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THE IMPACT OF ECONOMIC GROWTH AND TRADE OPENNESS ON INCOME INEQUALITY: AN EMPIRICAL ANALYSIS FOR TURKISH ECONOMY[1]

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Abstract: Kuznets curve hypothesis suggests that there is an inverted-U shaped relation between economic growth and income inequality. This study aims to investigate the validity of the Kuznets curve hypothesis in the sample of Turkey. This study also examines the impact of trade openness on income inequality. We use Johansen-Juselius cointegration method and Granger causality test based on vector error correction model (VECM) to test the relationships among economic growth, trade openness and income inequality. Empirical results reveal that the series used in this study are stationary at first difference. Empirical results also reveal that there is a long run relationship between the variables. This study shows evidence that the Kuznets curve hypothesis is valid for Turkish economy in the long run. This study also found out that trade openness decreases income inequality in the long run. Finally, the long run causality running from economic growth and trade openness to income inequality was detected. The results can provide some policy implications related with income inequality.

Key Words: Income Inequality, Economic Growth, Trade Openness, Cointegration, Causality, Turkey

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1. INTRODUCTION

Income distribution has been a topic of significant debate among academics and policy makers, especially in developing countries. It is widely believed that income distribution may have harmful effects on economic growth, education, health and democracy (Dabla-Norris et al., 2015: 6-7). One of the most important factors indicating socioeconomic development level of a country is distribution of total domestic income amongst individuals. Distribution of domestic income in line with the equality principle increases individual welfare, and it enhances social consensus and trust as well. However, it is not possible to achieve an absolute equality.

Economic growth, openness rate, demographic structure, wages, inequality in distribution of wealth and other social norms and traditions of the countries can result in unequal distribution of income (Nikoloski, 2013). Moreover, financial policies pursued by ruling governments have a significant influence on these inequalities (Shahbaz et al., 2007; Shahbaz & Islam, 2011).

Many researchers such as Kuznets (1955), Gallo (2002) and Voitchovsky (2005) have intensified on understanding the relationship between economic growth and income distribution. In these studies the link between ekonomik growth and income inequality are examined in the context of the Kuznets curve hypothesis implying that there exists an inverted-U shaped relationship between economic growth and income inequality. In other words, economic growth leads to a gradual degradation of the income distribution in its initial stages and, after a certain level of growth, it leads to an improvement in the income inequality. So, this study investigates this hypothesis for Turkey.

One of the main determinants of income inequality is trade openness. According to classical trade theory greater openness should increase the relative demand and prices for unskilled labour and creates a better distribution of wages in low and middle income countries. This theory implies that trade openness may decrease income inequality in developing countries. Meschi and Vivarelli (2007), Benar (2007), Faustino and Vali (2011) are among the empirical researchers examining the link between trade openness and income inequality. The present study also investigates this hypothesis for Turkish economy.

Turkey has been a developing country which has experienced significant inequalities in income distribution. Income inequality maintains its importance for Turkish economy. The main purpose of this study is to investigate the impact of economic growth and trade openness on income inequality in the sample of Turkey. Therefore, in this study the empiri-

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cal validity of Kuznets curve hypothesis suggesting that there is an inverted-U relationship between economic growth and income inequality was examined. Augmented Dickey-Fuller (ADF) (1979) and Phillips-Perron (PP) (1988) tests were applied to investigate the unit root properties of the variables used in the empirical analyses. The presence of cointegration relationship between the variables was analyzed by the Johansen-Juselius (1990) method. In addition, the causal relationships between the variables were analyzed by the Granger causality test based on vector error correction model (VECM) which was developed by Engle-Granger (1987). This study can present policy implications for Turkish economy.

The rest of the study was organized as follows: Section 2 gives a brief literature review on the factors determining income inequality. Section 3 provides an assessment of the Turkish economy. Section 4 describes empirical model and methodology used in the study. Section 5 reports the empirical results in detail. Section 6 concludes the study with some policy implications.

2. LITERATURE

2.1. Theoretical Literature

Income distribution refers to the dispersion of the income created within a certain period of time amongst individuals, social groups and production factors. The factors determining income inequality can be divided into two categories taking the functional and personal income distribution into account. Functional income distribution stands for the dispersion of the income obtained as a result of the production processes amongst the labor force performing the production, the capital, land and enterprise. The labor force receives a share through payment, salary and daily wage, whereas other factors receive a share through interest, unearned income, and profit. However, this distribution might contain an inequality within itself. For example, the share that labor receives can be divided as white collar/blue collar, or workers who are members or not members of a trade union (Çelik, 2004: 59). While functional income distribution is sufficient when an examination on individual income distribution is performed, it remains insufficient when the production factors obtain more than one income type (Tokol & Alper, 2014: 176).

Personal income distribution stands for the share received by individuals, families and groups from the total domestic income created in a country. While it is possible to obtain an insight into the general status and course of the inequalities existing in a country with the personal income distribution, it is also used in measuring income inequalities among countries and economic systems (TÜSİAD,

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2000: 16). Personal income distribution is ascertained by comparing the data obtained by classifying the household income within the rates determined. In general, the examination is carried out in 5, 10 or 20 % slices. 1% slice, which yields more detailed results, is also used. Gini coefficient and Lorenz curve are the most widely used methods in measuring the personal income inequalities. Gini coefficient measures the income inequality between 0 and 1. 0 stands for absolute equality and 1 stands for absolute inequality. Lorenz curve represents the total population on the horizontal axis and personal income percentage on the vertical axis on a diagram. In addition, its length accounts for 100%, which indicates the equality to the domestic total income of country. Absolute equality line illustrated with a 45-degree angle on the diagram indicates that the income is equally distributed throughout the country. This case is theoretical and Lorenz curve remains below the absolute equality curve. The proximity of the Lorenz curve to the absolute equality means income equality. The more distantance they have, the more unequal they are. Gini coefficient equals to the area of the triangle of the area between absolute equality line and Lorenz curve, which is situated below the absolute equality line.

Various factors play a role in income inequality. The most significant reason is the unequal distribution of wealth. The magnitude of the wealth that brings income determines the income level of those who possess the wealth and constitute the basis for the wealth creation as well. On the other hand, the wage gaps among dependent workers whose only income is their labor have a remarkable role in determining the income inequality. Personal capabilities and skills, education, experience and characteristics of the work, and labor union activities also play a significant role in determining wage gaps. Besides, demographic structure of a country and social norms and traditions are among the most important factors determining inequality. High rates of immigration and rapidly increasing population, which differ in line with demographic features of a country, contribute to the income inequality. Also, strict social norms and traditions, unemployment, gender, race, inherent skills, the number of the working family members and the number of the households, which determine the property distribution among the individuals, are significant parameters affecting the income inequality (Tokol & Alper, 2014: 179-181).

Other significant variables, which can influence the income inequity, include economic growth level and openness level of the country. Likewise, , the inverted-U shaped hypothesis put forward by Kuznets (1955) states that income inequality is depending on economic

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development level of a country. It is observed that income is relatively equal at the first phases of the development, and income inequality is projected to increase with industrialization process. Income inequality declines when the country attains a certain development level, and thus low-income segments of the society will benefit from this. Many studies carried out on income inequality take income per capita as the development criterion; however, no mixed empirical results are obtained about the impact of the income per capita on the income equality.

The most important approaches explaining the relationship between openness level of the country and income inequity are the theorems by Heckscher-Ohlin and Stolper-Samuelson. These theorems argue that those who possess the abundant factors of production in a country make profit from foreign trade; and those who possess the scarce factors of production lose in foreign trade. In other words, while openness reduces income inequity in poor countries, it increases income inequality in rich countries with abundant capital (Marrewijk, 2007: 100).

2.2. Empirical Literature

This study aims to present significant studies, which address the relationship between the factors determining income inequality theoretically. It also includes the studies investigating this relationship empirically. While some empirical studies which use time series analysis, particularly Blejer and Guerrero (1990) and Mocan (1999), focus on the impact of the inflation and unemployment rate on the income inequality, Feenberg and Poterba (1993) and Auten and Carroll (1999) concentrate on the relationship between the financial policies, especially tax rates, and income inequality.

Odekun and Round (2001) deal with the determinants of income inequality and their impact on economic growth for 35 African countries. Empirical findings indicate that the level of economic development, budget size and human resources are among the determinants of income inequality. Empirical findings also indicate that income inequality decreases economic growth. In addition, Kuznets curve hypothesis is not supported.

Li and Zou (2004) investigate the link between savings and income inequality by using panel data for 49 industrialized and developing countries over the period 1960-2001. The results reveal that there exists a weak negative relationship between the variables. The positive link between the variables is found in OECD and Asian countries.

Using annual data from 1960 to 1990, Knowles (2005) examines the relationship between economic growth and income in-

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equality through the regression analysis. The study employs Barro's growth regression model and finds a negative and statistically significant relationship between the variables.

Rebeggiani (2005) analyzes the link between economic growth and income inequality in case of Germanian economy. The empirical results of endogeneous growth model reveal that individual income determines economic growth. The empirical results also reveal that income inequality increases economic growth.

Disbudak and Suslu (2007) analyze the factors determining income inequality in the sample of Turkey by using annual data from 1963 to 1998. In this study the long run relations between the variables were estimated by ARDL bounds testing approach. The results indicated that economic growth and trade openness decrease income inequality. The results also indicated that inflation increases income inequality. It was found that the impact of trade openness on income inequality is limited.

Lee (2008) tries to estimate the relationship between economic growth and income inequality. According to the empirical results of regression analysis, the Kuznets curve hypothesis is not valid for Taiwan economy. Family structure, economic structure, political leadership and public policy are among the main causes of income inequality.

Zaman et al. (2011) explore the link between the impact of economic growth and income inequality on poverty in the context of panel data analysis covering Bangladesh, India, Nepal, Pakistan and Srilanka. The findings of panel data show that economic growth and income inequality decrease poverty.

Awe and Rufus (2012) analyze the determinants of income inequality in Nigeria.

Using Johansen cointegration method and error correction model (ECM), the study reveals that employment, inflation, GDP and social expenditures are the main determinants of income distribution. The study also reveals that there is no evidence supporting the validity of Kuznets curve hypothesis.

Ozturk (2012) investigates the link between economic development and regional inequalities in the sample of Turkey from 1965 to 2001 by applying panel data analysis. According to the results of panel regression analysis there exists an inverted-U relationship between economic growth and regional income inequality. This implies that the Kuznets curve hypothesis is valid for Turkish economy.

Aksogan and Elveren (2012) examine the links between defense, health and education

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expenditures and income inequality for Turkish economy. Using Johansen cointegration method and ECM, they reveal that economic growth and social expenditures decrease income inequality. They also reveal that defense expenditures increases income inequality.

Lee et al. (2013) examine the main determinants of income inequality in case of Korea. Classical regression analyses indicate that there exists no empirical evidence supporting the Kuznets curve hypothesis. The study reveals that investments decrease income inequality.

Nikoloski (2013) applies a dynamic panel data analysis by using income inequality data for developed and developing countries from 1962 to 2006. Panel regression results show that there exists an inverted U-curve relationship between financial sector development and income inequality. These results provide an evidence for the presence of financial Kuznets curve.

Artan and Kalayci (2014) investigate the main determinants of income inequality for 63 developed and developing countries. The results of panel data analysis show that there exists a negative link between trade openness and income inequality for both developed and developing countries. The results also show that there exists a positive link between foreign direct investment and income inequality in all countries. In addition, the level of democracy decreases income inequality in developed countries and it increases income inequality in developing countries.

Kanberoglu and Arvas (2014) estimate the relationship between financial development and income inequality for Turkish economy. Using ARDL bounds testing approach to cointegration, they find that per capita income, inflation and private sector credits decrease income inequality. The study shows that the effect of trade openness on income inequality is positive.

3. AN ASSESSMENT ON TURKISH ECONOMY

This part of the study involves the assessments on the income distribution in Turkish economy. Turkey, which aimed to achieve economic development by means of self-contained financial policies as of 1930s, has been exerting efforts towards making its economy "open" with the structural adaptation policies implemented under the influence of neo-liberal policies since 1980s. Within this process, some political practices, which include the transfer of the state financial enterprises to the private sector in line with the prevailing financial paradigm, were carried out. Although it was aimed to obtain necessary resources that enable the financial growth and social development via these transfers, they were

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not sufficient to promote economic development desired due to the insufficiency of the resources owned and financial conjecture as well as the pressure elements of the structure of the transforming society. Also, political instability and the crisis environment sweeping 1990s made it impossible to achieve the desired financial success.

In the general sense, 1980s and 1990s were the periods when the neo-liberal financial policies created undesired impacts particularly on the poor. It is seen that income inequality increased among majority of the OECD countries at this period. When the income distribution between 1980 and 1990 was examined in terms of the income groups in Turkey, it is seen that the share of the low-income and middle-income groups in the total income shrank and the share of the high-income group became larger. Within this period, Turkey comes to the fore as one of OECD counties, in which the share that the low and middle-income groups received from the total income dropped most remarkably (Candaş, 2010: 12-13).

1990-2000 is a period when a decrease was observed in the income of all income groups in the general sense. However, what was most attention grabbing about this period is that the highest rate of income loss was seen in the high-income group; and middle-income group experienced a relatively lower income loss. The loss trend continued in low-income group. It can be considered to be a period when the poor became poorer and when a medium-income group with an increased welfare level emerged (Candaş, 2010: 14-16).

It is observed that the economy policies implemented by the single-party governments in post-2000 period in Turkey, have contributed to the decline in the income equality. The analyses performed during this period by employing inequality parameters including Gini coefficient, The Average of Logarithmic Deviations, Theil Index, Half the Coefficient of Variable Square, which were prepared by using the Household Budget Analysis and Living Conditions Research data by TUIK (Turkish Statistics Institute) with the aim of measuring the income inequality, reveal similar results. Accordingly, it is observed that income inequality had a downward trend between 2002 and 2007. It is seen that in post-2007 period it has showed a horizontal trend in general. Post-2002 downward trend in income inequality most importantly resulted from that income growth created by structural changes emerged in this period not only determined the quality of the growth but also had an impact on reducing the income inequality (Selim et al., 2014: 55-56).

By using the Household Budget survey and Living Conditions Research data by TUIK, it is possible to determine the trend of the

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income inequalities by periods dividing the segments of the society into 20%. Accordingly, a decrease was observed between the income gap between the richest 20% and the poorest 20% between 2002 and 2007. It can be stated that the gap dropped from 9.5 times to 7.5 times in the aforesaid period. However, the gap did not show a downward trend in post-2007 period and a horizontal trend was observed generally. In 2010, this gap fell to 7 times. In 2011, it rose to 7.5 once again (Selim et al., 2014: 57).

2002-2007 period, in which income inequality showed a downward trend, is striking because macro financial policies were successfully implemented in conformity with the agreements made with IMF. The structural reforms within this period, in other words the trust environment created with the new economic institution and activities, caused new investments and international capital to accelerate. The recession in the structural reforms in post-2007 period also resulted in a decline in the supply side policies. This case slowed down the development pace and made it cyclical (Selim et al., 2014: 58).

Even tough minor developments were achieved in reducing the income inequality within the country during mid-2000s, it can be seen that Turkey stills ranks among the leading countries in income equality, in comparison with OECD and European Union countries. In this period, Turkey was the second worst country following Mexico among the OECD countries. A study ascertaining the income rate among EU countries between the richest and poorest 20% between 2003 and 2006 years revealed that Turkey was the top country with 9.9 times gap in 2003 and 8.1 times gap in 2006 (Candaş, 2010: 18-19).

4. EMPIRICAL MODEL AND METHODOLOGY

Li et al., (2000) and Barro (2000) use classical Kuznets curve in their studies. In other words, they include economic growth and income inequality variables. Summers and Heston (1995), and Gyimah-Brempong and Camacho (2006) use Gini coefficient that represents income inequality and a panel data model that considers foreign trade variable. In our study, we investigated the relationship between per capita real income, square of per capita real income, trade openness and income inequality and we used time series version of the panel data model used by Summers and Heston (1995), and Gyimah-Brempong and Camacho (2006) in this regard. So, the following log-linear model can be used to estimate the relationship between the variables:

$$lngini_t = \alpha_0 + \alpha_1 lngdp_t + \alpha_2 lngdp_t^2 + \alpha_3 lntr_t + \mu_t \quad (1)$$

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Where $lngini_t$ is Gini variable as an indicator of income inequality, $lngdp_t$ and $lngdp^2$ represent per capita real income and its square term respectively, and $lntr_t$ is trade openness ratio (i.e. the sum of total exports and imports of goods and services by the GDP). The residuals μ_t are assumed to be normally distributed and white noise. The present study covered annual data from 1970 to 2006.

Gini coefficient data were calculated by UTIP project team established at Texas University (http://utip.gov.utexas.edu/data.html, 2015). The data obtained by the university were recognized by the world literature and the data constitute the reference point for many researchers (Bahmani et al., 2012). The period was chosen because Gini coefficient data computed by UTIP team was calculated by 2006. It is fair to say that Gini coefficient data were calculated by using different methods and scales. Therefore, even though the data calculated by different Centers or statistical units cover the current period, it would be unfavorable to create a broad period by combining two different period data calculated by these two different methods and approximate the time series to current period. For this reason, it was found appropriate to carry out the empirical analysis within the relevant period in terms of ensuring integrity[1]. The other variables used in the study were derived from World Development Indicators (WDI) database. All the variables were employed in their logarithmic form.

The parameters a_i, i=1, 2, 3, indicate the long-run elasticity estimates of income inequality with per capita real income, square of per capita real income and trade openness. Based on the theory of Kuznets curve hypothesis, the expected sign for α_1 is positive while α_2 is negative (Barro, 2000), the expected sign for a_3 is negative (Ang, 2010). Table 1 indicates descriptive statistics of the variables. Figure 1 shows time series plots of the variables in detail.

1 Due to the limitations regarding the data calculation periods, Özdemir et al. (2011) has to analyze 1992-2007, Artan and Kalaycı (2014) has to analyze 1995-2005, Awe and Rufus (2012) has to analyze 1977-2005, Öztürk (2012) has to analyze 1965-2001 periods.

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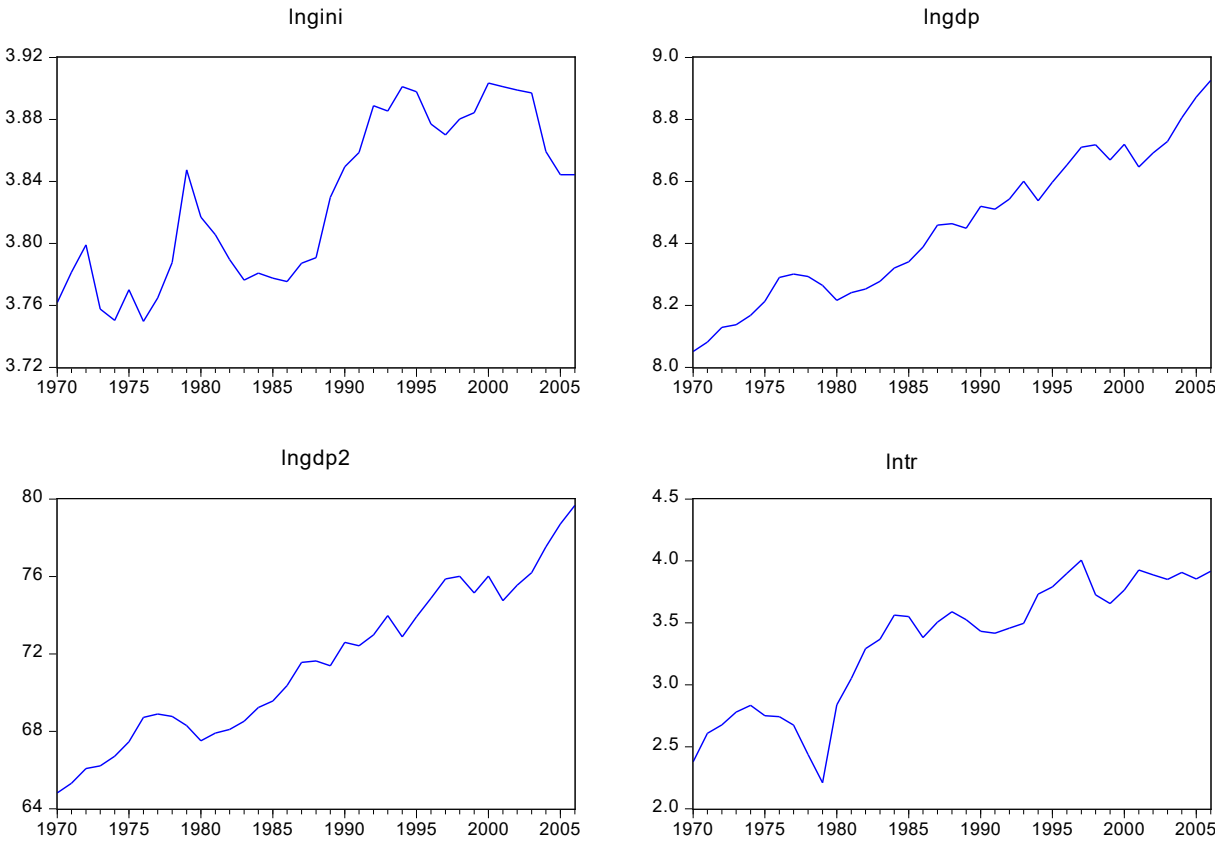
Table 1. Descriptive Statistics (Time Series Data: 1970-2006; Observations: 37)

Statistics/Variables	*lngini*	*lngdp*	$lngdp^2$	*lntr*
Mean	3.828	8.453	71.515	3.337
Median	3.829	8.459	71.555	3.497
Standard deviation	0.052	0.236	4.006	0.518
Minimum	3.749	8.051	64.819	2.208
Maximum	3.903	8.925	79.668	4.006
Skewness	0.053	0.136	0.174	-0.603
Kurtosis	1.475	1.943	1.964	2.081
Normal distribution	3.600	1.836	1.840	3.549
(*p*-value)	0.165	0.399	0.398	0.169

Figure 1. Time Series Plots Of The Variables



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It is particularly important for the series to be stationary in order to determine the relationship between the variables in time series analyses correctly. The first step of the cointegration, in other words long-term balance relationship analysis, consists of investigating the integration level of the variables. ADF and PP tests are among the most widely used unit root tests in the literature. PP test was used in our study due to some of the drawbacks that ADF unit root test has. PP test is the improved version of the ADF and it is accepted that error terms have a normal distribution and do not have heteroscedasticity and serial correlation (Awe & Rufus, 2012).

Upon ascertaining the integration degrees of the series with unit root tests, the second step is to investigate whether or not there is a long-term balance relationship between the variables. In fact, it is the cointegration analysis, which is an appropriate method in order to overcome spurious regression problem. Cointegration becomes important when two non-stationary variables become cointegrated (Mishra, 2011). Johansen-Juselius (1990) cointegration method is usually employed to investigate the presence of the long run relationship between the variables. This cointegration test is based on the VAR model as follow:

$$\Delta y_t = \mu + \Pi y_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta y_{t-i} + B z_t + \varepsilon_t \qquad (2)$$

where $\Pi = \sum_{i=1}^{p} A_i - I$ and $\Gamma_i = -\sum_{j=i+1}^{p} A_j$. If the coefficient matrix Π has reduced rank $r<n$, then there exist nxr matrices α and β each with rank r such that $\Pi = \alpha\beta'$ and $\beta' y_t$ is stationary. r represents the numbers of cointegrating relationships, the elements of α are known as the adjustment parameters in the vector error correction model, and each column of β denotes a cointegrating vector. Johansen-Juselius developed two different tests such as the trace test and maximum eigenvalue test. These tests can be expressed as follows:

$$J_{iz} = -T \sum_{i=r+1}^{n} \ln(1 - \hat{\lambda}_i) \qquad (3)$$

$$J_{max} = -T ln(1 - \hat{\lambda}_{r+1}) \qquad (4)$$

Here T is the sample size and $\hat{\lambda}_i$ is the i^{th} largest canonical correlation. In the trace test the null hypothesis of r cointegrating vectors is tested against the alternative hypothesis of n cointegrating vectors. On the other hand, the maximum eigenvalue test tests the null hy-

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pothesis of *r* cointegrating vectors against the alternative hypothesis of *(r+1)* cointegrating vectors. Johansen-Juselius procedure is very sensitive to the lag length. Therefore, AIC and SBC criteria are used to determine optimal lag length through the VAR model.

After determining the presence of a cointegration between the variables, in the third the VECM approach is employed to investigate the dynamic relationships between the variables. The VECM is based on restricted VAR model and presents an evidence of the long run relationship. In this method error correction term (ECT) derived from the long run model is integrated to the VAR model as an additional variable (Mishra, 2011). In this study, the following VECM equation was used:

$$\Delta lngini_t = \beta_0 + \sum_{i=1}^{p} \beta_{1i} \Delta lngini_{t-i} + \sum_{i=1}^{p} \beta_{2i} \Delta lngdp_{t-i} + \sum_{i=1}^{p} \beta_{3i} \Delta lngdp_{t-i}^2 + \sum_{i=1}^{p} \beta_{4i} \Delta lntr_{t-i} + \gamma ECM_{t-1} + \varepsilon_t \quad (5)$$

where, Δ is the lag operator and ECT_{t-1} is the lagged error correction term derived from the long run relationship; ε_t are error terms assumed to be N (0,σ). This term is expected to be negative and statistically significant.

In the final step, the causal linkages between the variables can be examined. The Johansen-Juselius cointegration approach does not investigate the causal relationships between the variables. Therefore, this study uses Granger causality test based on VECM approach to investigate the causal relations between the variables. In this causality method error correction term (ECT_{t-1}) derived from the long run model is added to the classical VAR system as an additional variable. The main feature of this approach is that it investigates both long and short run causality. The equations of the VECM Granger causality approach is expressed as follows:

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$$(1-L)\begin{bmatrix}\ln gini_{2t}\\ \ln gdp_t\\ \ln gdp_t^2\\ \ln tr_t\end{bmatrix}=\begin{bmatrix}\lambda_1\\ \lambda_2\\ \lambda_3\\ \lambda_4\end{bmatrix}+\sum_{i=1}^{p}(1-L)\begin{bmatrix}\alpha_{11i}\alpha_{12i}\alpha_{13i}\alpha_{14i}\\ \alpha_{21i}\alpha_{22i}\alpha_{23i}\alpha_{24i}\\ \alpha_{31i}\alpha_{32i}\alpha_{33i}\alpha_{34i}\\ \alpha_{41i}\alpha_{42i}\alpha_{43i}\alpha_{44i}\end{bmatrix}$$

$$x\begin{bmatrix}\ln gini_{t-1}\\ \ln gdp_{t-1}\\ \ln gdp_{t-1}^2\\ \ln tr_{t-1}\end{bmatrix}+\begin{bmatrix}\alpha\\ \beta\\ \phi\\ \varphi\end{bmatrix}ECT_{t-1}+\begin{bmatrix}\varepsilon_{1t}\\ \varepsilon_{2t}\\ \varepsilon_{3t}\\ \varepsilon_{4t}\end{bmatrix}(6)$$

(6)

Where, (1-L) is the lag operator. ε_{1t}, ε_{2t}, ε_{3t} and ε_{4t} are the residual terms. The existence of the long run causality between the variables is determined by a significant *t*-statistic on the coefficient of ECT_{t-1}. The short run causality is determined by a significant *F*-statistic on the first differences of the variables (Tiwari et al., 2013).

5. EMPIRICAL FINDINGS

In this study firstly the unit root tests were applied to examine the unit root properties of the variables. Here, ADF and PP tests were employed. Table 2 presents the unit root results of the variables in their level and first difference. According to the results the variables have unit root problem at level. The variables were found to be stationary at first difference. This means that the variables were integrated at *I*(1). The results led us to apply the Johansen-Juselius cointegration test to investigate the existence of the long run relationship between the variables.

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Table 2. The Results Of Unit Root Test

Variables	ADF test statistic	PP test statistic
lngini	-1.622(0)	-1.837(1)
lngdp	-2.299(0)	-2.428(1)
$lngdpgdp^2$	-2.194(0)	-2.322(1)
lntr	-2.272(0)	-2.272(0)
Δlngini	-5.192(0)***	-5.192(0)***
Δlngdp	-5.865(0)***	-5.865(0)***
$Δlngdp^2$	-5.893(0)***	-5.893(0)***
Δlntr	-5.002(0)***	-4.949(5)***

Notes: The model with constant and trend is used for unit root analysis. Figures in parentheses are the optimal lag orders. *** denotes the significant at 1% level of significance.

After examining the unit root properties of the series the optimal lag length was determined for Johansen-Juselius cointegration test through the VAR model. Table 3 reports selection of the optimal lag length. The optimal lag length was selected as 4. The diagnostic tests which include AIC, R^2, autocorrelation lm test, heteroscedasticity χ^2 test and Jarque-Bera normality test show that the VAR model is robust.

Table 3. Optimal Lag Length Selection

Lag length	AIC	R^2	Outocorrelation lm test	Heteroscedasticity χ^2 test	Normality J-B test
1	-4.941	0.880	17.810(0.335)	98.929(0.013)	24.495(0.001)
2	-4.909	0.903	19.114(0.262)	149.664(0.272)	13.700(0.089)
3	-5.073	0.937	16.935(0.389)	224.913(0.228)	14.902(0.061)
4*	-5.024	0.947	14.722(0.545)	282.689(0.443)	5.848(0.664)

Notes: * indicates the optimal lag length. Figures in parentheses are *p*-values.

The trace and maximum eigenvalue tests developed by Johansen-Juselius were used to test the presence of a long run relationship between per capita real income, square of per capita real income, trade openness and income inequality. The empirical results of these tests are reported in Table 4. The find-

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ings showed that there exists a cointegration vector. This means that there exists a long run relationship between the variables.

Table 4. The Results of Johansen-Juselius Cointegration Test

Null hypothesis	Alternative hypothesis	Trace test statistic	Critical value (5%)
R=0	R≥=1	54.405	47.856**
R≤1	R≥=2	16.072	29.797
R≤2	R≥=3	6.672	15.494
R≤3	R≥=4	0.047	3.841
Null hypothesis	Alternative hypothesis	Maximum eigenvalue test statistic	Critical value (5%)
R=0	R≥=1	38.332	27.584***
R≤1	R≥=2	9.400	21.131
R≤2	R≥=3	6.625	14.264
R≤3	R≥=4	0.047	3.841

Notes: Test statistics contain the results of the model with constant. *** and ** denote the significant at 1% and 5% level of significance, respectively.

In consideration of normalized cointegration vector, the long run equilibrium relationship between the variables is expressed as follows:

$$lngini_t = -53.778 + 13.079 lngdp_t - 0.734 lngdp_t^2 - 0.141 lntr_t$$

(-3.777) (3.611) (4.907)

The coefficients of all explanatory variables were found to be statistically significant. The results show that there exists a positive link between per capita real income and income inequality. The results also show that there exists a negative long run relationship between the square of per capita real income and income inequality. These results support the validity of Kuznets curve hypothesis for Turkish economy. These results are in line with Öztürk (2012) and Lee et al. (2013). On the other hand, trade openness affects negatively income inequality in the long run. This finding is consistent with Disbudak and Suslu (2007), Artan and Kalayci (2014).

The VECM provided information about short run estimates in detail. Table 5 reports the re-

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sults of VECM with diagnostic tests. The diagnostic tests indicate that VECM is robust. According to the empirical results, there exists no statistically significant relationship between the variables in the short run. However, error correction term (ECT_{t-1}) was found to be statistically significant with negative sign. This implies that there exists a long run relationship between the variables

Table 5. The Estimation Results Of VECM Approach

Variables	*Δlngini*	*t-statistic*
Constant	-0.006	-0.944
Δlngini(-1)	-0.037	-0.194
Δlngini(-2)	0.127	0.672
Δlngini(-3)	0.134	0.721
Δlngdp(-1)	3.640	1.028
Δlngdp(-2)	1.546	0.408
Δlngdp(-3)	6.472	1.665
$Δlngdp^2$(-1)	-0.223	-1.079
$Δlngdp^2$(-2)	-0.090	-0.406
$Δlngdp^2$(-3)	-0.367	-1.609
Δlntr(-1)	0.044	1.338
Δlntr(-2)	0.039	1.509
Δlntr(-3)	0.029	1.063
ECT_{t-1}	-0.339	-2.692**
Diagnostic tests		
R^2	0.595	
Adjusted-R^2	0.319	
F-statistic	2.153(0.062)*	
Normality test	0.660(0.718)	
Outocorrelation	0.562(0.579)	
Heteroscedasticity	0.219(0.642)	
Functional form	0.089(0.768)	

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Notes: Optimal lag length is selected using AIC. Figures in parentheses are *p*-values. ** and * denote the significant at 5% and 10% level of significance, respectively.

The direction of causality between the variables is was determined by the Granger causality test based on VECM. The Granger causality test results are reported in Table 6. According to the findings, the coefficient of ECT_{t-1} was negative and statistically significant. This implies that there exists a causality running from per capita real income, square of per capita real income and trade openness to income inequality in the long run. This also implies that economic growth and trade openness cause income inequality in the long run. In the short run there exists a causality running from per capita real income and square of per capita real income to income inequality. These causality findings reveal that the Kuznetz curve hypothesis is valid for Turkish economy in the long and short runs.

Table 6. The Results Of Granger Causality Test

Dependent variable	Short run causality (*F*-statistic)			Long run causality (*t*-statistic)
	Δlngdp	*Δlngdpgdp²*	*Δlntr*	ECT_{t-1}
Δlngini	2.600(0.082)*	2.494(0.090)*	1.111(0.369)	-2.692(0.014)**

Notes: Optimal lag length is selected using AIC. Figures in parentheses are *p*-values. ** and * denote the significant at 5% and 10% level of significance, respectively.

6. CONCLUSION AND POLICY IMPLICATIONS

Turkey has been one of the developing countries, which experiences significant imbalances in income distribution. Therefore, income inequality maintains its importance. This study empirically investigates the determinants of income inequality in case of Turkish economy. Specifically, the impact of per capita real income, square of per capita real income and trade openness on income inequality were examined by the cointegration and causality analyses. In addition, the validity of Kuznets curve hypothesis suggesting that there exists an inverted-U relationship between economic growth and income inequality was analyzed. For this purpose, Johansen-Juselius cointegration method and Engle-Granger causality test based on VECM approach were employed.

The empirical results of the study can be summarized as follows. Firstly, all the variables were stationary at their first difference implying that the series are integrated at *I*(1). This result led us to apply Johansen-Juselius coin-

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tegration approach in examining the long run relationship between the variables. Secondly, cointegration was found between the variables. This means that there exists a long run relationship between the variables. Thirdly, the coefficients of per capita real income and square of per capita real income were found to be positive and negative, respectively. This finding reveals that the Kuznets curve hypothesis is valid for Turkey in the long run. In addition, there exists a negative link between trade openness and income inequality meaning that trade openness decreases income inequality in the long run. Finally, in the long run a Granger causality running from per capita real income, square of per capita real income and trade openness to income inequality was determined. In the short run there exists a Granger causality running from per capita real income and square of per capita real income to income inequality.

The findings show that economic growth is seen as the main factor determining income inequality in Turkey. The government should reduce income inequality without compromising economic growth target. Within this context, if a sustainable improvement is projected in income distribution, it is evident that the economic development performance by the government within the last 12 years must be sustained. In addition, trade openness is the other factor affecting income inequality in Turkish economy. Therefore, the government should display a satisfactory performance in foreign trade and especially export in order to maintain the positive developments in income distribution. Additionally, the steps to be taken by the government to achieve low inflation, low interest and high employment rate should reduce the income inequality in Turkish economy.

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EKONOMİK BÜYÜME VE TİCARİ DIŞA AÇIKLIĞIN GELİR EŞİTSİZLİĞİ ÜZERİNDEKİ ETKİSİ: TÜRKİYE EKONOMİSİ İÇİN AMPİRİK BİR ANALİZ

Öz: Gelir dağılımı teorik ve ampirik literatürde uzun zamandır tartışılan sosyoekonomik bir olgu olarak kabul edilmektedir. Gelir dağılımı gelişmekte olan ekonomilerin en önemli ilgi alanlarından birisi olarak varlığını sürdürmektedir. Yapılan ampirik araştırmalar gelir eşitsizliğinin en önemli belirleyicileri arasında ekonomik büyüme ve ticari dışa açıklığın yer aldığını ortaya koymaktadır. Türkiye ekonomisi de diğer gelişmekte olan ülkeler gibi gelir dağılımında ciddi eşitsizliklerin yaşandığı bir ülke olarak ekonomik kalkınmasını hızlı bir şekilde sürdürmektedir. Bu çalışmada Türkiye ekonomisinde gelir dağılımı ve gelir eşitsizliğinin belirleyicileri üzerinde durulmaktadır. Literatürde Kuznets eğrisi hipotezi olarak bilien teori, ekonomik büyüme ile gelir eşitsizliği arasında ters-U şeklinde bir ilişkinin varlığını öne sürmektedir. Bu çalışmanın temel amacı, Kuznets eğrisi hipotezinin (yani ekonomik büyümenin gelir eşitsizliği üzerinde başlangıçta pozitif, belirli bir gelişme düzeyinden sonra ise negatif etkisinin olduğu hipotezinin) geçerliliğini Türkiye ekonomisi örneğinde araştırmaktır. Bu çalışma aynı zamanda ticari dışa açıklığın gelir eşitsizliği üzerinde negatif bir etkiye sahip olduğu hipotezini incelemektedir. Böylece çalışmanın temel amacı ekonomik büyüme ve ticari dışa açıklığın gelir eşitsizliği üzerindeki etkisini analiz etmektir. Burada her iki hipotezin test edilmesinde 3 aşamalı bir ampirik metodoloji tercih edilmiş ve uygyulamaya konmuştur. İlk aşamada ekonomik büyüme, ticari dışa açıklık ve gelir eşitsizliği değişkenlerinin durağanlık özellikleri incelenmiştir. Burada ADF ve PP birim kök testleri kullanılmıştır. PP birim kök testinin ADF testine göre daha güçlü sonuçlar verdiği bilinmektedir. İkinci aşamada ekonomik büyüme, ticari dışa açıklık ve gelir eşitsizliği değişkenleri arasında bir eşbütünleşme yani uzun dönem denge ilişkisinin olup olmadığı Johansen-Juselius eşbütünleşme tekniği ile araştırılmıştır. Bu eşbütünleşme tekniği literatürde en sık kullanılan metodlardan biridir. Bu tekniğin kullanılmasının temel koşulu değişkenlerin birinci farklarında durağan olmasıdır. Aksi takdirde bu metodu kullanmak mümkün değildir. Johansen-Juselius eşbütünleşme yaklaşımı iz testi ve maksimum öz değer testi olmak üzere iki test istatistiği geliştirmiştir. İz testinde r tane eşbütünleşme vektörünün olduğunu ifade eden sıfır hipotezi n tane eşbütünleşme vektörünün olduğu alternatif hipoteze karşı test edilir. Maksimum öz değer testinde ise r tane eşbütünleşmenin olduğu sıfır hipotezi r+1 eşbütünleşme vektörünün olduğu alternatif hipoteze karşı test edilir. Burada VAR modeli yardımıyla optimal gecikme uzunluğu AIC ve SBC kriterleri ile belirlenebilir. Dolayısıyla bu eşbütünleşme tekni-

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ği hem uzun dönem denge ilişkisinin olup olmadığını test ederken aynı zamanda değişkenlerin uzun dönem katsayılarını tahmin eder. Üçüncü aşamada ekonomik büyüme, ticari dışa açıklık ve gelir eşitsizliği değişkenleri arasında nedensellik ilişkilerinin yönü araştırılmaktadır. Vektör Hata Düzeltme Modeline dayalı Granger nedensellik testi bunun için kullanılan yöntemdir. Bu nedensellik testinin temel özelliği hem kısa hem de uzun dönem nedenselliğinin varlığı hakkında bilgi sunmasıdır. Bu metodolojide uzun dönem denge ilişkisinden elde edilen Hata Düzeltme Terimi klasik VAR modeline ilave bir değişken olarak eklenir. Burada Hata Düzeltme Terimi katsayısının anlamlı t-istatistiği açıklayıcı değişkenlerden bağımlı değişkene uzun dönem nedenselliğini açıklar iken bağımsız değişkenlerin farklarının gecikmelerinin bir bütün olarak anlamlı F-istatistiği ise kısa dönem nedenselliğinin varlığını açıklamaktadır. ADF ve PP birim kök testlerinin sonuçları her bir değişkenin düzey değerlerinde durağan olmadığını birinci farklarının alınmasından sonra durağan hale geldiklerini dolayısıyla değişkenlerin bütünleşme düzeyinin 1 olduğunu ortaya koymaktadır. Bu sonuç Johansen-Juselius eşbütünleşme tekniğinin kullanılmasına izin vermektedir. Bu eşbütünleşme testi için gerekli olan optimal gecikme uzunluğu VAR modeli yardımıyla 4 olarak tespit edilmiştir. Johansen-Juselius'un geliştirdiği öz ve maksimum öz değer test istatistiği sonuçlarına göre ekonomik büyüme, ticari dışa açıklık ve gelir eşitsizliği değişkenleri arasında bir uzun dönem denge ilişkisi söz konusudur. Değişkenlerin uzun dönem katsayılarının tahmin sonuçları kişi başına reel gelir ile gelir eşitsizliği arasında pozitif ve istatistiki olarak anlamlı bir ilişkinin varlığını göstermektedir. Sonuçlar aynı zamanda kişi başına reel gelirin karesi ile gelir eşitsizliği arasında ise negatif ve istatistiki olarak anlamlı bir ilişkiyi ifade etmektedir. Bu sonuçlar uzun dönemde Kuznet eğrisi hipotezinin geçerli olduğunu yani ekonomik büyüme ile gelir eşitsizliği arasında önce pozitif daha sonra ise negatif bir ilişkinin varlığı ortaya çıkmaktadır. Uzun dönem sonuçları aynı zamanda ticari dışa açıklık ile gelir eşitsizliği arasında negatif ve istatistiki olarak anlamlı bir ilişkinin varlığını kanıtlamaktadır. Yani ticari dışa açıklık uzun dönemde gelir eşitsizliğini azaltmaktadır. Hata Düzeltme Katsayısının negatif ve istatistiki olarak anlamlı bulunması değişkenler arasında uzun dönem ilişkisinin varlığını kanıtlar niteliktedir. Granger nedensellik test sonuçlarına göre uzun dönemde ekonomik büyüme ve ticari dışa açıklık değişkenlerinden gelir eşitsizliğine doğru bir nedensellik tespit edilmiştir. Kısa dönemde ise ekonomik büyümeden gelir eşitsizliğine doğru bir nedensellik belirlenmiştir. Ampirik sonuçlar ekonomik büyüme ve ticari dışa açıklığın Türkiye ekonomisinde gelir eşitsizliğinin temel belirleyicileri olduğunu ortaya koymaktadır. Bu çerçevede bazı politika önerileri sunmak mümkündür. Hükümet ekonomik büyümeden taviz vermeden gelir eşitsizliğini azaltmanın yollarını aramalıdır. Son 12 yılda gösterilen büyüme

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performansının sürdürülmesi gerekmektedir. Ayrıca dış ticaret alanında özellikle de ihracat alanında daha reel teşvikler ile ihracat performansının geliştirilmesi gerekmektedir. Bunların yanısıra düşük enflasyon, düşük faizler ve yüksek istihdam düzeyinin gerçekleştirilmesi gelir eşitsizliğinin azaltılmasına yardımcı olacaktır.

Anahtar Kelimeler: Gelir Eşitsizliği, Ekonomik Büyüme, Ticari Dışa Açıklık, Eşbütünleşme, Nedensellik, Türkiye