WHICH HYPOTHESIS IS VALID IN OECD COUNTRIES, KUZNETS U CURVE OR GREAT U-TURN? SYSTEM GMM ESTIMATION FOR DYNAMIC PANEL DATA

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ABSTRACT
The results of research in recent years have claimed that the relationship between economic growth and income inequality no longer supports Kuznets' inverse-U hypothesis. The expectation of "Inverse-U" in explaining the relationship between economic growth and income inequality replaced with "Great U-Turn" instead. In this context, this research aims to explain the relationship between income inequality and economic growth per capita in OECD countries for the period of 2000-2012. The analysis made using Dynamic Panel Data Method to explain the relationship between income inequality and economic growth per capita which shows evidence in support of Great U-Turn. The result of variables which alleged to cause income inequality to turn positive again, such as rapid technological change (positive), the labor force in the agriculture sector (positive), interest rate (negative) and foreign direct investment (negative) were all statistically significant. The results also indicated that labor force with a higher level of education has the effect of reducing income inequality while the effect of the unemployment rate on inequality was negative. ··
Keywords: The Kuznets curve, The great U-turn, Income inequality, System GMM

OECD ÜLKELERİNDE HANGİ HİPOTEZ GEÇERLİ, KUZNETS U EĞRİSİ Mİ BÜYÜK U DÖNÜŞÜ MÜ? DİNAMİK PANEL VERİ İÇİN SİSTEM GMM TAHMİNİ

ÖZET
Son zamanlarda yapılan birçok çalışmada ekonomik büyüme ve gelir eşitsizliği arasındaki ilişkinin, Kuznets' in Ters U hipotezini artık desteklemediği iddia edilmektedir. Ekonomik büyüme ve gelir eşitsizliği ilişkisi için "Ters U" bekleyişi yerini "Büyük U Dönüşü" ne bırakmaktadır. Bu bağlamda çalışmanın amacı, OECD ülkeleri için 2000-2012 döneminde gelir eşitsizliği ve kişi başı ekonomik büyüme arasındaki ilişkiyi tanımlamaktır. Dinamik panel veri yöntemi kullanılarak yapılan analizlerde gelir eşitsizliği ve kişi başı ekonomik büyüme arasındaki ilişkinin "Büyük U Dönüşü" nü desteklediğine yönelik bulgular elde edilmiştir. Gelir eşitsizliğinin tekrar pozitife dönmesine neden olduğu iddia edilen teknolojik değişim (pozitif), tarım sektöründe çalışan işgücü (pozitif), faiz oranları (negatif) ve doğrudan

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yabancı yatırımlar (negatif) istatistiki açıdan anlamlı bulunmuştur. Ayrıca, işsizlik oranı artışının gelir artışını olumsuz yönde etkilediği ancak işgücünün daha yüksek eğitim düzeyine sahip olmasının gelir eşitsizliğini azaltıcı yönde etki yaptığı bulgusu elde edilmiştir.

Anahtar Kelimeler: Kuznets eğrisi, Büyük U dönüşü, Gelir eşitsizliği, Sistem GMM

1. Introduction

The relationship between economic growth and income inequality has been investigated extensively since Kuznets' article in 1955. In the study of Kuznets, income inequality will increase along with economic development in the early stages of development, but in the later stages of development, income inequality trend is going to stop rising and then decrease after a certain threshold, therefore it is suggested that this relationship is inverse U-shaped (Kuznets, 1955: pp.6-7). According to Kuznets hypothesis, firstly, income inequality will increase to a threshold value, and then will decrease when a society shifted from the agricultural to the industrial sector, because income levels of residents with lower incomes than other urban residents increase as long as newcomers and their children from rural areas integrated into the urban labor force (Lantican et al., 1996, pp.236-237; Moran, 2005, pp.212; Deininger and Squire, 1998, pp.275).

The empirical evidence of the Kuznets hypothesis is supported by many researchers. Tsakloglou (1988) examined the relationship between income inequality and economic development using GDP as representative of economic development and time series and cross-section data for the sample of countries with non-centrally planned economies and obtained the results of support to the Kuznets hypothesis. Dawson (1997) tested the relationship between income and inequality with a quadratic functional form for 36 less developed countries and resulted in supporting Kuznets's hypothesis. Thornton (2001) estimated the simple hypothesis of Kuznets, which is a quadratic relationship between per capita GDP and inequality, for 96 countries and as a result of the relation obtained Kuznets' inverse U-curve. Chen (2003) estimated the relationship between income distribution and long-run economic growth using cross-country data where the results do not conflict with Kuznets curve. In the findings of Lantican et al.' (1996), the Kuznets hypothesis was supported in elementary school level or in urban areas, but the hypothesis was not supported at the level of secondary school or in rural areas. The empirical evidence on the relationship between growth and income inequality is thought still to be quite weak. Recently, criticisms against the traditional approach of defining the Kuznets curve have received considerable attention.

In the studies that generally support this hypothesis, the diversity between transnational dimensions is ignored because of studying with either cross-section data obtained from several countries or time series data obtained from a country. Kuznets curve also was originally based on the observations of just Germany, United Kingdom, and the United States. In the aftermath of the country's increasing number of studies, contradictory

results have been obtained for the Kuznets curve. Furthermore, recent finding at high-income levels of relationship between income inequality and per capita income is returned again to the positive (List and Gallet, 1999, pp.204).

Towards the year 2000s, it emerged that Kuznets hypothesis had failed to describe the relationship between growth and income inequality in many studies. For example; Bishop et al. (1991), Katz and Murphy (1992), Bound and Johnson (1992), Nielsen and Anderson (1997), Freeman (1997), Alderson and Nielsen (2002), Smeeding (2002) and Kwon (2016) have all obtained results that support 'The Great U-Turn" hypothesis. The concept of "Great U-Turn" was first used by Bluestone and Harrison (1988) in their book named "The great U-turn: Corporate restructuring and the polarizing of America". After that; Bluestone (1990), has addressed again the factors that led to the Great U-Turn in America. Nielsen and Alderson (1997), examined the determinant of an upswing in inequality in counties of the United States in 1970, 1980 and 1990. Their conclusion about the upswing in inequality was that female-headed households and percent of the population over age 65 have a negative impact on income inequality. List and Gallet (1999), emphasized the conclusion that Kuznets hypothesis is valid only for less developed or developing countries while the relationship between growth per capita and income inequality turned positive again for developed countries. Alderson and Nielsen (2002) identified that "The Great U-Turn Hypothesis" is valid again for years 1967-1992 in 16 OECD countries. Kwon (2016), determined that this hypothesis is valid between the years 1917-2008 in the United States. He especially emphasized that the service-knowledge transition impacts income inequality trends.

It is suggested that the "Inverse U-Curve" hypothesis is replaced with "Great U-Turn" hypothesis. According to the "Great U-Turn" hypothesis, when GDP per capita increases, income inequality decreases for developing countries (negative relationship), whereas income inequality increases for developed countries (positive relationship). The exact opposite is the case in Kuznets hypothesis. In this context, this study aims to reveal which hypothesis is valid for the relationship between income inequality and economic growth per capita in 34 OECD countries for the period of 2000-2012. Although income inequality is a dynamic phenomenon, the studies in the literature were estimated validness of these hypotheses as static. An important contribution of this study is that relationship between per capita GDP and income inequality has been addressed by using dynamic panel data model.

This study consists of three main parts. The importance and purpose of the study is highlighted and studies in the literature are mentioned in the first part. The following part provides information about data sets and methods used in the study. The empirical findings and assessments are given in the last part.

2. Data and Methodology

This study examined the relationship between income inequality and per capita growth in the 34 OECD countries for the period of 2000 to 2012[3]. To identify the shape of the relationship between economic growth and income inequality, and in order to reflect this relationship's key elements, three models were estimated. The variables used in the models are presented in Table 1.

Table 1 Data specification

Variable	Definition
Gini	Gini refers to inequality in net income
LGDP	Logarithm of GDP per capita, PPP (constant 2011 international $)
Empagr	Employment in agriculture (% of total employment)
Empind	Employment in industry (% of total employment)
Empser	Employment in services (% of total employment)
Unemployment	Unemployment, total (% of total labor force)
Technology	ICT goods imports (% total goods imports)
Education	Labor force with higher education (% of total)/ Labor force with primary education (% of total)
FDI	Foreign direct investment, net inflows (% of GDP)
Female	Labor force participation rate, female (% of female population ages 15-64) (modeled ILO estimate)
Interest	Long-term interest rates

Notes: The data used in this study was taken from the World Bank (World Development Indicators) except Gini coefficient and interest rate. Gini coefficient was taken from Standardized World Income Inequality Database (SWIIDv5_0) (Solt, F., 2014). The interest rate was taken from OECD database.

In all the models estimated in this study, Gini coefficient is the dependent variable. The first model is a simple form of Kuznets hypothesis since the independent variables are GDP per capita and the square of GDP per capita. In addition to GDP per capita and the square of GDP per capita; the ratio of labor force in industry and agriculture sector, the share of information and communication technology in imports, the education level of the labor, female labor force participation rate, foreign direct investment and interest rate are included as independent variables in the second model. In the third model, unlike the second model, the ratio of labor force in service is used instead of the industry due to the high correlation between them.

Figure 1 shows that when the countries' average of income inequality is considered, the highest Gini coefficient has occurred in Chile, Mexico and Turkey respectively which these countries have relatively lower incomes than others. However, the lowest inequality seems to be Slovenia, Sweden, and Denmark, respectively. Sweden and Denmark are the countries with the highest income group but Slovenia has a relatively lower per capita income than Sweden and Denmark. High inequality is observed in countries in the high-income group

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[3] The Gini coefficient can be found in the data sources until 2012. Due to this limitation, the analysis performed in this study could be done only by 2012.

such as United Kingdom, United Stated and Israel. In Table 2, Slovenia has the lowest Gini value with 22.093 in the year 2001 while Chile has the highest Gini value with 50.067 in the year 2000 in OECD countries.
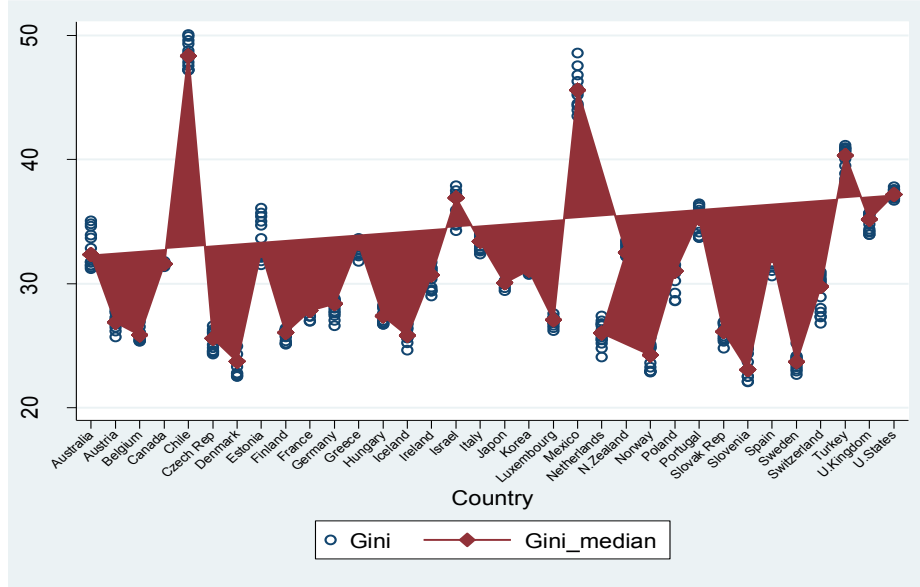

Figure 1 The Comparisons of the Gini Coefficient of the Countries

Kuznets' study suggested that income inequality would increase along with economic development in the early stages of development. However, income inequality trend was going to stop rising and then decrease after a certain threshold, and as a result, this relationship would be inverse U-shaped.

Model 1

The simplest form of the Kuznets hypothesis illustrates the quadratic relationship between income inequality and per capita gross domestic product (GDP):

$$\text{Gini}_{i,t} = \alpha_0 + \beta_1 \text{LGDP}_{i,t} + \beta_2 \left(\text{LGDP}_{i,t} \right)^2 + \varepsilon_{i,t} \qquad (1)$$

where $\varepsilon_{i,t}$ is an error term of country i at year t. When $\beta_1 > 0, \beta_2 < 0$ is, "The Inverted U" or "Kuznets" hypothesis is thought to be completely valid (Thornton, 2001, pp.15). Otherwise, if $\beta_1 < 0, \beta_2 > 0$ is, "The Great U-Turn" hypothesis is introduced. In this context, the square of per capita of GDP as well as per capita of GDP was added to the models. The first model in Table 3 is the simplest form of the Kuznets hypothesis.

The dualism between traditional (agricultural) and modern (non-agricultural) sectors of emerging economies is emphasized in the Kuznets' inverted U-curve hypothesis. While in the first period of the industrialization a society might have a small modern industrial sector

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with high productivity and high wages; in later stages, conversely, a large traditional agricultural sector with low productivity and low wages become dominant in this same society (Nielsen and Alderson, 1997, pp.6). In time, as modern sectors dominate the economy, it's argued that income inequality would be decreased owing to labor force passed from traditional sectors to productive sectors. In other words, as people move from rural areas where the income is low but the distribution of income is fair to urban areas where the income is high but the distribution of income is unfair, income inequality increases along with per capita income, at first. After that increase at first, income inequality is declining gradually. However, it is claimed that the shift in the economy from industry to service sector was one of the best of cases can explain "Great U-Turn" hypothesis. It is suggested to cause polarization in the distribution of wage because of service and retail sectors create new jobs with low-paid employment rather than high paying jobs in the economy (Bluestone, 1990, pp. 20). For this reason, the labor forces in agricultural and non-agricultural sectors are included in the models to reveal how sectors are affecting income inequality. Since the correlation between industry and service sectors is high, the labor force in agriculture and industry sectors are located in the second; the labor force in agriculture and service sectors are located in the third model in Table 3 to avoid the problem of multicollinearity.

Descriptive statistics of variables used in the models are given in Table 2, where the average labor forces in agriculture, industry and service sectors are 5.970%, 26.089%, and 67.139%, respectively. Most of the total labor force in OECD countries on average is observed to be in the service sector. Luxembourg is the country with the most of the employment in the service sector in 2012 with 84.2%. However, Japan is the country with minimal employment in service in 2011 with 27.9%. Turkey was the highest labor force in the agriculture sector with 37.6% in 2001; while the country which was the lowest share with 1% in 2008 and after 2008 is the United Kingdom.

Developments in information & communication technologies and worldwide innovation fluctuations that emerged with "The New Economy" are thought to be causing income inequality to increase due to a rise in the skill premium in favor of skill-biased workforce, and because of this reason, it is suggested that "The Great U-Turn" occurred (Deller, 2005). For this reason, the share in imports of information and communication technologies has been included in the second and third models. Also, the opinion that globalization causing "The Great U-Turn" exists in the literature. The share of foreign direct investment in GDP has been included in the model to represent the globalization. As shown in Table 2, the share in imports of information and communication technologies that are used to represent technological change with the lowest value is 3.096% in Belgium in 2012 but the highest value is 35.807% in Ireland in 2001. The average of foreign direct investment which used to represent the globalization is 5.696%. Interestingly, while the highest rate of this value is owned by Luxembourg with 142.257% in 2012, the lowest rate in 2007 with 58.978 belong to the same country as negative.

Female labor force participation rate also considered to be one of the causes of the increase in income inequality since women are paid a lower wage and generally working part-

time (Thurow, 1987, pp.34-35; Bluestone, 1990, pp.28). In this context, the female labor force participation rate is included in the second and third models. As seen in Table 2, while Iceland is the country with the most female labor force in the year 2000 with 83.3%, this ratio was realized with the lowest rate at 25.2% in 2004 and 2005 in Turkey.

Unemployment rates and education are important variables which can considerably affect income inequality that should be included as explanatory variables in the model (Nielsen and Alderson, 1997). It is believed that income inequality gap will widen as unemployment rate increases, because of unemployed people who don't have a regular income. It was concluded that as the education level increases, the income inequality will decrease in connection with individuals' ability to adapt more quickly to the changes, and these individuals become more skill-biased workforce. In light of this information, the education levels of the labor force and unemployment rate were taken into consideration in the model. To see the relative effect of the level of education, the ratio of labor force with higher education to the labor force with primary education included in the second and third model in Table 3.

Table 2 Descriptive statistics of variables used in the models

Variable	Obs	Mean	Std. Dev.	Min	Max
Gini	432	30.677	5.856	22.093	50.067
GDP	442	35305.440	14364.720	12090.010	96711.050
Empagr	440	5.970	5.484	1.000	37.600
Empind	440	26.089	6.157	8.000	42.300
Empser	440	67.139	8.652	27.900	84.200
Unemp	442	7.273	3.712	1.800	25.200
Ictimp	442	10.142	4.713	3.096	35.807
Education	399	2.092	4.724	0.121	55.333
Female	442	63.173	11.001	25.200	83.300
FDI	437	5.696	11.999	-58.978	142.257
Interest	399	4.711	1.971	0.650	22.500

While New Zealand is where the ratio of highly educated labor force to lower educated labor force is the highest, the exact opposite is the case in Portugal and Turkey, respectively.

Credit constraints are also thought to be a factor increasing income inequality. The poor people in credit constraint cannot participate in production activities as entrepreneurs because there are no investment opportunities. Furthermore, they do not have the opportunity to increase their level of education. Income inequality occurs as a result of credit constraint reduces economic growth by causing political and social instability (Shin, 2012, pp.2050; Deininger and Squire, 1998, pp.267). So, the interest rate is included in the model to represent credit constraint. Government spending, money supply or interest rate on behalf of the credit constraints are often used in the literature. However, the interest rate is used because appropriate data is not available on government spending or money supply.

These factors that are thought to be the cause of the increase in income inequality are included in the second and third models which is the extended version of first model are as follows;

Model 2

$$\text{Gini}_{i,t} = \alpha_0 + \beta_1 \text{LGDP}_{i,t} + \beta_2 \left(\text{LGDP}_{i,t}\right)^2 + \beta_3 \text{Unemployment}_{i,t} + \beta_4 \text{Empagr}_{i,t} + \beta_5 \text{Empind}_{i,t} + \beta_6 \text{Technology}_{i,t} + \beta_7 \text{FDI}_{i,t} + \beta_8 \text{Education}_{i,t} + \beta_9 \text{Female}_{i,t} + \beta_{10} \text{Interest}_{i,t} + \varepsilon_{i,t} \tag{2}$$

Model 3

$$\text{Gini}_{i,t} = \alpha_0 + \beta_1 \text{LGDP}_{i,t} + \beta_2 \left(\text{LGDP}_{i,t}\right)^2 + \beta_3 \text{Unemployment}_{i,t} + \beta_4 \text{Empagr}_{i,t} + \beta_5 \text{Empser}_{i,t} + \beta_6 \text{Technology}_{i,t} + \beta_7 \text{FDI}_{i,t} + \beta_8 \text{Education}_{i,t} + \beta_9 \text{Female}_{i,t} + \beta_{10} \text{Interest}_{i,t+} + \varepsilon_{i,t} \tag{3}$$

In this study, panel regression models were estimated in order to test whether the "Great U-Turn" hypothesis is valid. Panel data have several advantages over cross-sectional or time series data such as an increase in the number of observations and degrees of freedom, significantly reducing the problem of multicollinearity, and controlling for individual heterogeneity (Hsiao, 2003, pp.3). Panel data means that observed data at T different times for N different cross sections. The cross sections of this study are Australia, Austria, Belgium, Canada, Chile, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom, and United States while the time dimension covers years from 2000 to 2012.

Moving from being a dynamic phenomenon of income inequality, dynamic panel data analysis method was used in this study. When the model is taken into consideration dynamically, and with the other control variables affecting the income inequality, the model is written as the following;

$$\text{Gini}_{i,t} = \gamma \text{Gini}_{i,(t-1)} + \beta_1 \text{LGDP}_{i,t} + \beta_2 \left(\text{LGDP}_{i,t}\right)^2 + \delta Z_{i,t} + \varepsilon_{i,t} \tag{4}$$

where $Z_{i,t}$ represents a vector of control variables. In dynamic models, the lagged value of the dependent variable correlated with error terms so, fixed and random effects models' results are biased and inconsistent. (Baltagi, 2008, pp.147-148). Because of this reason, dynamic models are analyzed by GMM (Generalized method of moments).

The difference GMM based on the method of Arellano & Bond (1991) and system GMM developed by Arellano & Bover (1995) and Blundell &Bond (1998) are widely used GMM estimators. Arellano & Bover (1995) found that difference GMM has weak predictive power in the finite sample and the coefficient estimates are biased so system GMM estimator predictive power is higher than difference GMM. Therefore, the system GMM approach is used in the study. One of the advantages of using GMM estimation is related to endogeneity problem. GMM helps to control the potential endogeneity by using appropriate lags of the explanatory variables in the model (Blundell & Bond, 1998). The validity of the system GMM

estimates should be free of second order serial correlation to obtain the unbiased estimator since lagged values are used as an instrument. Besides, the overidentifying restrictions should be valid. Thus, Hansen J-test is performed. Under the null hypothesis of Hansen J-test, overidentifying restrictions are valid. The validity of the instrument subsets are used difference-in-Hansen test. If the Hansen J test p -value is very high or close to 1, underidentification and weak instruments in the System GMM estimator because of instrument proliferation (too many instruments as T grow) can result in an over-fitting of the model and biased estimates. In this case, the instrument matrix is recommended to be converted to one column matrix like the following (Roodman, 2009, pp.107).

$$
\begin{bmatrix} 0 & 0 & ... & 0 \\ y_{i1} & 0 & ... & 0 \\ 0 & y_{i2} & ... & 0 \\ \vdots & ... & ... & \vdots \\ 0 & 0 & & y_{i,T-2} \end{bmatrix} \text{ collapsed,} \quad \begin{bmatrix} 0 \\ y_{i1} \\ \vdots \\ \vdots \\ y_{i,T-2} \end{bmatrix} \tag{5}
$$

When the analysis was performed without the matrix of instrumental variables converted into a single column matrix, Hansen j test p value was close to 1 because of the problem with too many instruments with increasing time dimension. For this reason, collapsed instrument matrix was used as proposed by Roodman.

3. Results and Discussion

This study examined the relationship between income inequality and per capita growth in the 34 OECD countries for the period of 2000-2012 to determine whether "Kuznets' Inverted-U-curve" or "Great U-Turn" hypothesis is valid. The issues of income inequality motivated by having a dynamic process, three models were estimated with a combination of various independent variables.

Table 3 The effect of great U-turn variables on inequality from 2000-2012.

Variables	Model I	Model II	Model III
Panel A: System GMM Estimation where dependent variable is Gini coefficient			

$LGDP_{t-1}$	1.130*** (0.043)	1.108*** (0.069)	1.103*** (0.071)
LGDP	-1.408*** (0.463)	-3.174** (1.458)	-4.174*** (1.397)
$LGDP^2$	0.081*** (0.028)	0.241** (0.107)	0.291*** (0.107)
Unemployment		0.091* (0.054)	0.095* (0.054)
Empagr		0.329** (0.136)	0.387** (0.173)
Empind		-0.047 (0.062)	
Empser			0.050 (0.060)
Technology		0.069* (0.041)	0.075* (0.043)
FDI		-0.008* (0.004)	-0.007** (0.004)
Education		-0.025** (0.012)	-0.026** (0.012)
Female		0.020 (0.020)	0.022 (0.020)
Interest		-0.214*** (0.062)	-0.219*** (0.061)
Panel B: Diagnostics			
Wald test p val. AR(1) p val. AR(2) p val.	0.000*** 0.005*** 0.649	0.000*** 0.033** 0.584	0.000*** 0.032** 0.524
Hansen j-test p val. Diff-in-Hansen p val.	0.228 0.086*	0.239 0.163	0.261 0.231
Instruments Observations Countries	27 390 34	33 320 31	33 320 31

Notes: *,**,*** refer to a significance level of 10, 5 and 1%, respectively. Robust standard errors are reported in parentheses.

The first model is the simple form of the Kuznets hypothesis. The second and third models are extended version of the first model with the addition to variables which is thought to affect income inequality significantly. The lag of the dependent variable Gini coefficient which reveals the dynamic structure is statistically significant and positive in all models. There is a significant and negative relationship between Gini coefficient and per capita GDP. There is also a positive relationship between Gini and square of per capita GDP. This finding supports the hypothesis of "Great U-Turn" in three models. So, for countries with lower income, income inequality is declining; while inequality is increasing in high-income countries.

The unemployment rate and the share in imports of information and communication technologies were statistically significant and positive but the share of foreign direct investment in GDP was statistically significant and negative in the second and third models. Income inequality will increase as unemployment rate increases because of unemployed people don't have a regular income. An increase in the share in imports of information and communication technologies increases income inequality. Because, the income gap between the people who can adapt to technological change and others will be widened. This result is consistent with the findings of Conceicao&Galbraith (2000); Jaumotte, Lall&Papageorgiou (2008) and Hall (2009).

Employment in the agriculture sector was statistically significant and positive. As labor force in agriculture sector increases, income inequality is becoming wider. In the literature, being dominant services sector of the great U-turn is caused to be emphasized (Bluestone, 1990; Alderson and Nielsen, 2002). However, as a result of the analysis, for the corresponding period for the OECD countries, the coefficient of the share of employment in the services sector was positive but statistically insignificant. The female labor force participation rate was also found statistically insignificant.

The ratio of labor force with higher education to the labor force with primary education was statistically significant and negative in second and third models. As the education level increases, income inequality will decrease because of individuals adapt quickly to the changes by becoming more skill-biased (Acemoglu and Pischke, 2000; Vindingi, 2002). Based on the claim that globalization increases income inequality; foreign direct investment (FDI) was included in the models to represent globalization. However, contrary to aforementioned claim, findings have been obtained that foreign direct investments tend to reduce income inequality. Foreign direct investments are thought to decrease income inequality by revealing new business areas to reduce unemployment. Also, it is believed that FDI reduce income inequality by narrowing the gap between wage rents and capital rents through reducing the total returns to capital and increasing the returns to labor (Hung, 2005; Jensen and Rosas, 2007).

Interest rates representing credit constraints included in the models are statistically significant, however, contrary to expectations, have come up negative. The findings support that low-interest rates increase income inequality. There are some findings consistent with this result (Galor and Zeira, 1993; Montecino and Epstein, 2015). In those studies it is emphasized that one factor underlying this result comes from inflating stock market. Higher stock prices will widen the gap between poor and rich because of richer people have more stock. Also, the gap between wage (the return of labor) and profit (the return of entrepreneurship) increases because of low-interest rate reduced the cost of borrowing.
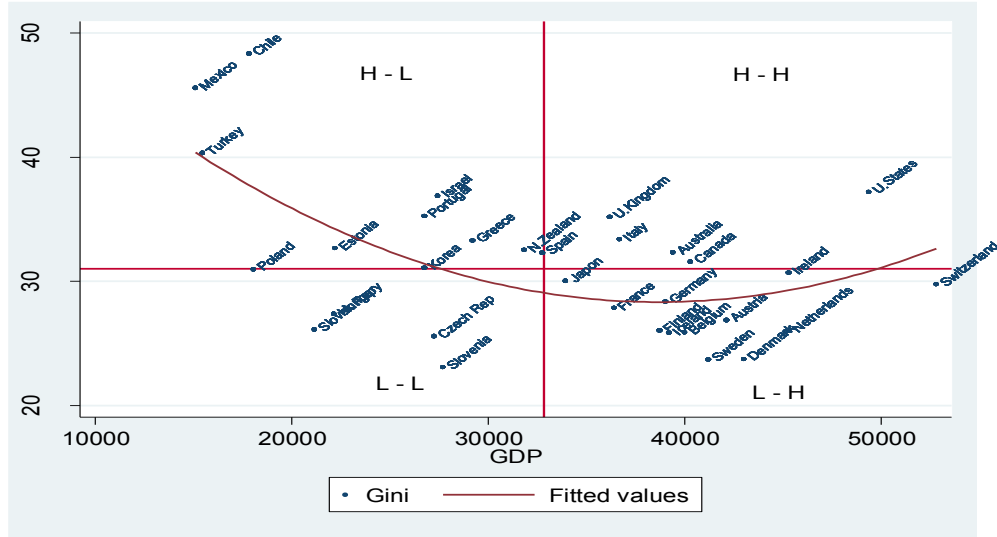
Figure 2 The Relationship Between Income Inequality and Per Capita GDP[4]

Figure 2 which confirms the "Great U-Turn" hypothesis shows that the quadratic relationship between GDP and income inequality indicates that, the relationship between Gini and per capita GDP is negative in countries like Turkey, Estonia, Korea, Japan, while on the positive side of this relationship is where countries like United Kingdom, Italy, Australia, United States. The brown axis on the figure shows the average value of Gini and per capita GDP. The upper left panel (H-L) in the figure shows that countries with low income where inequality is higher compared to the average of OECD countries. Chile, Turkey, Mexico, Israel, Portugal, Greece, etc. are located in the H-L. Both higher income and inequality countries appear in the right of the top panel (H-H). United Kingdom, Italy, Australia, Canada and the United States have been in this area. Slovakia, Slovenia, Hungary and the Czech Republic where the countries both lower inequality and income are located in the bottom left panel (L-L). Despite being the higher income with lower inequality among countries, Denmark, France, Germany, Japan, etc. are situated in the L-H section at the bottom right of the panel.

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[4] Luxembourg and Norway are not included in this figure since average of the per capita GDP of these countries is quite high compared to other countries. The figure that includes Norway and Luxembourg is located in the Appendix.

4. Conclusions

The results of dynamic panel data analysis used in this study reveals that the relationship between income inequality and per capita GDP supports the "Great U-Turn" hypothesis in OECD countries for the period of 2000-2012. While the relationship between income inequality and per capita GDP is negative at lower income levels, this relationship is positive at higher income levels. So, the evidence was obtained that as income increases, inequality, too, increases after a certain threshold. The results also indicated that as labor force in agriculture sector, technological diffusion and unemployment increases, income inequality is becoming wider. However; a higher level of education, the more interest rate and foreign direct investment has the effect of reducing income inequality.

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Appendix The Relationship Between Gini and Per Capita GDP Including Luxembourg   and Norway