Eurasian Economic Review, 3(2), 2013, 165-182
DOI: 10.14208/eer.2013.03.02.004

THE RELATIONSHIP BETWEEN ECONOMIC GROWTH AND INCOME DISTRIBUTION IN TURKEY AND THE TURKISH REPUBLICS OF CENTRAL ASIA AND CAUCASIA: DYNAMIC PANEL DATA ANALYSIS WITH STRUCTURAL BREAKS[†]

Mehmet Mercan* and Ozlem Arzu Azer**

Abstract: In this study, the effect of economic growth on income distribution was tested using data from Central Asian and Caucasian countries' economies (Azerbaijan, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan) and Turkish economy over the period of 1995 to 2009. New generation panel data methods, which consider cross-section dependence and structural breaks among countries, were used for the analysis. The results indicate that there exists co-integration among the series. We found that that the economic growth had a negative effect on the income distributions across the countries. In particular, the results show that the economic growth improved the income distribution in Turkey and Azerbaijan.

Keywords: Income Distribution, Gini Coefficient, Transition Countries, Panel Data Analysis with Structural Breaks
JEL Classification: C33, E24, O15

1. Introduction

Total amount of goods and services that have been produced through labor and capital, which are the basic factors of production, constitute the national income of a country. The problem of fair national income distribution has found a wide discussion platform in every period by different schools and approaches in economics. Many economists have studied on how to distribute the national income and related results by developing different methods (Yasin, 2010).

Income distribution is to divide the income generated within certain periods in a country among individuals, groups composing of individuals or factors of production (Guran, 1989, p.18). The primary objective of every economic effort is to put forth goods and services that create a real income. The quantity of created income level, in other words, the quantity of the generated goods and services gives us the best measurement for determining the social welfare in a certain period. It is necessary to know how the national income is distributed and how this distribution changes in terms of years in order to determine in which direction social welfare level

[†] This study is the revised and altered (extended) version of the text presented at the conferences, 9th EBES (Eurasia Business and Economics Society) Conference, held in Rome/Italy on January 11-13, 2013.

* Corresponding Author: Faculty of Economics and Administrative Sciences, Hakkari University, Hakkari, Turkey. Email: mercan48@gmail.com; mehmetmercan@hakkari.edu.tr
** School of Applied Sciences, Kadir Has University, Istanbul, Turkey. Email: mularoz@gmail.com

exhibits a development. According to Schumpeter, income distribution, which is considered to be a “thermometer” of the social environment, changes direction via constriction of profit margins, resistance strength of trade unions, progressive income taxes, social welfare programs and government interventions (Uysal, 1999).

After the Cold War, the independent states emerging from the separated former Soviet Union experienced problems during the transformation stage from central planned economy to a free market mechanism. These countries faced with hyperinflation for free market economy in parallel with their structural deficiencies. The increasing unemployment and poverty also accompanied with the hyperinflation problem. While a remarkable growth has been observed in some of these countries whose growth rates have returned to positive since 1996 over time due to their raw materials, each part of the society could not receive the same share from the rising income and this has led to the emergence of an elite class. With a high geopolitical importance of the region, as a result of internal and border conflicts and also due to the economic weaknesses, loopholes in managements emerge and this presents a challenge for the fight against the poverty which is the largest economic problem of them. Poverty and income inequality in these new independent Republics carrying the Soviet heritage in this region with a high geopolitical importance are the motivations of this study.

This study will examine the relationship between the economic growth and the income distribution in Turkey and the Turkic Republics of Central Asia and Caucasia, and determine whether or not the economic growth secures the fairness in the income distribution. Theory and literature review, which highlights the studies conducted on this subject in theory and application, constitutes the second part of the study. The relationship between the economic growth and the income distribution in Turkey and the Turkic Republics of Central Asia and Caucasia over the period of 1995 to 2009 will be practically set forth in the third part. The findings of the study will be interpreted in the conclusion part.

2. Theoretical Framework and Literature Review

Income distribution has been a frequently examined subject at national and international scales in the economic literature. Apart from income generation, income distribution has also been frequently discussed. The conducted studies have highlighted the analyses for the theoretical foundations of the income distribution; the criteria on measurement of the income distribution; and political approaches for maintaining a fair income distribution. According to the classical economists, Malthus and Ricardo, the problem of the most effective distribution of the shares taken by the factors of production such as rent, profit and wage has become the basic problem of the positive economic theory (Yasin, 2010).

Classical economists took an interest in the distribution of the income among the classes (Miynat, 2003, p.55). The sharing of incomes

among the factors that participate in the production was emphasized on the subject of income distribution in the neoclassical economic thought (Uysal, 1999, p.30). Keynes pointed out the importance of tax policies on the income distribution, and claimed that a fair income distribution could be maintained by transferring resources from high to low income individuals via effective tax policies (Yasin, 2010).

The study of Kuznets (1955) is considered to be one of the most important studies that examined the relationship between the income distribution and the economic growth. According to Kuznets's hypothesis, the income distribution is relatively fairer in the lower levels of per capita income in the early periods of development. In the following course, income inequality begins to increase as the income increases. When the income inequality reaches the highest degree at a certain level of development, it will improve as it comes close to the level of the industrialized countries; inequality will decrease; and the relationship between per capita income and income inequality will be in the form of an "Inverted U". According to this hypothesis, the income inequality in the middle income countries can be expected to be higher than the least developed countries and the industrialized countries. This condition involves a transition from an agriculture-based economy, which has low productivity within economic development process, to an industrial economy that has high productivity (Konukman and Ciftci, 2008). Apart from the studies that support Kuznets's hypothesis (Barro, 1999; Thornton, 2001; Bahmani-Oskooee and Gelan, 2008; Morrisson and Murtin, 2013), there have also been studies that contradict his hypothesis in recent years (Laszlo *et al*. 1998; Acemoglu and Robinson, 2002; Syed and Jalil, 2004).

Lorenz Curve and Gini coefficient derived from Lorenz curve are frequently used in measuring the income distribution. Lorenz Curve shows the cumulative distribution of the total national income within a country's population (Dulgeroglu, 1991). Cumulative percentage shares of the population are shown on the horizontal plane of the curve whereas cumulative percentage shares of the household income earned are shown on the vertical plane of the curve (Aktan and Yasar, 2002, pp.19-20). If there is inequality in the income distribution, for instance, 10% of the population that have the least income will take less than 10% of the total income whereas 10% of the population that have the highest income will take more than 10% of the total income. Therefore, Lorenz Curve, which shows the actual income distribution, always remains below the absolute equality curve.

The studies regarding the relationship between income distribution and economic growth, country groups, the used methods and results are presented in Table 1. As can be followed from Table 1 the view that economic growth affects the income distribution negatively is generally supported in the studies.

Table 1. Abstract of empirical studies regarding the income distribution and economic growth relationship

Authors, Sampling and Econometric Method	Basic Findings
Aigbokhan (2008) Nigeria (1985-2004)	The economic growth deteriorated the income distribution but reduced the poverty.
Alesina and Rodrik (1994)	Increases of tax rates for social expenditures would have negative effects on the economic growth. They argued that social expenditures would reduce inequality in the course of time and tax reduction would support the economic growth. The writers pointed out that no clear result could be set forth on the relationship between the income distribution and the economic growth and this could result from the data used or the sample selected.
Banerjee and Duflo (2000) All countries of the world. Nonparametric methods.	The "Inverted U" shape was valid for the countries, and any inequality in the income distribution negatively affected the economic growth in the following periods. The writers also stated that the nonlinear methods were more appropriate in explaining the relationship between the economic growth and the income distribution.
Barro (1999) 146 countries Panel data analysis	Income inequality decreased the economic growth in poor countries whereas it increased the economic growth in rich countries. He asserted that the relationship between the economic growth and the income distribution would be positive when the resources were distributed by the public in the most effective manner. He expressed that the relationship between the economic growth and the income distribution would be negative when the savings rate was low whereas the relationship between the economic growth and the income distribution would be positive when the savings rate was high.
Branco and Williams (1988) 68 countries (54 developing and 14 developed countries) Panel data analysis	Income of the poorest 40% of the population decreased in the early periods of the economic growth
Chen (2003) 43 countries Panel data analysis	The function of redistributing the income negatively affected the economic growth if the income distribution was balanced whereas the function of redistributing the income increased the economic growth if the imbalance of the income distribution was high. He found that Kuznets's hypothesis was valid for the examined 43 countries and the relationship between the income distribution and the economic growth was in the form of an inverted U. However, he also found that there was no relationship between the long-term economic growth and the income distribution in Latin America, Africa and Asia.
Disbudak and Suslu (2007) Turkey (1963-1998) Autoregressive Distributed Lag (ARDL) method.	The economic growth and outward orientation had corrective effects on the income distribution. They concluded that the detrimental effect of inflation and budget deficits on the income distribution was higher, and consequently, the total effect was in negative direction in the related period. The writers also stated that it could be misleading to explain the income distribution with only the economic growth.

Table 1. Continued

Dollar and Kraay (2001) Selected 92 countries Panel data analysis	There was no relationship between the economic growth and the income distribution. They found that the income of the poorest 20% of the population changed proportionally with the average income. They stated that the economic development would affect only the absolute income of the poor community.
Dollar and Kraay (2004) Selected 50 countries in which the income distribution was low (since 1960)	The increase in the economic growth and the international trade openness reduced the poverty and positively affected the income distribution.
Forbes (2000) 45 countries (1966-1995) Panel data analysis	There was a strong positive relationship between the economic growth and the increase in the inequality in the income distribution of the countries in the short and medium terms.
Gelaw (2009) Ethiopia (1994-2004)	The changes in the economic growth and income distribution considerably affected the poverty.
Gundlach *et al.* (2004) 137 countries (1950-1999) Panel data analysis	The increase in the human capital negatively affected the income distribution
Gunes (2007) Turkey (1987-2005)	There was no serious change in the income distributions throughout the related period.
Huang (2004) The flexible nonlinear inference approach	There was a strong relationship between Gini coefficient and the economic growth, and that the Kuznets's hypothesis was valid.
Lombardo (2011) Italy (1977-2004)	1% increase in the income would decrease the poverty with a ratio of 2.8% whereas 1% increase in the income distribution would decrease the poverty with a ratio of 2.2%.
Ogus (2004) Different Country Groups (1960-1975 and 1985-1999)	He was not able to find a significant relationship between the income distribution and the economic growth.
Shin (2012) General equilibrium analysis	The income inequality negatively affected the economic growth in the early stages of the economic development whereas it positively affected the economic growth in the steady state in parallel with the study of Barro (1999). Higher income tax might reduce the income distribution imbalance in the steady state whereas the income inequality might not be reduced by higher income tax in the early stages of the economic development.
Syed and Jalil (2004) Developed and developing countries including Turkey	The relationship was not the same for all countries and could vary from country to country. They found that Kuznets Curve (Inverted U) was not valid for the developing countries such as Turkey, Ecuador, Egypt, Chile and Greece whereas the "Inverted U" relationship was valid for a small number of developed countries.
Persson and Tabellini (1994) General equilibrium model	Separate analyses were conducted for the developed countries and the developing countries. In light of the analyses, it was found that the economic growth negatively affected the income distribution.
Zaman and Khilji (2013) Pakistan (1964-2011)	1% increase in the income reduced the poverty in rural areas with a ratio of 0.162% whereas in cities with a ratio of 0.256%. They found that the increase in Gini coefficient, which represents the income distribution, increased the poverty with a ratio 2.641%.

Source: Authors' studies

3. Empirical Analysis

3.1 Data Set

Annual data of 1995-2009 for six Central Asia-Caucasia countries (Azerbaijan, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan) and Turkey has been used in the analysis. In the study, income distribution coefficient (GINI) and as representative for income Gross Domestic Product per capita (GDP, with the price of $2000) variables have been used. The variables have been obtained from the World Bank (www.worldbank.org) and IMF database International Financial Statistics (IFS). Variables are included in the analysis in their natural logs.[1]

3.2. Method

In the study, before analysing the relationship between the series, whether there is dependence between the cross-sections forming the panel (countries) has been analysed with the LM_{adj} test (Adjusted Cross-sectionally Dependence Lagrange Multiplier). LM test was first suggested by Breusch-Pagan (1980) and whose deviation was adjusted by Pesaran *et al.* (2008). As a unit root test, we used the CADF (Cross-Sectionally Augmented Dickey Fuller) test, which considers the cross-section dependency (CD).[2] The existence of the co-integration relationship between series has been analysed with "multiple structural break co-integration test" developed by Westerlund (2009) considering CD and the structural breaks in the co-integration equation. The individual co-integration coefficients belonging to the long period and the co-integration coefficients belonging to the panels overall have been computed by the AMG (Augmented Mean Group) estimator of Eberhardt and Bond (2009) considering CD.

3.3. Testing the Cross-section Dependency

While there is a CD between the series, in the analysis without considering this case it is highly likely that the results would be affected. (Breusch and Pagan, 1980; Pesaran, 2004). So, before beginning the analysis, the existence of CD in the series and the co-integration equation should be tested. Considering the CD while selecting the unit root and co-integration tests will make the analysis results biased and inconsistent.

The existence of a CD between the series is tested by the Breusch-Pagan (1980) *LM* test when the time dimension is greater than the cross-section dimension and Pesaran (2004) Cross-sectional Dependency test when the time dimension is smaller than the cross-section dimension

[1] For the analysis, we used Gauss-9 and Stata-11 software packages.
[2] This test is one of the second-generation unit root tests and developed by Pesaran (2006b).

and time dimension is greater than the cross-section dimension. These tests are biased when the average group is zero, but the average individual is different from zero. Pesaran *et al.* (2008) adjusted this deviation by adding the variance and the average to the test statistics. Therefore, it is called the bias-adjusted *LM* test (LM_{adj}). The first form of *LM* test statistics is as the following:

$$LM = T\sum_{i=1}^{N-1}\sum_{j=i+1}^{N}\hat{\rho}_{ij}^{2} \sim \chi^{2}_{\frac{N(N-1)}{2}} \qquad (1)$$

It became the following with the adjustment:

$$LM_{adj} = \left(\frac{2}{N(N-1)}\right)^{1/2}\sum_{i=1}^{N-1}\sum_{j=i+1}^{N}\hat{\rho}_{ij}^{2}\frac{(T-K-1)\hat{\rho}_{ij}-\hat{\mu}_{Tij}}{\upsilon_{Tij}} \sim N(0,1) \qquad (2)$$

Here, $\hat{\mu}_{Tij}$ represents the avarage, υ_{Tij} represents the variance. The test statistics to be obtained here show a standard normal distribution as asymptotic (Pesaran *et al.* 2008). The hypotheses of the test are:

H_0: No CD.
H_1: CD.

When the probability value obtained from the test result is smaller than 0.05, H_0 hypothesis is rejected at the 5% significance level and it is determined that there is a CD between the units forming the panel (Pesaran, 2008). The existence of the CD in the variables and co-integration equation was tested one by one with the LM_{adj} test and the results in Table 2 were obtained.

Table 2. Cross-sectional dependency (LM_{adj}) test results

Variables and Co-integration Equation	GINI	GDP	Co-integration Equation
	Test Stat. and p-value		
CD LM1 (Breusch and Pagan 1980)	43.101 (0.003)	19.237 (0.570)	60.671 (0.000)
CD LM2 (Pesaran, 2004 CDLM)	3.410 (0.000)	0.272 (0.393)	6.121 (0.000)
CD LM (Pesaran, 2004 CD)	-1.625 (0.000)	-1.871 (0.031)	6.344 (0.000)
Bias-adjusted LM test (Pesaran *et al*. 2008)	2.339 (0.010)	2.281 (0.011)	6.035 (0.000)

As seen in Table 2, since the probability values for the income distribution (GINI) and total gross domestic product (GDP) and co-integration variables are smaller than 0.05, H_0 hypotheses are strongly rejected and it has been determined that there is a CD among the countries

in the panel. A shock in a change in income distribution or in Gross Domestic Product in one of the countries also affects the rest of the countries. So, while the decision makers in these countries are determining the economy policies, they should also take into consideration the income distribution of the other countries and the shocks affecting Gross National Product of these countries. Also, while the unit root analysis is performed in the next stages of the analysis for GINI and GDP series in the study, the unit root tests considering CD should be used. However, while the existence of co-integration relationship between the series and the co-integration equation are estimated, the test methods considering CD should be used. For that reason, the second generation panel unit root test and the panel co-integration analysis method considering CD have been used in the following stages of the study.

3.4. Panel Unit Root Test

The panel unit root tests considering the information about both the time and the cross-section dimension of the data are accepted to be statistically stronger than the time series unit root tests considering the information only about the time dimension (Im *et al*. 2003; Maddala and Wu, 1999; Taylor and Sarno, 1998; Levin *et al.* 2002; Hadri, 2000; Pesaran, 2006b; Beyaert and Camacho, 2008) because the variability in the data increases with the addition of the cross-section dimension to the analysis.

The first problem in the panel unit root test is whether the cross-sections forming the panel are independent from each other. Panel unit root tests here are divided into two as first and second generation tests. First generation tests are also divided into two as homogeneous and heterogeneous models. While Levin *et al.* (2002), Breitung (2005) and Hadri (2000) are based on the homogeneous model hypothesis, Im *et al.* (2003), Maddala and Wu (1999), and Choi (2001) are based on the heterogeneous model hypothesis.

First generation unit root tests are based on the hypothesis that the cross-section units forming the panel are independent and all the cross-section units are equally affected from the shock to one of the units in the panel. However, it is a more realistic approach that units are differently affected from the shock to one of the cross-sectional units in the panel if it is thought that national economies are related to each other today. In order to supply this deficiency, second generation unit root tests making the unit root analysis considering CD between the cross-sectional units have been developed. The main second generation unit root tests are MADF (Taylor and Sarno, 1998), SUDARF (Breuer *et al.* 2002), CADF (Pesaran, 2006b) and PANKPSS (Carrion-i-Silvestre *et al.* 2005).

In this study, since CD between the countries in the panel for the GINI and GDP variables used in the study has been identified, stationary of the series has been analysed with one of the second generation unit root tests, namely the CADF test developed by Pesaran (2006b) that can be used in the case that there is CD. CADF for panel's overall unit root test

can be carried out in each cross section unit (for each country) of series in panel. Also, the CADF test supposing that each country is affected differently from time effects and considering spatial autocorrelation can be used in T>N and N>T situations. Stationarity for each country is tested by comparing these test statistic values with Pesaran's (2006b) CADF critical table values. If the CADF critical table value is greater than the CADF statistics value, the null hypothesis is rejected and it is found that series of only this country is stationary. CADF test statistics are predicted as the following:

$$Y_{i,t} = (1 - \emptyset_i)\mu_i + \emptyset_i y_{i,t-1} + u_{i,t} \qquad i = 1,2,\ldots..,N \;\; ve \; t = 1,2,\ldots.,T \quad (3)$$

$$u_{it} = \gamma_i f_t + \varepsilon_{it} \quad (4)$$

Here, f_t shows the unobservable common effects of each country, ε_{it} shows individual-specific error. Equation (3), (4) and unit root hypotheses can be written as the following:

$$\Delta y_{it} = \alpha_i + \beta_i y_{i,t-1} + \gamma_i f_t + \varepsilon_{it} \quad i = 1,2,\ldots..,N \;\; ve \; t = 1,2,\ldots.,T \quad (5)$$

H_0: $\beta_i = 0$ for all *i* (Series is non-stationary)
H_1: $\beta_i < 0$ i=1,2,,….,N_1, $\beta_i = 0$ i=N_1+1, N_1+2,…, N. (Series is stationary)

Also, for the panels overall a unit root test statistics CIPS (Cross-Sectionally Augmented IPS) is obtained by getting the average of unit root statistics belonging to each cross sections (countries) (Pesaran, 2006b). CIPS statistics can be expressed as the following:

$$CIPS = N^{-1} \sum_{i=1}^{N} CADF_i \quad (6)$$

Unit root statistics for each country in panel (CADF) and test statistics (CIPS) for the panels overall and critical values calculated by Pesaran (2006b) are presented in Table 3.

Table 3. CADF panel unit root test results

Countries / Variables	Test Statistics		Critical Value		
	GINI	GDP	%1	%5	%10
Azerbaijan	-2.090	-3.762***	-5.44	-4.17	-3.64
Kazakhstan	-2.078	0.827	-5.44	-4.17	-3.64
Kirghizistan	-1.081	-3.386	-5.44	-4.17	-3.64
Tajikistan	-1.675	-2.310	-5.44	-4.17	-3.64
Turkey	-1.226	-2.300	-5.44	-4.17	-3.64
Turkmenistan	-3.702***	-6.201*	-5.44	-4.17	-3.64
Uzbekistan	-1.688	-1.082	-5.44	-4.17	-3.64
Panel (CIPS)	-1.933	-2.602	-3.24	-2.93	-2.76

Notes: *, ** and *** indicates that the series are stationary at 1%, 5% and 10% significance levels, respectively. In the test specifications, we included constant and trend terms for GINI and GDP variables. As significance level 5% was chosen.

When we observe the results in Table 3, for the panels overall, we can see that series are non-stationary in level and they become stationary when their first difference is taken, in other words, they are I(1). Since all of the series are I(1), we can pass to the co-integration analysis, because being I(1) for the series is a prerequisite for the co-integration analysis.

3.5. Multi Structural Breaks Panel Co-integration Test

Although structural breaks happen, the tests without structural breaks can give biased results (Charemza and Deadman, 1997). By considering CD this test developed by Basher and Westerlund (2009) tests the existence of the co-integration relationship between the series that are I(1). This test allows the breaks in the constant term and trend. The developed test statistics is:

$$Z(M) = \frac{1}{N}\sum_{i=1}^{N}\sum_{J=1}^{M_i+1}\sum_{t=T_{ij-1}+1}^{T_{ij}} \frac{S_{it}^2}{(T_{ij}-T_{ij-1})^2\hat{\sigma}_i^2} \quad (7)$$

Here is $S_{it} = \sum_{s=T_{ij-1}+1}^{t} \widehat{W}_{st}$. However, $\widehat{W}_{st}$ is the regression residual obtained by using any efficient estimator of the co-integration vector such as the fully modified least squares estimator. $\hat{\sigma}_i^2$ is the usual Newey and West (1994) long-run variance estimator based on $\widehat{W}_{st}$. *Z(M)* becomes as the following when it is simplified by taking their cross-sectional averages.

$$\mathrm{Z(M)} = \sum_{\mathrm{t=T_{ij-1}+1}}^{\mathrm{T_{ij}}} \frac{\mathrm{S_{it}^2}}{\mathrm{(T_{ij}-T_{ij-1})^2\hat{\sigma}_i^2}} \sim \mathrm{N(0,1)} \quad (8)$$

These test statistics shows the standard normal distribution. Hypotheses of the test are:

H_0: There is a co-integration relationship between the series.
H_1: For some cross-sections, there is no co-integration relationship between the series.

In observing the co-integration relationship, while the test statistics are compared with the critical value of 1.645 when there is no CD between the countries in the panel, they are compared with the critical value of 0.05 when there is CD (for 5% of significance level). When the probability value of the calculated test is greater than 0.05, H_0 is accepted and it is decided that there is a co-integration relationship between the series. Co-integration test results are presented in Table 4.

Table 4. Multi structural breaks panel co-integration test results

When the breaks considered:	LM Test Stat.	Asymptotic p-value	Decision
In constant	6.618	0.000	No co-integration
In constant and trend	20.163	0.000	No co-integration
	LM Test Stat.	**Bootstrap p-value**	**Decision**
In constant	6.618	0.447	Co-integration.
In constant and trend	20.163	0.542	Co-integration.

Notes: Probability values are obtained with 1000 replications by using Bootstrap.

When the results in the table are analysed, the fact whether CD and structural breaks are considered or not significantly affects the decision about the existence of a co-integration relation. For instance, we can see that while there is no co-integration relationship between the series in the case of no CD (prob=0.000), there exists a co-integration relationship in the case of CD (prob=0.447 and 0.542) in the option considering the structural breaks. Here it has been decided that there is a co-integration relationship between series in panels overall when the structural breaks in CD and co-integration equations are taken into consideration.

Table 5. Dates of structural breaks of countries forming the panel in co-integration equation

Countries	Break Number	1.Break Date	2.Break Date
Azerbaijan	2	2001	2005
Kazakhstan	1	2001	-
Kirghizstan	2	1999	2004
Tajikistan	2	1998	2003
Turkey	2	1998	2005
Turkmenistan	1	2001	-
Uzbekistan	1	2005	-

Notes: Break dates are obtained with 1000 replications by using Bootstrap. Maximum break number is chosen as 2. The model allowing breaks in constant and trend was chosen.

The test method has successfully identified the structural breaks. When the structural breaks are analysed in the Turkey sample, 1998 shows the economic instability period just before the crises in 2000 and 2001 in Turkey, 2005 shows the period that Turkey dealt with foreign Exchange and

banking crises and the transition period from fixed exchange rates to floating exchange rates after the 2001 crisis and the period that a wide range of arrangements in the banking sector and the period that a transition programme to a stronger economy has started to be implemented and the period of one party rule.

In Azerbaijan it has been seen that economy has gained a momentum with the increase in foreign direct investments since 2001 and with the increasing oil production and exports by the introduction of the Baku-Ceyhan-Tbilisi pipeline in 2005. However, Asian Crisis in 1997-1998 affected the economy of the Central Asian-Caucasia countries and Turkey and it has been observed as a break for the concerned countries.

3.6. The Estimation of Long Term Co-integration Coefficients

In this part of the study, after the co-integration relationship between the series is identified, long term individual co-integration coefficients are estimated with the AMG (Augmented Mean Group) Estimator developed by Eberhardt and Bond (2009). This estimator also takes CD into consideration. AMG is an estimator that can be used when series are I(1) and calculate co-integration coefficients about the panels overall and the countries forming the panel. The AMG estimator calculates by weighting the group averages. In this regard it gives more reliable results than the CCE (Common Correlated Effects) estimator developed by Pesaran (2006a) (Eberhardt and Bond, 2009).

AMG estimates the long term co-integration coefficient valid for the panels overall by taking weighted arithmetic averages of long term co-integration coefficients belonging to cross-sections. Co-integration coefficient belonging to the countries in the panel and panels overall were estimated with AMG and the results are presented in Table 6.

Table 6. Long term co-integration coefficients *GINI=f(GDP)*

Countries	GDP	t statistics
Azerbaijan	-0.013	-1.59***
Kazakhstan	0.172	2.39*
Kirghizstan	0.371	1.30***
Tajikistan	0.211	3.56*
Turkey	-0.218	-3.25*
Turkmenistan	0.290	10.20*
Uzbekistan	0.659	4.53*
Panel	0.210	1.99**

Notes: In the calculation of t statistics, Newey-West heteroscedasticity standard error is used. *, **,*** shows the 1%, 5% and 10% significance levels, respectively.

As can be seen in Table 6, increases in income in the panel (Turkey and Central Asia Countries) affect GINI coefficient positively. Overall, 1%

increase in income will cause a 0.21% increase in GINI coefficient. An increase in GINI coefficient indicates deterioration in income distribution.

When the countries are specially studied, the effect of increases in income on income distribution is significant in all analysed countries. Increases in income have decreased GINI coefficients for Azerbaijan and Turkey, in other words, they have had a positive effect on income distribution. Increases in income for Kazakhstan, Kirghizstan, Tajikistan, Turkmenistan and Uzbekistan has increased GINI coefficient, in other words they have had a negative effect on income distribution. The countries where the effect of increases in income on income distribution is the highest are Uzbekistan, Kirghizstan, Turkmenistan and Tajikistan. A 1% increase in income for Uzbekistan, Kirghizstan, Turkmenistan and Tajikistan economies will increase GINI coefficient 0.65%, 0.37%, 0.29% and %0.21, respectively.

4. Conclusion and Policy Recommendations

In this study, the relationship between the economic growth and the income distribution (GINI coefficient) was analyzed for six Central Asian countries and Turkey using annual data over the period of 1995 to 2009 along with the panel co-integration analysis method which considers the multiple structural breaks in the model and cross-section dependence (CD), that is to say, the assumption that a macroeconomic shock in a country would affect other countries.

The existence of CD among the countries that form the panel was examined via LM test which was developed by Breusch and Pagan (1980), and deviation of which was adjusted by Pesaran *et al.* (2008). We found that there is a CD in GINI coefficient, GDP series and co-integration equation. The fact that these countries are in the same geographical group can be considered as the reason for this condition.

The existence of the unit root among the series in the analysis was analyzed with CADF test which was developed by Pesaran (2006b) and considers CD among the series. Our results indicated that the series are I(1), stationary when their first differences are taken. The existence of co-integration relationship among the series was analyzed with the test which was developed by Basher and Westerlund (2009) and considers CD and structural breaks. It was determined that co-integration relationship existed among the series.

Long-term co-integration coefficients were estimated with the AMG method which was developed by Eberhardt and Bond (2009) and which considers CD. It was observed that the increases in income across the countries that formed the panel negatively affected the income distributions. These interpretations are valid since the co-integration coefficient is statistically significant for the overall panel. In view of the analyses in the study, the effect of the increases on the income distributions is statistically significant and at an interpretable level in all examined countries.

When examined for specific countries, it was observed that the increases in income in Azerbaijan and Turkey decreased the GINI coefficient, that is to say, it created a positive effect on the income distributions. As a consequence of rapid growth in Azerbaijan resulting from petroleum and natural gas a rapid economic growth was secured while the income distribution inequality was slowed down. Similarly, maintaining macroeconomic stabilization in Turkey by actualizing structural reforms primarily in banking sector as a result of "Transition to a Powerful Economy" policy that has been implemented since 2001, the income distribution inequality was reduced.

Although the rapid increase in GDP in Turkey caused a decrease in the income distribution inequality, GINI index is at a high level with a ratio of 38.95% (2009). GINI index was 33.71% in 2009, but an important progress has been accomplished in reducing the poverty thanks to the implemented policies. Another reason for the decreasing effect of the economic growth on the income distribution in these two countries can be a result of the fact that competitiveness of these countries is higher than other studied countries.

The increases in the income in Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan increased the GINI coefficient, that is to say, created a negative effect on the income distributions. The basic reason for this result in Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan is poverty that emerged as a result of social and economic adaptation problems that these countries experienced during their transition from the socialist system to the capitalist system. The economic instability, which emerged in the transition from the socialist planning structure to the capitalist market economy after these countries gained their political independence, paved the way for the clash environment. Domestic clashes and border clashes created political instability in these countries. Governance failure and corruption within the economic and political instability caused an increase in the income distribution inequality.

Income distribution inequality is one of the most important problems of the transition countries where poverty is the fundamental macroeconomic problem. Particularly, preventing corruption; being able to generate policies that will reduce unemployment; and democratization hold a great importance in order for a government to be robust in economic and political terms to solve this problem.

References

Acemoglu, D. and Robinson, R.A., 2002. The political economy of the Kuznets curve. *Review of Development Economics*, 6(2), pp.183-203.

Aigbokhan, B.E., 2008. Growth, inequality and poverty in Nigeria. *ACGS/MPAMS Discussion Paper,* 3.

Aktan, C.C. and Yasar, V.D., 2002. Gelir dagiliminda adalet(siz)lik ve gelir esit(siz)ligi: Terminoloji, temel kavramlar ve olcum yontemleri [(In)Justice and income (in)equality in income distribution: Terminology, basic concepts and methods of measurement]. C.C. Aktan ed., *Yoksullukla mucadele stratejileri [Poverty reduction strategies]*. Ankara: Hak-İs Konfederasyonu Yayinlari.

Alesina, A., and Rodrik, D., 1994. Distributive politics and economic growth. *The Quarterly Journal of Economics*, 109(2), pp.465-489.

Bahmani-Oskooee, M. and Gelan, A., 2008. Kuznets inverted-U hypothesis revisited: A time-series approach using US data. *Applied Economics Letters*, 15(9), pp.677-681.

Banerjee, A.V. and Duflo, E., 2000. Inequality and growth: What can the data say? *NBER Working Paper*, 7793, pp.2-27.

Barro, R.J., 1999. Inequality, growth and investment. *NBER Working Paper*, 7038, pp.2-32.

Basher, S.A. and Westerlund, J., 2009. Panel cointegration and the monetary exchange rate model. *Economic Modelling*, 26(2), pp.506-513.

Beyaert, A. and Camacho, M., 2008. TAR Panel unit root tests and real convergence: An application to the EU enlargement process. *Review of Development Economics*, 12(3), pp.668-681.

Branco, K.J. and Williams, J.B., 1988. Economic development and income distribution-a cross national analysis. *American Journal of Economics and Sociology*, 47(3), pp.277-297.

Breitung, J., 2005. A parametric approach to the estimation of cointegrating vectors in panel data. *Econometric Reviews*, 24(2), pp.151-173.

Breuer, B., Mcnown, R., and Wallace, M., 2002. Series-specific unit root test with panel data. *Oxford Bulletin of Economics and Statistics*, 64(5), pp.527-546.

Breusch, T.S. and Pagan, A.R., 1980. The Lagrange multiplier test and its applications to model specification tests in econometrics. *Review of Economic Studies*, 47(1), pp.239-253.

Carrion-I-Silvestre, J.L., del Barrio-Castro, T. and Lopez-Bazo, E., 2005. Breaking the panels: An application to the GDP per capita. *Econometrics Journal*, 8(2), pp.159-175.

Charemza, W.W. and Deadman, D.F., 1997. *New directions in econometric practice: General to specific modelling, cointegration and vector auto regression*. Second Edition. Cheltenham: Edward Elgar Publishing.

Chen, B., 2003. An inverted-u relationship between inequality and long run growth. *Economic Letters*, 78(2), pp.205-212.

Choi, I., 2001. Unit roots tests for panel data. *Journal of International Money and Finance*, 20(2), pp.229-272.

Disbudak, C. ve Suslu, B., 2007. Turkiye'de kisisel gelir dagilimini belirleyen makroekonomik faktorler [Macroeconomic factors that determines personal income distribution in Turkey]. *Ekonomik Yaklasim*, 65(18), pp.3-25.

Dollar, D. and Kraay, A., 2001. Growth is good for the poor. *Journal of Economic Growth*, 7(3), pp.195-225.

Dollar, D. and Kraay, A., 2004. Trade, growth, and poverty. *Economic Journal*, 114(493), pp.22-49.

Dulgeroglu, E., 1991. *Kalkinma ekonomisi*. [*Development economics*] Bursa: Bursa Uludag Universitesi Guclendirme Vakfi Yayini.

Eberhardt, M. and Bond, S., 2009. Cross-section dependence in non-stationary panel models: A novel estimator. *MPRA (Munich Personal RePEc Archive)*, 17692. [online] Available at: <http://mpra.ub.uni-muenchen.de/17692/> [Accessed 12 December 2012].

Forbes, K., 2000. A reassessment of the relationship between inequality and growth. *The American Economic Review*, 90(4), pp.869-886.

Gelaw, F., 2009. The relationship between poverty, inequality and growth in the rural Ethiopia: Micro evidence. In: *International Association of Agricultural Economists Conference.* Beijing, China, 16-22 August, 2009.

Gundlach, E., Jose, N.P., and Natasscha, W., 2004. Education is good for the poor: A note Dollar and Kraay. In: S. Anthony and R. Van Der Hoeven eds. *Growth, inequality and powerty*. London: Oxford Press, pp.92-106.

Gunes, S., 2007. Functional income distribution in Turkey: A cointegration and VECM' analysis. *Journal of Economic and Social Research*, 9(2), pp.23-36.

Guran, S., 1989. *Makroekonomik analize giris [Introduction to macroeconomic analysis]*. Istanbul: Der Yayınları.

Hadri, K., 2000. Testing for stationarity in heterogenous panels. *Econometrics Journal,* 3(2), pp.148-161.

Huang, H.C., 2004. A flexible nonlinear inference to the Kuznets hypothesis. *Economics Letters*, 84(2), pp.289-296.

Im, K., Pesaran, H., and Shin, Y., 2003. Testing for unit roots in heterogeneous panels. *Journal of Econometrics*, 115(1), pp.53-74.

Konukman, A. and Ciftci, C., 2008. Kuresellesmenin gelir dagilimi uzerindeki etkileri [The effects of globalization on income distribution]. *Ekonomik Yaklasım Dergisi*, 19(Ozel Sayi), pp.59-83.

Kuznets, S., 1955. Economic growth and income inequality. *American Economic Review*, 45(1), pp.1-28.

Laszlo, M., Laszlo, K., and Macquarie, L., 1998. The Kuznets U-curve hypothesis: Some panel data evidence. *Applied Economics Letters*, 5(11), pp.693-697.

Levin, A., Lin, C., and Chu, C.J., 2002. Unit root tests in panel data: Asymptotic and finite sample properties. *Journal of Econometrics*, 108(1), pp.1-24.

Lombardo, V., 2011. Growth and inequality effects on poverty reduction in Italy. *Rivista Italiana Degli Economisti*, 16(2), pp.241-280.

Maddala, G.S. and Wu, S., 1999. A comparative study of unit root tests with panel data and a new simple test. *Oxford Bulletin of Economics and Statistics,* 61(S1), pp.631-652.

Miynat, M. 2003. *Liberalizasyon surecinde uygulanan istikrar politikalarinin gelir dagilimina etkisi (1980 sonrasi Turkiye ornegi)* [*The effect of stabilization programs on income distrubution during liberalization process (The case of Turkey after 1980)*] Unpublished Ph.D. Thesis, Celal Bayar University, Social Sciences Institute, Department of Finance.

Morrisson, C. and Murtin, F., 2013. The Kuznets curve of human capital inequality: 1870-2010. *Journal of Economic Inequality,* 11(3), pp. 283-301.

Ogus, A., 2004. Turkiye'de ekonomik buyume ve gelir dagilimi [Economic growth and income distribution in Turkey]. In: *IV. Iktisat Kongresi*, Turkiye, Izmir, 5-9 Mayis 2004.

Persson, T. and Tabellini, G., 1994. Is inequality harmful for growth: Theory and evidence. *American Economic Review*, 84(3), pp.600–621.

Pesaran, H., 2004. General diagnostic tests for cross section dependence in panels. *Cambridge Working Papers in Economics*, 0435.

Pesaran, H., 2006a. Estimation and inference in large heterogeneous panels with a multifactor error structure. *Econometrica*, 74(4), pp.967-1012.

Pesaran, H., 2006b. A simple panel unit root test in the presence of cross-section dependence. *Journal of Applied Econometrics*, 22(2), pp.265–312.

Pesaran, M.H., Ullah, A., and Yamagata, T., 2008. A bias-adjusted LM test of error cross-section independence. *Econometrics Journal*, 11(1), pp.105-127.

Shin, I., 2012. Income inequality and economic growth. *Economic Modelling*, 29(5), pp.2049-2057

Syed, M.K. and Jalil, M.M., 2004. Revisiting Kuznets hypothesis: A time series and panel data approach. *Bangladesh Development Studies*, 30(3-4), pp.89-112.

Taylor, M. and Sarno, L., 1998. The behaviour of real exchange rates during the Post-Bretton woods period. *Journal of International Economics*, 46(2), pp.281-312.

Thornton, J., 2001. The Kuznets inverted-U hypothesis: Panel data evidence from 96 countries. *Applied Economics Letters*, 8(1), pp.15-16.

Uysal, Y., 1999. *Bolusum iliskileri ve bu iliskilerin duzenlenmesinde etkili olabilecek iktisat politikalarinin degerlendirilmesi –Turkiye ornegi* [*Distribution relations and evaluation of the economic policies that can be successful in managing these relations: The case of Turkey*]. [online]. Available at: <http://www.sbe.deu.edu.tr/Yayinlar/dergi/dergi02/bolum1.htm> [Accessed 3 November 2012].

Westerlund, J., 2009. Panel cointegration tests of the fisher effect. *Journal of Applied Econometrics*, 23(2), pp.193-233.

Yasin, D., 2010. Turkiye'de buyume, gelir dagilimi ve issizlik arasindaki iliskinin analizi (1987-2009): Buyume, daha adil gelir dagilimini getirdi mi? İssizligi azaltti mi? [The analysis of relationship among growth, income distribution and unemployment in Turkey (1987-2009): Has growth brought a fairer income distribution? Has it decreased unemployment?]. [pdf]. Available at: <http://www.tcmb.gov.tr/yeni/ iletisimgm/dilek_yasin.pdf> [Accessed 01 January 2013].

Zaman, K. and Khilji, B.A., 2013. The relationship between growth–inequality–poverty triangle and pro-poor growth policies in Pakistan: The twin disappointments. *Economic Modelling*, 30, pp.375-393.