*Araştırma Makalesi* ● *Research Article*

# Is There Income Inequality Convergence Between Regions in Turkey? Panel Data Analysis

## *Türkiye'de Bölgeler Arasında Gelir Eşitsizliği Yakınsaması Var Mı? Panel Veri Analizi*

Gökhan Konat [a,*]

[a] Arş. Gör. Dr., Abant İzzet Baysal Üniversitesi, İktisadi ve İdari Bilimler Fakültesi, Ekonometri Bölümü, 14030, Bolu/Türkiye.
ORCID: 0000-0002-0964-7893

A B S T R A C T

In recent years, with globalization and technological change, it is seen that income inequality has increased in many economies. Therefore, the concept of income inequality is one of the issues that attract attention by researchers. There are many studies on income inequality in the literature. In terms of fiscal policy, the relationship with economic growth is tested, or with financial development. In this study, the validity of the stochastic convergence hypothesis of income inequality is desirable to test for interregional in Turkey. For this purpose, the stationarity test of income inequality was carried out with the panel unit root test. Coefficient of income inequality which expressed as Gini covers the period 2006-2019 and this coefficient to Turkey Statistical Institute has been accessed from the official database. As a result of the panel unit root analysis performed for 12 Regions (Level 1) according to the classification of statistical region units, it was concluded that the Gini coefficient was not stationary. So the hypothesis of convergence between regions in Turkey is not available and there is an imbalance in the distribution of income. Therefore, a lot of work falls on policy makers to ensure justice in income distribution.

ÖZ

Son yıllarda küreselleşme ve teknolojik değişim ile birlikte birçok ekonomide gelir eşitsizliğinin arttığı görülmektedir. Bu yüzden gelir eşitsizliği kavramı araştırmacılar tarafından dikkat çeken konulardan biri olmaktadır. Bu çalışmada Türkiye için bölgeler arası gelir dağılımı eşitsizliğinin stokastik yakınsama hipotezinin geçerliliği sınanmak istenmektedir. Bu amaçla gelir eşitsizliğinin durağanlık sınaması panel birim kök testi ile gerçekleştirilmiştir. Gini katsayısı olarak ifade edilen gelir eşitsizliği serileri 2006-2019 dönemini kapsamaktadır ve bu katsayıya Türkiye İstatistik Kurumu resmi veri tabanından erişilmiştir. İstatistiki bölge birimleri sınıflamasına göre 12 Bölge (Düzey 1) için yapılan panel birim kök analizi neticesinde Gini katsayısının durağan olmadığı sonucuna varılmıştır. Yani Türkiye'de bölgeler arası yakınsama hipotezi geçerli değildir ve gelir dağılımında dengesizlik mevcuttur. Dolayısıyla gelir dağılımında adaleti sağlamak için politika yapıcılara çok iş düşmektedir.

## 1. Introduction

The neoclassical growth model not only predicts the reduction of regional income per capita and productivity inequalities, but also predicts a long-term convergence in personal income distribution (Ezcurra and Pascual, 2005: 763). Neoclassical models mean the convergence of not only average income levels but the entire distribution.

Studying the evolution of income and capital inequality is important not only because of the need to control poverty, but also because of inequality's potential impact on

* Sorumlu yazar/*Corresponding author*
e-posta: gokhan.konat@inonu.edu.tr

economic growth rates. Economists have long believed that economic growth alone would be sufficient to solve problems of inequality and poverty. Simon Kuznets (1955) postulated that sustainable economic growth would eventually lead to lower inequality. Similar concepts of the correlation between inequality and economic growth have long dominated international financial institutions, including the World Bank and the International Monetary Fund. The World Bank thinks that the acceleration of economic growth is a sufficient measure to improve the conditions of all layers in the population (Lyubimov, 2017: 42-43).

Reducing or minimizing income inequality appears to be one of the most difficult public policy issues in the macroeconomic literature. According to Kuznets (1955) inverse-U hypothesis, income inequality increases in the early stages of economic development and decreases after reaching a turning point (Savvides and Stengos, 2000: 207). However, this situation is not possible with the increasing globalization and technological progress, whether in developed or developing countries.

Compared to other income groups, there has been a rapid increase in income among the very rich in recent years and possible financial consolidations in some developed and developing economies have had a negative effect on low-income groups. In addition, high rates of unemployment have been observed in many developed economies after the financial crisis. Increasing income inequality due to such reasons has reached a worrying level for policy makers in many economies.

Coady and Gupta (2012) expressed the factors that have increased income inequality since 1980 as follows:

- Expanding inequality between regions in economies
- Globalization exerting downward pressure on the wages of low-skilled workers
- Technological change supporting highly skilled workers
- Institutional and regulatory reforms that increase competition in product and factor markets and reduce the bargaining power of labor
- Increases in the labor force participation of low skilled workers
- The increasing importance of high-income couples and single-parent families

The problem of inequality in income distribution may arise from the spending policies of economies, as well as from the tax structures of economies (Karaoğulları, 2017: 178). A more even distribution of income is seen as a desirable goal for many policy makers. But the underlying motivations can be different. Low income inequality is often seen as important to achieve greater equal opportunity in access to economic, social and political resources. But the reason it appears to be desirable in essence is that current income inequality is perceived as the result of unfair access to resources and hence harms social cohesion. Although some inequalities are deemed necessary to stimulate investment and economic growth, there is also evidence that high inequality can retard growth. Especially if it causes deficiencies in the credit market, political corruption or political instability, there is a decline in growth (Coady and Gupta, 2012: 4).

In fact, the social dimension, which is often neglected in the economic growth approach, has a strategic position in the development process. In this process, besides growth-equality considerations in economics, it also takes into account the impact of economic activities on the social life of the society (Soebagyo et al., 2019: 204). In addition, this process includes initiatives aimed at changing the economic structure for the better. Arsyad (2010) talked about the integrity of national economic development and regional economic development. The success of regional economic development is estimated from the poverty level, income distribution and unemployment rate.

Development cannot be judged solely on the basis of economic growth rate, but also requires equitable development aspects. Inequality in regional income distribution is becoming a global problem, and approaches that emphasize macroeconomic growth tend to neglect the glaring gap in development between regions. For this purpose, in this study, the validity of stochastic convergence and income inequality convergence hypothesis between regions is tested with the help of unit root test.

The convergence estimation in income distribution depends on the basic similarities between states, regions or countries (Ivanovski et al., 2020: 128). Conduct tests on a regional basis for income inequality convergence of Turkey makes it possible to take more homogeneous or similar results. Therefore, due to poor convergence between countries of Turkey for the possibility of establishing regional homogeneity it is more appropriate to examine the data.

Economic cooperation at regional and sub-regional levels has been an important feature of the country's economic development policies. Regional development policy allocates available resources to increase regional income or to address significant interregional income gap. Therefore, measuring the allocation and efficiency of factor donations in sub-national regions is very important for policy makers and planners.

To this end, Turkey 2006-2019 period, income inequality in the region the convergence was conducted with the unit root test taking into account cross-section dependency. There are some advantages in testing the validity of the convergence hypothesis with the unit root test. The literature also often uses beta convergence to test for convergence in income distribution. The usage of beta convergence for income inequality convergence is parallel to tests of average income convergence in growth practices, usually based on cross-section or panel data regressions that relate the average annual growth rate of per capita income over a given period. According to Bernard and Durlauf (1996), using this method, in the case of the existence of multiple output balances, one can easily reject the null hypothesis that there is no convergence in the initial-output regressions. As reported by Quah (1993), finding a negative correlation between average income growth and initial income using a beta test does not necessarily mean convergence. (Ivanovski et al., 2020: 128).

The remainder of this study is organized as follows. The next section presents the algebraic proof of the GINI coefficient and its graphical demonstration. Section three

presents the selected literature. Section four presents the data, econometric methodology, and empirical results. Finally, the last part of this study presents the conclusion.

## 2. Gini Coefficient

As long as full competition conditions are provided in the market, justice is ensured in the distribution of income in the country's economy, depending on the full and effective operation of the market. However, the lack of competition conditions and the failure in the market will create income inequality. In order to solve this problem, that is, to reduce income inequality, the state has to rearrange the income distribution that has been distorted by intervening in the economy (Şen and Sağbaş, 2019: 184).

There are different techniques used to measure income distribution. Among these, the most frequently used techniques are Lorenz Curve, Gini coefficient, percentage share analysis, Atkinson Coefficient, Pareto Coefficient and Kuznets Coefficient. Trends in income inequality often depend on the inequality indicator used. The most widely used and widely available measure of inequality is the Gini coefficient. While Gini is sensitive to what the revenue shares in the queues of the income distribution are, he is more sensitive to changes in shares in the middle of the distribution. Therefore, it is often preferable to support Gini with an inequality analysis at the extreme points of the income distribution. For example, it is the division of the share in the highest income quintile by the lowest quintile share.

**Figure1.** Lorenz Curve and Gini Coefficient
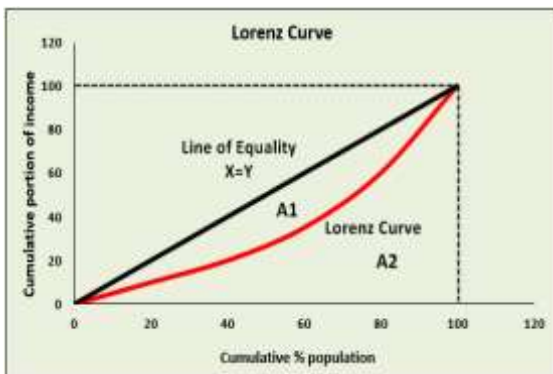


The Gini coefficient is calculated by the following formula:

$$G = \left[ \frac{1}{N^2} \sum_{i=1}^{N} \sum_{j=1}^{N} |Y_i - Y_j| f(Y_i) f(Y_j) \right] / 2\bar{Y} \qquad (1)$$

where $Y_i$ and $Y_j$ respectively $i$. and $j$. group's total income, f $f(Y_i)$ and $f(Y_j)$ respectively $i$. and $j$. the group's income multiplicity, $N$ is the number of units and $\bar{Y}$ is the arithmetic mean of the income. The Gini coefficient is equal to the ratio of the area between the curve and the diagonal to the total area below the diagonal, which depends on the Lorenz curve. It is interpreted that the larger this ratio, the greater the inequality in the distribution. Gini measure takes value in the range of [0-1] and the closer to zero, the justice of the income distribution in that economy is mentioned.

## 3. Related Literature

Solow (1956) and Swan (1956) first proposed the convergence hypothesis as part of the Neoclassical growth models. These models illustrate the diminishing returns of factors of production predicting that income per capita in poor countries will eventually converge to that of rich countries. The convergence hypothesis has generated tremendous interest and has led to extensive literature tests of convergence in average incomes both within and between countries. Bénabou (1996) stated that neoclassical growth models can mean convergence of the whole income distribution, not just the average. Countries with a high rate of income inequality will have a fair income distribution over time, and countries with a relatively fair income distribution will have an unequal income distribution. Reducing income inequality represents one of the most important challenges for policy makers in the twenty-first century. A large literature has been developed that examines both the premises and consequences of income inequality.

There are many alternative approaches regarding the convergence process in the current literature. Some of the studies examine whether there is real GDP convergence among the countries studied. Barro ve Sala-i-Martin (1992), Mankiw vd. (1992) ve Quah (1996) have brought a new approach to the existing literature by using beta convergence tests. Conditional convergence is obtained when additional control variables are included in the test. Absolute convergence is obtained without control variables. Eta convergence tests usually predict a log-linear solution to a non-stochastic model with an additional error term. As an alternative to beta convergence, tests of sigma convergence were first performed by Friedman (1992) and Quah (1993). A group argues that when the cross-section variance of the variable in question decreases over time, a group of countries, sectors or regions converge. However, the assumption underlying a changing data distribution poses difficulties in interpreting the sub-zero test distribution. Moreover, rejecting the sigma convergence hypothesis does not mean that they do not converge. That is, the presence of transition dynamics in the data may lead to the rejection of the null hypothesis of sigma convergence.

Other approaches to testing the convergence hypothesis use cointegration and unit root tests. Cointegration and unit root convergence tests owe their assets to Bernard and Durlauf's (1995, 1996) statistical definition of convergence between countries. Here it states that the two countries converge if their long-term estimates are equal. According to Bernard and Durlauf's definitions, if the output gap is a zero-mean stationary process, the two countries converge.

The literature summary on the subject is presented in Table 1.

**Table1.** Literature Review

| Author(s) | Periods | Method | Result |
|---|---|---|---|
| Chen and Fleisher (1996) | 1978–1993 | Beta and Sigma convergence | Conditional convergence exists for 25 China regions |
| Gundlach (1997) | 1978–1989 | Beta and Sigma convergence | There is absolute convergence for 29 China regions |
| Raiser (1998) | 1978–1992 | Beta convergence | Conditional convergence exists for 29 China regions |
| Marina (2000) | 1953-1995 | Beta convergence | There is convergence between regions for Argentina |
| Azzoni (2001) | 1939-1995 | Beta convergence | There is convergence between regions in Brazil |
| Cai et al. (2002) | 1979-1998 | Beta convergence | Conditional convergence exists for 29 China regions |
| Goerlich ve Mas (2004) | 1973-1991 | Beta convergence | There is convergence between regions for Spain |
| Ezcurra and Pascual (2005) | 1993-1998 | Gaussian-Kernel approach | There is a convergence of regional income inequality distribution in the European Union |
| Wu (2006) | 1978-2002 | Beta convergence and spatial econometric method | Conditional convergence exists for 30 China regions |
| Gomes (2007) | 1991-2000 | Beta convergence | There is convergence between regions for Brazil |
| Güven (2007) | 1979-2000 | Gini coefficient and Theil index | Income inequality is increasing between provinces in Turkey |
| Ezcurra and Pascual (2009) | 1969-1999 | Nonparametric Kernel OLS and GMM methods | Convergence exists for 48 US regions |
| Lin ve Huang (2011) | 1916-2005 | Beta convergence | Convergence exists for 48 US states |
| Lin and Huang (2012) | 1916-2005 | Panel LM unit root test | Convergence exists for 48 US states |
| Dhongde and Miao (2013) | 1980-2005 | Panel and cross section regression analysis | There is income inequality convergence for the selected country group |
| Zhu et al. (2014) | 1952-2008 | Beta convergence and spatial econometric method | There is convergence in the west and central areas for the 30 regions of China and three geo-economic clubs, divergence in the eastern regions and the whole nation |
| Tian et al. (2016) | 1978-2013 | Club Convergence | For China regions, income inequality between clubs worsens over time, while income inequality within only one club decreases |
| Chambers and Dhongde (2016) | 1990-2010 | Beta convergence | Convergence exists for selected countries |
| Chambers and Dhongde (2017) | 1985-2011 | Sigma convergence | There is absolute convergence for selected countries |
| Gündem (2017) | 1987-2001 2004-2011 | Spatial econometric method | Turkey's convergence regions available for the NUTS-2 level |
| Apergis et al. ( 2018 ) | 1916-2012 | Club Convergence | There is convergence for the US states in the late 1970s and early 1980s and then divergence. |
| Çapar and Yayla (2019) | 2003-2016 | Spatial econometric method | Turkey's convergence regions available for the NUTS-2 level |
| Belke et al. (2019) | 1989-2015 | Nonlinear Panel KSS and SPSM analysis | Convergence in 9 Central and Eastern European (CEE) countries |
| Ivanovski et al. (2020) | | LM and RALS-LM unit root analysis | There is both convergence and divergence for Australian states |

## 4. Dataset and Econometric Methodology

Countries publish data on income distributions in different forms, such as the population quintile income share, or on summary measures of income inequality, such as the Gini index, mean logarithmic deviation, and coefficient of variation. We choose the Gini index because it is the most widely found measure of inequality for many countries regarding what data is obtained over time and from multiple data sources. The Gini index measures the average difference between all possible income pairs in the population, expressed as a proportion of total income. It varies between 0, which indicates perfect equality, and 100, which indicates perfect inequality (Dhongde and Miao, 2013: 6-7). This study aimed to investigate whether NUTS 1 level of income inequality is the convergence in Turkey. Gini index data for Turkey Statistical Institute (TUIK) has reached the official database. Annual data covering the period 2006-2019 have been used and its graphical representation for the regions is presented in Figure 2.
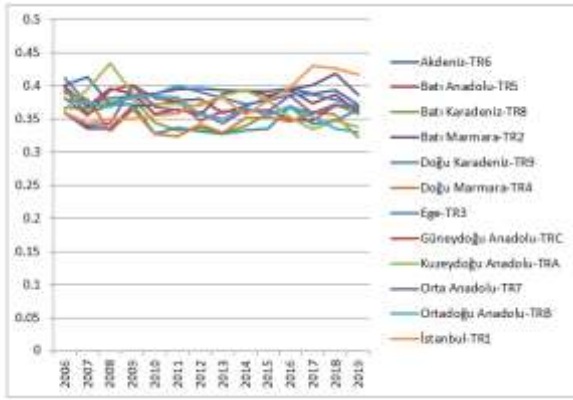
**Figure2.** Gini Index for NUTS 1

The stochastic convergence test is performed by the stationarity analysis of the logarithm of the ratio of the series to the group average. For this, whether the income inequality convergence hypothesis is valid was investigated with the panel unit root test proposed by Pesaran (2007). This test completes the test procedure taking into account the cross-sectional dependence. It also allows cross-sectional heterogeneity in constant, trend, and autoregressive coefficients, and Pesaran (2007) has proven to be a powerful test regardless of unit and time dimension length. Whether convergence to average regional income inequality in Turkey, stochastic convergence formula which is decided according to the following unit root analysis applied to the results obtained in the series consequences.

$$RGINI_{i,t} = ln(GINI_{it}/\overline{GINI}_t) \qquad (1)$$

where $RGINI$ is the relative Gini coefficient, $\overline{GINI}$ the mean of all units. Also $i = 1,2,...,12$ and $t = 2006, 2007, ...,2019$.

4.1. Pesaran (2007) CADF and CIPS Panel Unit Root Test

This test proposed by Pesaran (2007) adds the first differences of individual series and cross-sectional averages of the lags to the usual augmented Dickey-Fuller (ADF) regressions, and is based on simple averages of the individual ADF (CADF) statistics extended cross-sectionally. That is, it eliminates the cross-section dependency problem by using the lag values $\bar{y}_t$ and $\Delta \bar{y}_t$ to the model. The CADF regression model is as follows:

$$\Delta y_{it} = a_i + b_i y_{i,t-1} + c_i \bar{y}_{t-1} + d_i \Delta \bar{y}_t + \varepsilon_{it} \qquad (2)$$

The $t$-ratio of the Ordinary Least Squares (OLS) estimation of the $b_i$ parameter obtained from CADF regression is used as test statistics. The unit root structure under the null hypothesis is tested. The null hypothesis for all's as follows:

$$H_0: b_i = 0$$

The alternative hypothesis is based on the assumption of heterogeneity and is as follows:

$$H_1: b_1 < 0, b_2 < 0, ..., b_{N_0} < 0, \quad N_0 \leq N$$

In Equation (2), a separate CADF regression is calculated for each unit and the average of individual CADF test statistics is used for the panel as a whole. This statistic is the CIPS statistic based on the test proposed by Im, Pesaran and Shin (2003), that is IPS.

$$CIPS(N,T) = t - bar = N^{-1} \sum_{i=1}^N t_i(N,T) \qquad (3)$$

Pesaran (2007) suggested adding an appropriate number of lagged values to the CADF regression number of (2) in order to get ahead of this in the presence of a serial correlation, and it is shown as follows:

$$\Delta y_{it} = a_i + b_i + c_i \bar{y}_{t-1} + \sum_{j=0}^p d_{ij} \Delta \bar{y}_{t-j} + \sum_{j=1}^p \delta_{ij} \Delta y_{i,t-j} + \varepsilon_{it} \qquad (4)$$

This equation shows both cross-sectional and serially correlated regression of the $p$ th order individual error term.

## 5. Empirical Findings

For stochastic convergence, if the stasis assumption of the logarithm of the ratio of income inequality to the group average is valid, the convergence hypothesis will be valid. The CADF and CIPS panel unit root test results suggested by Pesaran (2007) are presented in Table 2. TR6, TR5, TR8, TR2, TR9, TR4, TR3, TRC, TRA, TR7, TRB and TR1 respectively Mediterranean, Western Anatolia, Western Black Sea, Western Marmara, Eastern Black Sea, Eastern Marmara, Aegean, Southeastern Anatolia, Northeastern Anatolia, Central It represents the regions of Anatolia, Middle East Anatolia and Istanbul.

**Table2.** CADF and CIPS Panel Unit Root Test Results

|  | Regions | CADF Test Statistics | Critical Values | | |
|---|---|---|---|---|---|
|  |  |  | %1 | %5 | %10 |
| **Constant** | TR6 | -1.353 | | | |
|  | TR5 | -0.765 | | | |
|  | TR8 | -1.625 | | | |
|  | TR2 | -1.606 | | | |
|  | TR9 | -1.797 | | | |
|  | TR4 | -3.844** | -4.65 | -3.53 | -3.06 |
|  | TR3 | -1.112 | | | |
|  | TRC | -1.788 | | | |
|  | TRA | -0.902 | | | |
|  | TR7 | -1.886 | | | |
|  | TRB | -0.228 | | | |
|  | TR1 | -0.809 | | | |
| **CIPS** |  | -1.476 | -2.66 | -2.37 | -2.22 |
| **Constant and Trend** | TR6 | 0.336 | | | |
|  | TR5 | -0.674 | | | |
|  | TR8 | -1.103 | | | |
|  | TR2 | -0.808 | | | |
|  | TR9 | -0.826 | | | |
|  | TR4 | -3.576 | -5.45 | -4.17 | -3.64 |
|  | TR3 | -2.747 | | | |
|  | TRC | -3.736* | | | |
|  | TRA | -1.369 | | | |
|  | TR7 | -1.142 | | | |
|  | TRB | -1.561 | | | |
|  | TR1 | -2.534 | | | |
| **CIPS** |  | -1.645 | -3.24 | -2.93 | -2.76 |

**Note:** ** and * show significance at the 5% and 10% level, respectively.

According to the test results in Table 2, individual CADF test statistics converge at the level of 5% for the East Marmara region in the constant model, and at the level of 10% for the Southeast Anatolia region according to the constant and trend model. However, the CIPS test statistic, which gives results for the panel in general, shows that the basic hypothesis that the series have unit root in both the constant model and the model with constant and trend cannot be rejected. Therefore, it is to say that the existing inequality of income convergence between regions in Turkey.

## 6. Conclusion and Evaluation

Although neo-classical growth models imply convergence across the entire income distribution, the literature largely tests for convergence in average income levels. Turkey regional revenue unequal convergence test is the current empirical studies by several stochastic convergences is intended to contribute to the literature by testing with regional convergence.

Reducing or minimizing income inequality is one of the most important challenges for policy makers in economies. Asked by Simon Kuznets (1955), "Do the stabilizing forces of growth, competition and technological progress lead to a reduction in inequality and greater cohesion between classes in later stages of development?" The question is still seeking an answer. There has been a lot of research recently on both the premises and consequences of income inequality. In this study, the Gini index was used to test the income inequality convergence hypothesis and covers the period 2006-2019. The data were obtained from the official database of TUIK and the unit root test was applied to the obtained series by taking the ratio of income inequality to the group average to the logarithm for stochastic convergence. Pesaran (2007) by developed according to the panel unit root test results it is concluded that there is no regional convergence in Turkey. Therefore, the income inequality convergence hypothesis is not accepted and means that it does not converge to the group average. So the hypothesis of convergence between regions in Turkey is not available and there is an imbalance in the distribution of income. Therefore, a lot of work falls on policy makers to ensure justice in income distribution. Changes involving labor and financial market regulations, union policies, tax policies and social norms related to wage inequality in a broader sense will play a key role in the evolution of inequality. Economic growth inevitably does not have an even distribution in terms of subnational influence and therefore significantly affects the income gap in subnational regions. Productivity and factor equipment affect regional income. Regional development policy allocates available resources to increase regional income and address significant interregional income gap. Therefore, measuring the allocation and efficiency of factor donations in subnational regions is very important for policy makers and planners.

## References

Apergis, N., Christou, C., Gupta, R., & Miller, S. M. (2018). Convergence in income inequality: Further evidence from the club clustering methodology across states in the us. *International Advances in Economic Research, 24*(2), 147–161.

Arsyad, L. (2010). Ekonomi Pembangunan. *Penerbit UPP STIM YKPN*. Yogyakarta.

Azzoni, C. R. (2001). Economic growth and regional income inequality in Brazil. *The annals of regional science*, 35(1), 133-152.

Barro, R. J., & Sala-i-Martin, X. (1992). Convergence. *Journal of political Economy*, 100(2), 223-251.

Belke, M., Harun, K., & Bolat, S. (2019). Merkezi ve Doğu Avrupa ülkelerinde gelir dağılımı yakınsaması: SPSM yönteminden kanıtlar. *Erciyes Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, (54), 343-366.

Benabou, R. (1996). Inequality and growth. *NBER macroeconomics annual,* 11, 11-74.

Bernard, A. B., & Durlauf, S. N. (1995). Convergence in international output. *Journal of applied econometrics*, *10*(2), 97-108.

Bernard, A. B. & Durlauf, S. N. (1996). Interpreting Tests of the Convergence Hypothesis. *Journal of Econometrics,* 71, 161-173.

Cai, F.,Wang, D.W. & Yang, D., 2002. Regional disparity and economic growth in China the impact of labor market distortions. *China Econ. Rev.* 13 (2), 197–212.

Chambers, D., & Dhongde, S. (2017). Are countries becoming equally unequal?. *Empirical Economics*, *53*(4), 1323-1348.

Chambers, D. & Dhongde, S. (2016b). Convergence in income distributions: Evidence from a panel of countries, *Economic Modelling*, 59, 262-270.

Chen, J., Fleisher, B.M., (1996). Regional income inequality and economic growth in China. *J. Comp. Econ.* 22 (2), 141–164.

Coady, M. D., & Gupta, M. S. (2012). Income inequality and fiscal policy. *International Monetary Fund.*

Çapar, U., & Yayla, N. (2019). Türkiye'de Bölgelerarası Gelir Dağılımı Yakınsaması: Mekânsal Ekonometrik Analiz. *Uluslararası İktisadi ve İdari İncelemeler Dergisi*, (25), 283-302.

Dhongde, S., ve Miao, X. (2013). Cross-country convergence in income inequality. *ECINEQ WP* 2013, 290.

Ezcurra, R., & Pascual, P. (2005). Is there convergence in income inequality levels among the European regions?. *Applied Economics Letters,* 12(12), 763-767.

Ezcurra, R., & Pascual, P. (2009). Convergence in income inequality in the United States: A nonparametric

analysis. *Applied Economics Letters, 16*(13), 1365–1368.

Friedman, M., (1992). Do old fallacies ever die? *Journal of Economic Literature,* 29, 2129–2132.

Goerlich, F. J., & Mas, M. (2004). Three (marginal?) questions regarding convergence. *Journal of Economic Studies,31*(1), 25–38.

Gomes, F. A. R. (2007). Convergence in income inequality, the case of Brazilian municipalities, *Economics Bulletin,* 15(15), 1-9.

Gundlach, E., (1997). Regional convergence of output perworker in China: a neoclassical interpretation. *Asian Econ. J.* 11 (4), 423–442.

Güven, A. (2007). Türkiye'de İller Arası Gelir Eşitsizliğinde Teşvik Politikasının Rolü: Bir Ayrıştırma Analizi. *Akdeniz İİBF Dergisi, 7*(14), 20-38.

Im, K. S., Pesaran, M. H., & Shin, Y. (2003). Testing for unit roots in heterogeneous panels. *Journal of econometrics,* 115(1), 53-74.

Ivanovski, K., Churchill, S. A., & Inekwe, J. (2020). Convergence in income inequality across Australian states and territories. *Social Indicators Research*, 148(1), 127-142.

Karaoğulları, E.(2017). Maliye Politikası, *Agon Yayınevi,*4. Baskı, Ankara.

Kuznets, S. (1955). Economic growth and income inequality. *The American economic review*, 45(1), 1-28.

Lin, P.-C., & Huang, H.-C. (2011). Inequality convergence in a panel of states. *The Journal of Economic Inequality, 9*(2), 195–206.

Lin, P. C., & Huang, H. C. (2012). Convergence in income inequality? Evidence from panel unit root tests with structural breaks. Empirical Economics, 43(1), 153-174.

Lyubimov, I. (2017). Income inequality revisited 60 years later: Piketty vs Kuznets. *Russian Journal of Economics*, 3(1), 42-53.

Mankiw, N. G., Romer, D., & Weil, D. N. (1992). A contribution to the empirics of economic growth. *The quarterly journal of economics*, 107(2), 407-437.

Marina, A. (2000). Economic convergence of the first and second moment in the provinces of Argentina. *Estudios de Economía*, 27(2), 259-277.

Pesaran, M. H. (2007). A simple panel unit root test in the presence of cross-section dependence. *Journal of Applied Econometrics*, 22(2), 265-312.

Quah, D. (1993). Galton's fallacy and tests of the convergence hypothesis. T*he Scandinavian Journal of Economics*,95(4),427-443.

Quah, D. T. (1996). Empirics for economic growth and convergence. *European economic review*, 40(6), 1353-1375.

Raiser, M., (1998). Subsidizing inequality: economic reforms, fiscal transfers and convergence across Chinese provinces. *J. Dev. Stud.* 34 (3), 1–26.

Savvides, A., & Stengos, T. (2000). Income inequality and economic development: evidence from the threshold regression model. *Economics Letters*, 69(2), 207-212.

Soebagyo, D., Fahmy-Abdullah, M. O. H. D., Sıeng, L. W., & Panjawa, J. L. (2019). Income Inequality and Convergence in Central Java under Regional Autonomy. *International Journal of Economics & Management*, 13(1).

Solow, R. M. (1956). A contribution to the theory of economic growth. *The quarterly journal of economics*, 70(1), 65-94.

Swan, T. W. (1956). Economic growth and capital accumulation. *Economic record*, 32(2), 334-361.

Şen, H., & Sağbaş, İ. (2019). Vergi Teorisi ve Politikasına Giriş. Ankara: *Barış Arıkan Yayınları*.

Tian, X., Zhang, X., Zhou, Y., & Yu, X. (2016). Regional income inequality in china revisited: A perspective from club convergence. *Economic Modelling, 56,* 50–58.

Wu, Y., (2006). A spatial econometric analysis of China's provincial economic growth convergence. *J. Quant. Tech. Econ.* 12, 101–108.

Zhu, G., Yu, J. & Qiao, K., (2014). Is provincial economic growth convergence in China? *China Econ. Q.* 13 (3), 1171–1194.