation. The budget deficit has been lowered to levels, which is below those of major EU countries, international reserves have continued to increase, Free Trade Agreements have been signed with more than 50 countries around the world and liberal policies have been followed in international trade.

Despite these improvements and large increases in per capita income over the last decade, Turkey persistently ranked one of the most unequal among the OECD countries in terms of distribution of income and wealth. This paper addresses income inequality and income mobility of Turkey during 2006-2009 looking at same individuals from one year to next. Specifically, the effect of economic growth on income mobility and a relationship between income mobility and long-run income equalization are questioned. We ask that what part of the income mobility is due to economic growth and what extent of income mobility occurred because people moved up or down within a given structure and whether or not income mobility equalizes longer-term incomes relative to base year incomes.

The literature on economic mobility is vast. Surveys may be found in Atkinson, Bourguignon, and Morrisson (1992), Fields (2001) and Fields and Ok (1999). Income mobility can be conceptualized in different ways. The economic position of an individual might change from one time period to another or one generation to another. Fields (2001) distinguishes these concepts as *a time dependence* which measures the dependence of one's final income on his / her initial income, *a positional movement* which measures change in the

well-being of the individual's position, *a symmetric income movement* which measures total income movement, *a directional income movement* which measures the fraction of upward or downward movers and the average amount gained by the winners or lost by the losers.

The interest of measuring income mobility in Turkey is twofold. First, exploring the degree of income inequality and income mobility in Turkey will supplement the knowledge on the nature of income distribution and income mobility. Second, it will add evidence to the discussion of the whether economic growth leads more equitable distributions of income or it is achievable only at a cost of greater inequalities.

Up to now and to the best of my knowledge, this paper is the first one in the literature that has tried to measure the degree or pattern of mobility within income distribution of Turkey. The aim of this paper is to try to give a measure of the degree and pattern of income inequality and income mobility of the Turkish income distribution and investigate the equalizing long-term effect of income mobility and to compare the results obtained with those of other countries.

In addition, it emphasizes the role of economic growth on income mobility. The causality between income mobility and economic growth might run both ways. Individuals with better opportunities to move upper income classes will enjoy greater incentives than individuals who live in a society with lower income mobility. These individual incentives will in turn lead to higher productivity in the economy and other positive externalities. Thus, higher income mobility leads to higher economic growth. On the other hand, greater economic growth and development creates better chances and investment opportunities to individuals which leads to reallocation of labor from low to high productivity activities and sectors and in turn leads to higher income mobility of individuals.

Data is obtained from Turkstat (Turkish Statistical Institute) which conducts Income and Living Conditions Survey within the scope of the studies compliance with European Union and surveys have been carried out regularly in every year since 2006. Questionnaire on Income and Living Conditions Survey is formed in order to obtain target variables requested by EUROSTAT to calculate indicators such as income, poverty and other living conditions. In these surveys, using panel survey methodology, households have been designed as the final sampling unit and monitored throughout 4 years. Survey applications have been carried out with face to face interview basis/technique and information is recorded to portable computers.

In the panel survey applications, the rotational design is used. According to this methodology, one part of the household stays in the sample frame from one year to another, a

new sample household is added to the frame. Specifically, while the 75% of the sampling size is left in the frame of the panel, 25% of the sampling size changes in each year. Thus, panel application starts with the selection of the basic sampling which represents target population and individuals are monitored throughout 4 years with the direction of the rules of monitoring. The sampling size covers the entire members of the households that live within the borders of the Republic of Turkey. However the population in the aged home, elderly house, prisons, military barracks, private hospitals, hotels and child care centers together with the immigrant population were excluded out of the scope.

In this study, 2048 household members from 600 households for which interviews are carried out in each survey of 2006, 2007, 2008 and 2009 are determined. Those interviews with the same 2048 household members across four years ensure comparability and construct mobility measures using balanced panel. The individuals or head of households in those households answered whole questions throughout 2006, 2007, 2008 and 2009 years and are not dropped out of data because of death, migration or deciding to no longer participation in the survey.

Since the survey is conducted each year, an annual total available household income declared by the head of household is used in analyses. Household net annual disposable income is calculated as the total of individual usable income of all members of the household (total of the income in cash or in kind such as salary-wage, daily wage, enterprises income, pension, widowed-orphan salary, old-age salary, unpaid grants, etc.), adding the total of yearly income for the household (such as real property income, unreturned benefits, incomes gained by household members less than age 15, etc.) and subtracting taxes paid during the reference period of income and regular transfers to other households or persons[1].

Houeholds total income is deflated by CPI 2003=100 using the database of Central Bank of Turkey to indicate them in real terms. Since the standard of living of households depends on both its income and composition and number of households members, it will not be correct to calculate the individual income as total income divided by number of household members. In order to consider these factors, an equivalence scale of OECD which assigns a value of 1 for the reference person of the household, 0.5 for household members aged 13 and over and 0.3 for household members less than aged 13 is used for family members. The methodology of dividing total of household income by equivalised household size allows

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[1] The Turksat code for total household annual disposable income used in this study is HG110.

making better comparisons of the households with different size and structure. Thus, per capita real incomes adjusted with an equivalence scale of OECD of total 2048 family members of 600 households are recorded for 2006, 2007, 2008 and 2009 years. The members added to or dropped from the household is excluded from the sample.

Preliminary Examination

If income Y_t is jointly distributed over T period as $f(Y_1, Y_2,\ldots, Y_T)$, while an economic growth can be defined as a difference in the means of marginal distributions in the two years, an income mobility can be defined as changes in the covariances across years. An income mobility provides comparisons proportions of income groups across periods.

A preliminary examination of the distribution of the variable of interest is extremely useful in guiding any empirical analysis. During economic growth, not everybody gains from economic growth. Figure 1 shows the distribution of per capita income changes of 2048 household members between 2006 and 2009. It is seen that, in this period, the majority of income changes were to the right of the zero (mean income changes is 0.134 in logs), and also, sizeable number of people lost income in this period. But, on average, people succeeded in getting higher incomes, i.e., they moved better positions.

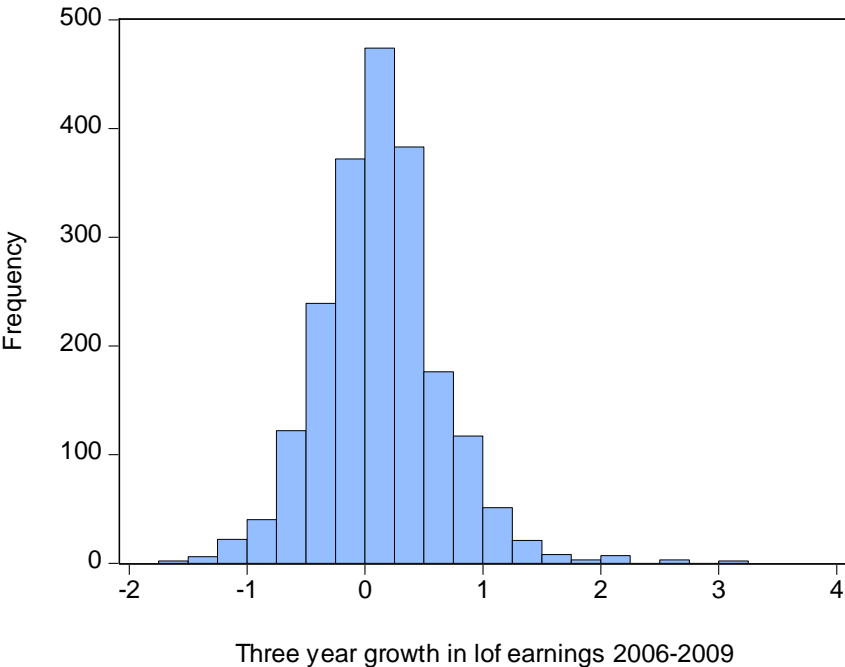Figure 1. Distribution of Earnings Changes: 2006-2009

Three year growth in lof earnings 2006-2009

Figure 2 depicts kernel distributions of real log-household members' per capita income for 2006 and 2006 years. The first thing to notice is the small shift from 2006 to 2009. Concerning the shape, although there are no very big differences between the form of the two first densities (2006 and 2009 respectively), it can be observed that very low earners in 2006 moved to the right, i.e., their incomes increased, the situation of medium earners before the average has been worse, the density around average is lower larger and high earners mostly moved better positions in 2009. A deeper inspection of the picture reveals the presence of two bumps on the distribution of 2009. There is a contraction of a probability mass near the expected value. In the distribution of 2009, a very small decrease in the data dispersion is registered (closer left tail, similar right tail).

Figure 2: Kernel Density Estimate
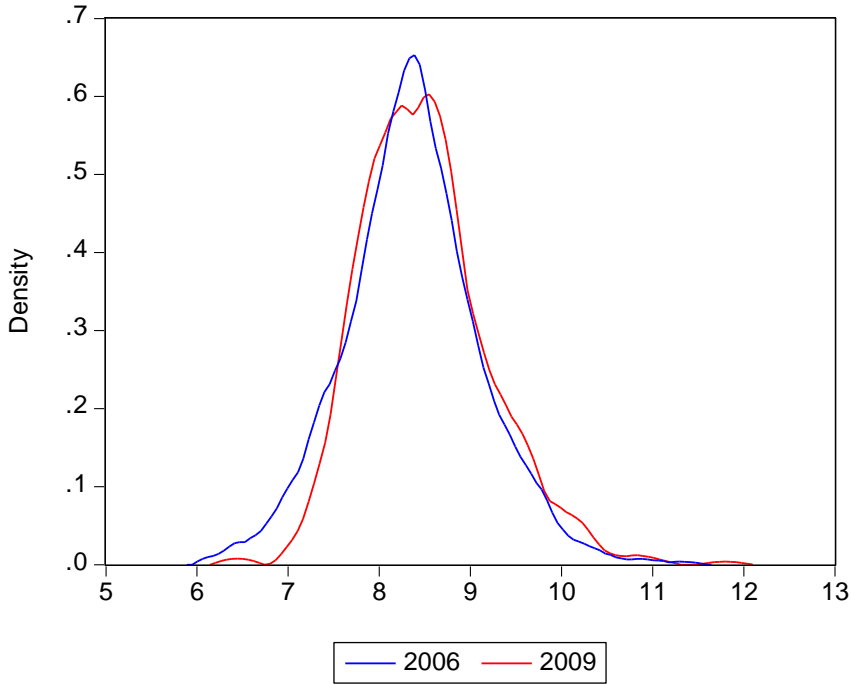
A First Measure: The Correlation Coefficient

A simple answer to the question of how much mobility there is in Turkey can be derived from the relationship between observed incomes at time periods t and $t+1$ for $t = 1,2,3…$. The closer is the value of the correlation coefficient to +1 (0), the lower the (greater) the mobility there is. In this measure, the value of the correlation coefficient depends on the time period elapsed between the base and final year. The shorter the time period, the higher the correlation coefficient and the less income mobility is measured.

A similar measure of income mobility is the rank correlation coefficient. This study uses Spearman –rank correlation coefficient in which income levels of the household heads are ranked from lowest to highest in both the base year and the final year and the difference between these rankings is computed. The correlation coefficient is

$$r = 1 - \left\{ 6 \left[\sum_{i=1}^{n} rank(X_i) - rank(Y_i) \right] / (n^3 - n) \right\}.$$

Table 1 denotes the correlation coefficients. As would be expected, the longer time period provides the lower correlation coefficients. While the Pearson coefficients range from 0.80 to 0.87 between 2006 and 2009 incomes, the Spearman-rank correlation coefficients range from 0.74 to 0.77 between 2006 and 2009 incomes. These results can be compared to those obtained for the U.K. by Jarvis and Jenkins (1996), for Spain by Canto (2000), for Denmark, Finland, France, Germany, Italy, Sweden, United Kingdom and United States by OECD (1996). Using monthly income accounting period, Jarvis and Jenkins (1996) calculates correlation coefficients range from 0.56 to 0.69 depending on the waves considered in 1991. Canto (2000) uses quarterly rotating panel survey conducted in Spain between first quarter of 1985 to last quarter of 1992. The correlation coefficient is found 0.835 for absolute income and 0.859 for logged income for yearly accounting period. This value is higher than that of Turkey. OECD (1996) calculates both Pearson correlation and Spearman rank correlation coefficients for 1986 and 1991 earnings for the OECD countries above. The Pearson correlation (Spearman rank correlation) coefficients range from 0.649 (0.652) for Denmark to 0.793 (0.754) for Germany[2]. The correlations for these countries cluster around 0.70. A first conclusion could be that the level of income mobility in Turkey is within similar range with the level of income mobility in the OECD countries above. However, these comparisons should be interpreted with caution due to the differences in the income concepts, income periods and time periods used.

Table 1: Correlation Coefficients

Ordinary (Pearson) Correlation Coefficients					Spearman- rank Correlation Coefficients					
Final Years		2006	2007	2008	2009	Final Years		2006	2007	2008	2009
Base	2006	1	0.87	0.83	0.80	Base	2006	1	0.77	0.74	0.74
Years	2007	0.87	1.00	0.88	0.87	Years	2007	0.77	1.00	0.83	0.80
	2008	0.83	0.88	1.00	0.91		2008	0.74	0.83	1.00	0.86
	2009	0.80	0.87	0.91	1.00		2009	0.74	0.80	0.86	1.00

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[2] Even though the correlation coefficient for Finland is found much lower, 0.363, it is not comparable due to data characteristics.

Transition Matrices and Total Relative Mobility

Although the correlation coefficients are very useful summaries to measure income mobility (immobility), it does not provide much information about the patterns of individual's positional movements in the income distribution. In order to examine positional movement of individuals, a quintile mobility matrix is constructed. Table 2 shows the transition matrix in which the numbers (in bold) on the principal diagonal running from north-west to south-east corners are the staying probabilities (multiplied by 100). Numbers above (below) the principal diagonal represents probabilities moving up (down) one or more earnings groups. The table reveals that 25 percent (upper left corner) of all households who had incomes in the lowest 20 percent—or lowest quintile—in 2006 were still in the lowest quintile 3 years later, while only 2 percent (upper right corner) made it to the richest quintile. As shown in the figure 1, this represents very high mobility among the poorest. About 65 percent of the poor people moved to second quintile in 3 years. A similar high mobility is observed for the individuals in the fourth quintile in which while only about 25 percent of the people in the fourth remain in the same quintile, about 38 percent of the people moved to third quintile and about 27 percent of the people in the fourth quintile moved to fifth quintile. In contrast to these quintiles, very high immobility is recorded in the second and fifth quintile in which 55 and 72 percent of all households who had incomes in the second and fifth quintiles were still in those quintiles 3 years later. These immobility ratios are very high compared to Lima, Peru found by Herrera (1999) and similar to income mobility of rural households in China for the periods between 1978 and 1983 (Nee, 1994).

Table 2: Quintile Mobility Matrix based on per capita incomes

		Income quintile in 2009					
		1	2	3	4	5	Total
	1	**24.67**	64.67	8.00	0.67	2.00	100
Income	2	10.61	**55.07**	24.02	5.62	4.68	100
quintile	3	0.80	24.70	**40.04**	19.32	14.94	100
in 2006	4	0.82	9.88	37.86	**24.69**	26.75	100
	5	0.28	2.77	11.63	12.74	**72.58**	100

Note: Average trace is 43.41. The income classes (measured according to per household income, x in Turkish Liras) are:

$1 : x \leq 2000$

$2 : 2000 < x \leq 4000$

$3 : 4000 < x \leq 6000$

$4 : 6000 < x \leq 8000$

$5 : x > 8000$

Measuring income mobility using quintile immobility ratios and transition matrices have a disadvantage of not capturing mobility. These are; first, if some people change ranks within given quintile. Second, if all incomes change proportionally or all incomes change by a constant dollar amount. Third, it does not capture mobility when some people gain income and others do not unless someone change quintile and a rank-preserving equalization does not take place unless someone changes quintile. Fields and Ok (1996 and 1999) produces an income mobility measure based on the per capita aggregate change in log-incomes. They show that their measure satisfy a set of properties ; scale invariance, symmetry, subgroup decomposability and multiplicative path separability[3]. They measure symmetric income movement using the formula:

$$m_n(x, y) = \frac{1}{n} \sum_{i=1}^{n} \left| \log x_i - \log y_i \right| \qquad (1)$$

where x is the base year and y is the final year income. The symmetric income movement is calculated as 0.368 for the period 2006-2008 and 0.398 for the period 2006-2009. These results represents that higher the period, higher the movement. The conclusion implies that the mean percentage income changes for the period 2006-2008 and 2006-2009 years are approximately 36.8 and 39.8 percent, respectively. These results indicate a low degree of income flux compared to symmetric income movement degree calculated by Fields, Leary and Ok (1998). They find that the mean percentage income change between 1979-1986 years in the United States was approximately 52.8 percent.

As shown by Fields and Ok (1996 and 1999), the equation (1) can be decomposed into an economic growth component and a transfer component. First, since $\sum y_i \geq \sum x_i$ during an economic growth, $(\sum \log y_i - \sum \log x_i)/n$ denotes the per capita social welfare change due to the economic growth. Second, total social utility transfer composes two parts: a loser part and a gainer part. If L is defined as the set of losers during the process, i.e.

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[3] The details about these properties can be found in the related papers.

$L \equiv \left\{ i : x_i > y_i \right\}$, $2\sum_{i \in L} (\log x_i - \log y_i)/n$ can be thought as the per capita total social utility transferred from losers to winners. Given this interpretation, they decompose the equation (1) as;

$$m_n(x, y) = \frac{1}{n} \sum_{i=1}^{n} (\log y_i - \log x_i) + \frac{2}{n} \sum_{i \in L} (\log x_i - \log y_i) \qquad (2)$$

First part of the equation (2) is per capita social utility growth and second part is per capita social utility transfer.

Per capita income movement in Turkey using the sample is going to be calculated by formulas provided by equation (2). This part will provide first, the extent of per capita income movement and second, the extent of part of this movement attributable to economic growth and the extent of part of this movement attributable to transfer of incomes.

Table 3 indicates the mobility index with the composition of growth and transfer part. Both total and growth part of the income mobility is higher for the period 2006-2009 compared to the period 2006-2008. These results can be compared to very similar and recent paper by Riener (2012). Using European Community Household Panel (ECHP) data for the years 1995,1998 and 2001, he calculated relative total income mobility for 13 European Countries. He finds very heterogeneous relative income mobility and its growth and transfer components for the countries under consideration. Countries' growth components ranged 0.05 to 0.20 and 0.07 to 0.21 for the years 1995-1998 and 1998-2001, respectively. Compared to these, Turkey's growth component are at intermediate levels. However, Turkey's transfer component is very high, thus total relative income mobility is very high compared to those European countries. While transfer component is in the range of 0.09 and 0.24 for the period 1995-1998 and it is in the range of 0.08 and 0.20 for the period 1998-2001 in the European countries in the paper of Riener (2012), it is 0.67 for the period 2006-2009 in Turkey. This result indicates the existence of very high level of redistribution of incomes from richer households to poorer or vice versa. This meant also the existence of very high level of equalization of incomes in Turkey if incomes are transferred from richer to poorer.

Table 3. Fields and Ok (1999) Mobility Index

Equation (2)	Total	Economic growth	Transfer of incomes	Economic growth (%)	Transfer of incomes (%)
2006-2008	0.709	0.114	0.595	0.16	0.84
2006-2009	0.807	0.134	0.673	0.17	0.83

Income Inequality Measures

Several measures of inequality has been developed and we present the most of important of these. For further details, see the classic book by Atkinson (1983), Amiel and Cowell (1998) and Cowell (2009).

Gini Coefficient of Inequality

The most widely used single measure of inequality is the Gini coefficient. It is measured as the ratio of the area between the Lorenz curve and the line of absolute equality and the area underneath the diagonal. It is defined as

$$I_{gini}(x) = \frac{1}{2n(x)^2 \mu(x)} \sum_{i=1}^{n(x)} \sum_{j=1}^{n(x)} |x_i - x_j| \tag{3}$$

The Gini coefficient is bounded between 0 and 1. While the perfect equality is denoted by 0, the complete inequality is denoted by 1. The Gini coefficient satisfies the mean independence (if all incomes were doubled, the measure would not change), population size independence (If the population were to change, the measure of inequality should not change, all else equal), symmetry (swapping of incomes would not change the measure of inequality) and Pigou-Dalton transfer sensitivity hypothesis (measured inequality is reduced when income is transferred from rich to poor). However, the decomposition of inequality by population groups or income sources is not provided by the Gini coefficient and its statistical significance is not testable.

Generalized Entropy Measures

All six criteria above are satisfied by other inequality measures which are produced from generalized entropy (GE) index. The general formula for generalized entropy (GE) inequality measures is;

$$I_{GE}(x) = \frac{1}{\alpha^2 - \alpha} \left[\frac{1}{n(x)} \sum_{i=1}^{n(x)} \left[\frac{x(i)}{\mu(x)} \right]^{\alpha} - 1 \right]$$

where α is a sensitivity parameter that may be assigned any real value. For lower values of α, GE becomes more sensitive to the bottom of the income distribution and for higher values of α, GE is more sensitive to changes at the top of the income distribution. The value of GE is bounded between zero and infinity. While an equal distribution is represented by zero, higher GE values represent higher values of inequality.

The most common of the α used is 0, 1 and 2. When α is 0, it is referred as mean log deviation index (MLD) or Theil's L index. It is defined as;

$$I_{MLD}(x) = \frac{1}{n}\sum_{i=1}^{n(x)}\ln(\frac{\mu(x)}{x_i})$$

When α is 1, it is called as Theil's T index or Theil's first index which may be written as;

$$I_{TF}(x) = \frac{1}{n(x)}\sum_{i=1}^{n(x)}\frac{x_i}{\mu(x)}\ln(\frac{x_i}{\mu(x)}) \; .$$

Turkey's income inequality for per capita real incomes of the household members are calculated using these three measures of inequality. Table 4 shows the inequality measures for 2006, 2007, 2008 and 2009 years.

Table 4. Inequality measures

Years	2006	2007	2008	2009	2006-2008	2006-2009
Gini	0.41329	0.42778	0.40600	0.42123	0.39576	0.39499
MLD	0.29391	0.30624	0.27148	0.29351	0.25774	0.25560
Theil's T	0.32412	0.40143	0.31802	0.35578	0.31873	0.31644

In Table 4, we can see inequality measures using three different measures. All three measures conclude that income inequality was higher in 2007 and 2009 and lower in 2008. In addition, the medium-term income inequalities of 2006-2008 and 2006-2009 are lower than single year income inequalities. Compared to Riener's (2012) calculations for 13 European countries, income inequality in Turkey is higher than any country in the sample of Reiner's.

Measures of Mobility as an Equalizer of Longer-Term Incomes

Income changes during economic growth might equalize or dis-equalize longer term incomes. In order to measure whether mobility has been equalizing or dis-equalizing the long-term income, Fields (2010) reviews previous studies and develops a new index which has better properties. He suggests the index below;

$$E = 1 - (I(a)/I(y_1))$$

where a is the vector of incomes and y_1 is the vector of the base year and $I(.)$ is a static inequality index such as the Gini coefficient or the Theil's T index or mean log deviation

index. The positive (negative) value of the index refers an equalization (dis-equalization) of long-term incomes. Positive (negative) values occur when average incomes are more (less) equally distributed and a zero value occurs when a and y_1 are distributed equally or unequally. If $I(l)$ and $I(s)$ are measures of inequality of long term and short term incomes where $l = (l_1, l_2, , l_n)$ and $s = (s_1, s_2, , s_n)$ are vectors of long-term and short term incomes, respectively, then, the index has (i) *a normalization* property that $I(l) = I(s) \Rightarrow E(I(l), I(s)) = 0$ which refers no equalization or disequalization takes place, (ii) an *equalization* property that $I(l) < I(s) \Rightarrow E(I(l), I(s)) > 0$ which refers that inequality is larger in the short run and (iii) a *dis-equalization* property that $I(l) > I(s) \Rightarrow E(I(l), I(s)) < 0$ which refers a negative index due to larger inequality in the long run. Fields (2010) also defines a greater disequalization and a greater disequalizaiton to compare two different income regimes.

Fields's (2010) equalization index has been applied to Turkey's case. Using the income inequality measures above for per capita real incomes of the household members, Table 5 indicates whether income mobility in Turkey equalizes its long-term incomes.

Table 5. Mobility as equalization in Turkey.

Years	2006-2008	2006-2009
Gini	0.0424	0.0443
MLD	0.1231	0.1304
Theil's T	0.0166	0.0237

According to Table 5, Turkey is income equalizing because indices measured by three inequality measure are all positive. It also shows that higher the time period, higher the income equalization of income mobility. Compared to results in very similar paper by Reiner's (2012) who used only Gini coefficient for the European countries, the value of the index is lower than the value of the index for European countries. It can be concluded from these results that even though very high income mobility is realized, its effect on income distribution to be more equal has been rather small.

Conclusion

In this article, the level of income mobility of household members in Turkey between 2006 and 2009 has been calculated using various income mobility measures and whether income mobility has equalized or dis-equalized long-term incomes in Turkey has been questioned. The correlation coefficients are found in similar ranges compared to those of some OECD countries. Very high income mobility is observed in the transition matrix. 25 of all household

members who had incomes in the or lowest quintile in 2006 were still in the lowest quintile 3 years later. This represents very high mobility among the poorest. About 65 percent of the poor people moved to second quintile in 3 years. In contrast to this quintile, very high immobility is recorded in the second and fifth quintiles.

Using Fields' (1996 and 1996) index, income mobility in Turkey is decomposed into an economic growth component and a transfer component. Compared to conclusions in the paper of Riener (2012), Turkey's growth component are at intermediate levels. However, Turkey's transfer component is very high, thus total relative income mobility is very high compared to those European countries. This result indicates the existence of very high level of redistribution of incomes from richer households to poorer or vice versa. This meant also the existence of very high level of equalization of incomes in Turkey if incomes are transferred from richer to poorer.

Having recorded very high income transfer component and relative total income mobility, the paper focused on whether or not this income mobility equalizes longer term incomes. The measures of Gini coefficient, Theil's T index and mean log deviation conclude that income inequality in Turkey is higher than any country in the sample of Reiner's (2012) paper. In addition, using Fields'(2010) index, the results indicate that Turkey is income equalizing because the value of the indices was all positive. Compared to results Reiner's (2012) paper who used only Gini coefficient for the European countries, the value of the index is lower than the value of the index for European countries. These results suggest that even though very high income mobility is realized, its effect on income distribution to be more equal has been rather small. Poor people got richer during 2006 and 2009 but richer people also stayed their positions by increasing their incomes.

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