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Real Interest Rate and its Effect on Income Inequality

Reel Faiz Oranı ve Gelir Eşitsizliği Üzerindeki Etkisi

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ABSTRACT

Clarifying the factors for continually increasing income inequality is important to maintain fairness. This study, seeking to fulfil this objective, examines nine developed countries for the period of 2005-2015 and five developing countries for the period of 2003-2013. Utilizing panel data techniques, the study finds that where the price level of per capita investment is dependent variable of income distribution in developing countries, it exhibits a 5 pct-significance correlation. The real interest rate has no significant effect upon the income distribution variable. In developed countries, the human capital and real interest rate variable has a significant effect upon income distribution. Increase in human capital makes the income distribution fairer whereas increase in the real interest rate disrupts income equality.

Keywords: Income justice, real interest rate, interest, inequality, human capital, developed and developing countries
Jel Code: D63, E43, J24

ÖZ

Sürekli artan gelir eşitsizliğinin faktörlerini netleştirmek, adaleti sağlamada etkin olmak açısından önemlidir. Bu amaç doğrultusunda yapılan bu çalışma, 2003-2013 yılları arası gelişmekte olan 5 ülke ve 2005-2015 yılları arası gelişmiş 9 ülkeyi incelemektedir. Panel veri teknikleri kullanılarak yapılan çalışmada gelişmekte olan ülkelerde kişi başı yatırımın fiyat seviyesi gelir dağılımı değişkeninin bağımlı değişken olduğu durumda %5 düzeyinde anlamlı bir ilişkiye sahiptir. Reel faiz oranı değişkeni ise gelir dağılımı değişkeni üzerinde anlamlı bir etkiye sahip değildir. Gelişmiş ülkelerde ise beşeri sermaye ve reel faiz oranı değişkeninin gelir dağılımı üzerinde anlamlı bir etkisi vardır. Beşeri sermayede meydana gelecek artış gelir dağılımı adaletini daha adaletli hale getirmekte iken reel faiz oranında meydana gelen artış gelir dağılımı adaletini bozmakta daha adaletsiz kılmaktadır.

Anahtar kelimeler: Gelir adaleti, reel faiz oranı, faiz, eşitsizlik, beşeri sermaye, gelişmiş ve gelişmekte olan ülkeler
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1. Introduction

Preparing a legal basis for concepts seen as social problems and applying the necessary measures at the right time and place make the problems more vulnerable in crisis situations and improve the performance of the solution (Şimşek, Bayındır, & Ustaoğlu, 2017). The concept and practice of interest has been part of a fierce debate in legal texts and social interactions throughout the history of mankind. It has become an indispensable part of commercial and daily life because it contributed to the facilitation of monetary relations and appeared to be a convenient tool and means of meeting financial needs. Societies have remained distant to the interest-based financial tools in early stages of the history due to the social problems it caused; however, they were unable to be successful in taking it out of the economic life. For the greater part of history, interest has been seen as an instrument that disrupts social justice and income equality because it worsens the income gap. In the times of the Sumerians, temples and the clergy wielded interest as a means of persecution and pressure upon the free people. The Assyrians, who were actively engaged in commercial activities, and the ancient temples relied on interest for the purpose of exploitation through rigid practices. The practices of slavery caused by the extensive use of interest in commercial activities reveal the magnitude of income inequality in certain times of history. The Roman Empire era offers historical data to better understand the disruption interest has caused in terms of deepening income inequality. A review of the legal texts from ancient times reveals that Hammurabi's legal initiatives contain sanctions and measures to address income inequality that interest has caused. These measures and practices that were not limited to Hammurabi have been discussed extensively in other societies and administrations. Particularly in periods and societies where the theological base was pretty strong, the relationship between interest and income equality has been a major talking throughout history.

Modern time economic theories have seen interest as an indispensable instrument of economic activities. The institutionalization of the practice of interest has played a major role in its rise. Even thinkers who agree that it disrupts social cohesion and social justice failed to offer an alternative towards regulating the borrowing relations. The problem of income inequality, though not a problem of ancient times only, appears to be an important issue in contemporary times as well in conjunction with the issue of interest. From the 1980s onwards in particular, the income inequality has attracted a great deal of attention as a major problem and empirical works have been conducted to address this issue in a scholarly manner. For instance, during the 1980-2014 period in the US, as real interest rates approximate zero, income inequality has gotten worse. In this period, 10 pct of the total income held 1 pct of the wealthiest has increased to 20 pct (Piketty, 2018). This study reviews the link between income inequality and real interest rate with reference to 5 developing and 9 developed countries.

2. Income Inequality and Concept of Interest

The concept of income inequality requires a comprehensive approach as it cannot be explained by reliance on a general theoretical framework that would identify it or address the problems it may have caused. Even though the concept refers to lack of equality, the concept points to a state of affairs where income is not equal among a certain group in the literature of economics. This notion, often associated with connotations such as deprivation and justice, holds an ethical value as well. In his seminal book, Discourse on the Origin and Basis of Inequality Among Men, Rousseau (2016) notes that in the transition of the individuals from a primitive state model to a society where private property is promoted and protected, the need and efforts of the people for adaptation to the process and identification of roles within the society led to inequalities and diversities among the people. Income inequality appears to be a result of this adaptation and identification of individual roles and it is understood as a combination of economic and social activities that affect the individuals and populations at the same time. This set of economic and social activities also determine the requirements for a certain income distribution among the individuals. The level of inequality in the society is not a result of social policies, taxation policies or economic development alone, but is also a collective idleness brought about by the personal decisions, efforts and productivity of individuals (Charles-Coll, 2011). Modern societies have developed various means and practices to maintain income equality which has become a major debate in recent decades. Studies focusing on factors that disrupt income equality offer solutions on how to achieve fairness in income distribution. It is also possible to observe similar attempts in different stages of human history. Attempts by Hammurabi in ancient times to achieve income fairness through legal means is a good example of this. Likewise, Islam offers an alternative solution in the form of alms-giving which holds wealthy people responsible for the net assets they hold in possession. Alms-giving is focused on idle wealth and assets and thus discourages accumulation of capital and because it does not attach any form of responsibility to capital used in production, this practice encourages investment and employment. Given that only a small fraction of the wealth is part of the responsibility, the practice also promotes savings as well. Alms is, according to the Islamic tenets, only given to the poor and the needy who are ranked at the bottom of the income inequality scale, thus, it has a positive and corrective effect on addressing the income inequality (Aydın, 2016). Most Muslims do not have a sensitive attitude to the interest ban. However, there is no objection by the average Muslims or Islamic sects and groups, regarding the prohibition of interest (Bayındır & Şimşek, 2019). One major reason for the prohibition of interest in Islam is the pursuit of addressing income inequalities and unfair profit-making. The practice of alms-giving and the interest ban together constitute a comprehensive attempt of dealing with the problem of income unfairness. Chapra (2016)

explains the efficiency of income justice by reference to the premise that the needs of the society are met, that all members of the society have a decent income and that income and wealth is distributed fairly in the society. In case these requirements are met, he further notes that economic growth and stability will become more balanced. It is also a known fact that there are huge differences between the developed countries in the world in terms of income distribution. There is a direct link between the level of development and the income level in a country. The level of development is a factor on income distribution, however, due to poor policies, it may also become disruptive to the income justice. There are also some countries that rely on taxation policies and social policies to address income inequality problem. A review of the interest rates of these countries reveal that they generally rely on low rates. All these indicators encourage the scholars to examine the link between interest rates and income distribution.

In the literature, interest has been treated as part of distribution theory from the classical era to the time of Keynes. If economy is taken in reference to four manufacturing groups, labor class receive wages whereas land owners are entitled to rent. The entrepreneurs make profit whereas capital holders earn interest. All these are factors of income (Conard, 1959). If we review the interest as a functional component of income distribution, we conclude that the entrepreneur make profit out of the capital he uses while the capital holder makes interest revenue by lending his money. The reason the holder of capital wants to earn interest is because the entrepreneur who would use the money he lends will make profit. The holder of capital gives up on the profit, utility and pleasure out of using his capital by lending it to others. Interest is the price for this transaction (Ergin, 1981). Keynes, on the other hand, offers a different approach. According to Keynes, interest is nothing more than a monetary phenomenon and is a means of payment for the utilization of money. The Keynesian approach towards the interest shows that he reviews money together with production and employment. Thus, the interest rate is relevant to investments and investments are of importance in determining the size and level of employment (Dillard, 1957). Siddiqi (2002) presents a different approach on interest, arguing that the contemporary studies ignore the instability of the system and for this reason, the society is unable to experience an effective distribution of sources and noting that interest is a burden for the entrepreneurs and workers and that it should be viewed as a source of wealth for the capital holders. As a result of there being no mechanism for justice such as profit-loss sharing, labor and risk-taking in this order, the income distribution between the upper and lower segments of the society results in a serious income inequality.

If we attempt to review the subject with reference to interest rate and income distribution, our theoretical argument will be further clarified. It is expected that a neutral monetary policy will have one significant effect in terms of real interest rate in the long term. Galli and

Hoeven (2001) note that in monetary neutrality, the monetary policy activities have no real effect upon the real interest rate in the long term, that in the short term, nominal interest rate declines in line with the expected inflation and that real interest rates go back to normal values. For this reason, the short-term negative effect upon net debtors is reversed and net debtors will be better off whereas net lenders will not in the long term. To this end, the monetary policy will have no long-term effect upon income distribution through interest rates. However, in case the initial stages of the high inflation rates are addressed successfully via proper decisions, it also affects the real interest rates which will decline in the long run. This process which will clear the net debtors off the inflation will make the net lenders lose and create a fairer income distribution.

3. Literature Review

Literature focused on the link between interest rates and income inequality is mostly of qualitative. In addition, it is fair to argue that literature in this field falls short to offer scientific and empirical insights. Although there is no single approach to review the interest rate and income inequality interaction, it is hard to speak of a dominant theoretical position and premise in the literature. There are only a few studies that offer plausible explanations. The first account on this subject has been published by Galor and Zeira (1993). The study that analyzes the role of macroeconomic income distribution by making investment on human capital shows that the distribution of wealth significantly affects total economic activity. Growth is relevant to the percentage of the individuals who hold huge sum of wealth and are expected to make investment on human capital. The study, which in general proves that wealth and income distributions are macroeconomically related, does not however focus solely on interest rates. But the authors further note that the quick decline in interest rates in the world affects wealth and income distribution. This view can be taken as a first for the studies on interest rate and income inequality. A study that followed the footsteps of these authors was conducted by Battisti, Fioroni, and Lavezzi (2014). This study which reviews the growth model of Galor and Zeira in terms of the results associated with the decline in the interest rates in the world notes that in a theoretical model, decline in the interest rate in the world, depending on the initial requirements and conditions of the country, has a different effect upon the income inequality within the country. The decline in global interest rates and the increase in the global income polarizations cover the period of 1985-2005. The model estimates for the same period that inequality declines initially in poor countries and increases in wealthier ones. However, the estimated relations between inequality and human capital accumulation are different in poor and wealthy countries, showing significantly negative results only in the latter. In general, the study shows that global interest rate does not have a determinative effect upon global polarization.

Lancastre (2016), more specifically, pays attention to the real interest rates and income inequality and reviews the relationship between income inequality and real interest rates, the marginal borrowing and heterogenous population's lifelong income by the ratios of savings. Analyses run in the study to show how growing income inequality reduces the real interest rate feature that the borrowing ratio of the wealthy is lower than the ratio of the poorer. The study further shows that the savings for future generations inherently increases along with lifelong income and promotes the expansion of savings through a channel of heirs which eventually lead to greater inequality also notes that the marginal saving ratio of the wealthier is higher compared to the saving ratio of the poorer.

Berisha, Meszaros, and Olson (2018), employing a different perspective and utilizing the past household debt data in the US by Philippon (2015), review the linkage between interest rates, stock exchange, household debts and income distribution. The study relies on the generalized variance decompositions and generalized impulse reply models by Diebold and Yılmaz (2012). The findings reveal that the increases in stock exchange and household debts contribute to income inequality. In addition, there is a negative and statistically significant relationship between interest rates and income inequality. The results suggest that the wealthiest make their revenues mostly out of the assets vulnerable to the interest rate.

Çetin and Gün (2013), in an analysis on income components and income inequality in Turkey, measured the impact of interest on income inequality. The study, done with Shorrocks Decomposition Analysis, examines the contributions of main and low income components on both household and individual bases upon income inequality in Turkey. The authors, in their study covering a period of 2002-2009, argue that interest revenue is the income component that makes the greatest contribution to the income inequality. Noting that this is more visible in times of crisis, the authors further underline that the contributions by interest, profit and rent are greater than the contributions by wages and transfer revenues.

Maraşlı (2016), on the other hand, approaches the matter from a different perspective with reference to Islamic economics. I n his study where he notes that interest is banned by Allah and that it has significant impact upon social justice, he reviews the link between real interest rate and income inequality to measure the impact of interest rate on social justice. Noting that income inequality is something caused by the unequal distribution of the wealth, revenues and assets, the author states the unequal and unfair distribution of income creates different segments in the society and negatively impacts upon social justice. In the analyses in the study, the changes in the real interest rate leads to disruptions in income equality and thus social justice. The study further concludes that both low and high interest rates may have a negative effect upon the income distribution, adding that it is the interest itself that generates the inequalities.

Brückner, Gerling, and Grüner (2010) adopt a more specific approach instead of focusing on global interest rates. In their study published in 2010, they departed from the premise that economic theory envisages that changes in the distribution of wealth in a certain economy affect the real interest rates when the capital markets are flawed. For the US, Britain and Sweden, they investigated this linkage between wealth inequality and real interest rates by utilizing multi-variable times series analysis. The estimations show that a decline in wealth equality over the 20th century led to significant declines in real interest rates. They refer to the capital market flaws out of moral considerations as the reason for this.

Dağdemir (1998), on the other hand, reviews the relationship between economic development, income distribution and macroeconomic indicators and takes the real interest rate as a macro variable. Referring to Kuznets (1955) who argued that in the initial stages of economic development, the income distribution will get worse but it will improve along with further economic growth, the author questions the empirical validity of this argument for developing countries. Relying on intersection regression analysis for 42 countries, the study focuses on the impacts of macroeconomic policies on income distribution and finds that the real interest rates have no significant impact upon specific income groups, but when all variables are reviewed, the study further finds that the real interest rates have a negative effect transferring revenues from low income groups to high income groups.

Sugözü, Erdoğan, and Ulaşan (2017), investigating the interaction between interest expenditures and income distribution, note that Turkey relies on domestic borrowing for financing since the 1980s and that this causes a shift from the people to the holders of capital through unjust taxation policies. The study, utilizing Topsis model for a period of 2002-2015, shows that where the interest rates decline, the income distribution appears to be fair and more equal.

4. Methodology

This study offers a contribution to the literature by using panel data techniques focusing a fairly recent period of time to review the relationship between real interest rates and income inequality. Additionally, the study examines five developing and nine developed countries on the basis of annual data that has never been analyzed before.

Turkey, Argentina, Romania, Ukraine and Chile are picked as developing countries whereas United Kingdom, United States, Iceland, Czechia, Australia, New Zealand , Canada, Singapure, Italy and Hungary are selected as developed countries because the per capita income in these countries are approximate to each other. It is assumed that this is a proper

method to effectively examine the income distribution impact. The countries are also similar in terms of market efficiencies. Time period for the developing countries is 2003-2013 and for the developed countries, it is 2005-2015. The variables include gini coefficient as dependent variable and real interest rates, human capital and price level of per capita investment as independent variables. Human capital and price level of per capita investment variables are included in the model as control variables.

The model employed for developing countries is the following:

$$logY_{it} = a_{it} + log\beta_1 X_{1it} + \beta_2 X_{2it} + log\beta_3 X_{3it} + \upsilon_{it}$$

The model employed for the developed countries is the following:

$$Y_{it} = a_{it} + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \upsilon_{it}$$

Y indicates Gini (per capita) variable, X_1 human capital index variable, X_2 real interest rates and X_3 indicates price level of capital formation variable. The Gini (per capita) variable, showing the income distribution fairness, is retrieved from SWIID database, world income inequality database standardized by Solt (2016). Real interest rates variable, representing real interest rates, is retrieved from the World Bank (2019) database, with the exception of data on Turkey. There is no disclosed real interest rate data for Turkey. The real interest rate data for Turkey is compiled by the consideration of official national inflation data and the nominal interest rates published by the Central Bank of Turkey. Human capital index, representing human capital, and the price level of capital formation index, representing the price level of per capita investment, are retrieved from Penn World Table 8.0 updated by Feenstra, Inklaar, and Timmer (2015).

Panel data analysis holds efficient and advantageous features in controlling the heterogeneity on individuals, countries or firms. Time series and horizontal intersection analyses are not as successful as panel data analysis in this matter. Smaller multi-linear connection and greater degree of freedom make panel data more advantageous (Baltagi, 2005). For these reasons, panel data techniques are applied to the model.

In the analysis, the time effect and unit effects are tested first; the panel data group's unit effect statistical value proves to be significant. First, the time effect is defined and then it is tested by utilization of fixed effects test, random effects test and Breusch and Pagan test, a simple test developed by Breusch and Pagan (1979) in a linear regression model as part of the Lagrangian multiplier test for the defects of heteroscedasticity. The same tests are redone after the unit effect is activated. Review of the findings reveals that the tests where unit effect is active and strong are visibly significant. Thus, in both models, tests are run after unit effect is activated.

Table 1: Time effect results (Developing countries)

	Probability values	Conclusion
Fixed effect	0.9983	No time effect
Random effect	Sigma value insignificant	No time effect
Breusch and Pagan	1	No time effect

Table 2: Unit effect results (Developing countries)

	Probability values	Conclusion
Fixed effect	0.000	Unit effect
Random effect	Sigma value significant	Unit effect
Breusch and Pagan	0.000	Unit effect
LR	0.000	Unit effect

Table 3: Time effect results (Developed countries)

	Probability values	Conclusion
Fixed effect	1	No time effect
Random effect	Sigma value insignificant	No time effect
Breusch and Pagan	1	No time effect

Table 4: Unit effect results (Developed countries)

	Probability values	Conclusion
Fixed effect	0.000	Unit effect
Random effect	Sigma value significant	Unit effect
Breusch and Pagan	0.000	Unit effect

When testing the model in consideration of the assumption that there is a unit effect, a fixed effects test is run first. Before the Hausman test to examine whether the model exhibits fixed or random effects, LR and Breusch and Pagan test is executed. Hausman test is run last; the results reveal that the null hypothesis is not rejected and that the model exhibits random effects.

Table 5: Fixed effect test results (Developing countries)

lgini	Coefficients	Standard error	P>IzI
real interest rates	-0.001	0.000	0.212
lhc	-0.475	0.290	0.108
lpli	-0.132	0.025	0.000
constant	4.025	0.308	0.000

Table 6: Random effect results (Developing countries)

lgini	Coefficients	Standar error	P>IzI
real interest rates	-0.001	0.000	0.190
lhc	-0.507	0.272	0.063
lpli	-0.130	0.024	0.000
constant	4.058	0.310	0.000

Table 7: Fixed effect results (Developed countries)

gini	Coefficients	Standard error	P>IzI
real interest rates	0.140	0.033	0.000
hc	-1.082	0.564	0.059
pli	0.156	0.558	0.781
constant	34.632	1.882	0.000

Table 8: Random effect results (Developed countries)

gini	Coefficients	Standard error	P>IzI
real interest rates	0.139	0.033	0.000
hc	-1.078	0.565	0.057
pli	0.144	0.560	0.797
constant	34.634	2.412	0.000

Table 9: Hausman Test Results (Developing countries)

	Coefficients-fixed effect	Coefficients-random effect
real interest rates	-0.001	-0.001
lhc	-0.475	-0.507
lpli	-0.132	-0.130

Chi Square: 0.41 Probability: 0.9373

Table 10: Hausman Test Results (Developed countries)

	Coefficients-fixed effect	Coefficients-random effect
real interest rates	0.140	0.139
hc	-1.082	-1.078
pli	0.156	0.144

Chi Square: 4.16 Probability: 0.2442

Table 11: Deviations from hypothesis (Developing countries)

	Probability values	Conclusion
Pesaran	1.417 > 0.05	No inter-units correlation
Friedman	0.054 > 0.05	No inter-units correlation
Frees	0.665 > 0.31	No inter-units correlation
Heteroscedasticity	0.158 > 0.05	No Heteroscedasticity
Durbin Watson	0.591 < 2	Autocorrelation exists
Baltagi -Wu LBI	0.816 < 2	Autocorrelation exists

Table 12: Deviations from hypothesis (Developed countries)

	Probability values	Conclusion
Frees	0.660 > 0.31	Inter-units correlation exists
Heteroscedasticity	0.000 < 0.05	Heteroscedasticity exists
Durbin Watson	0.513 < 2	Autocorrelation exists
Baltagi -Wu LBI	0.711 < 2	Autocorrelation exists

A review of the deviations in the model from the hypothesis is done with the use of tests developed by Pesaran (2004), Friedman (1937) and Frees (1995) to maintain correlation between units for the developing countries. In two out of three tests, the correlation values are insignificant and the null hypothesis is confirmed. There is no correlation between units in the model. Heteroscedasticity test is a deviation test from other hypothesis developed as null hypothesis. The results indicate that heteroscedasticity results require the confirmation of the null hypothesis. There is no heteroscedasticity in the model. For autocorrelation, the autocorrelation tests developed by Durbin and Watson (1971) and Baltagi and Li (1991) are utilized. The tests reveal that autocorrelation is confirmed. The autocorrelation in the model, under the assumption that there is no heteroscedasticity an correlation between units, is examined in line with the AR(1) residual random effects generalized least squares regression estimation for the random effects. For the developed countries, the deviation tests of the model from the assumption presents autocorrelation, heteroscedasticity and correlation between units. Under this condition, the model is tested and examined through Discroll-Kraay estimator.

Table 13: AR(1) residual random effects generalized least squares regression estimation (Developing countries)

lgini	Coefficients	Standard error	P>IzI
real interest rates	-0.000	0.006	0.744
lhc	-0.626	0.365	0.087
lpli	-0.081	0.031	0.009
constant	4.205	0.399	0.000

Table 14: Discroll-Kraay estimator results (Developed countries)

gini	Coefficients	Standard error	P>IzI
real interest rates	0.139	0.038	0.005
hc	-1.078	0.465	0.043
pli	0.144	0.247	0.573
constant	34.634	1.145	0.000

5. Findings

For the developing countries, independent variables in the model explain the dependent variable by 18 pct. There is a 15 pct of significant relationship between income distribution variable and price level of per head investment and the model finds a 10 pct of significant relationship between the income distribution variable and human capital. The test results reveal that there is no significant relationship between the real interest rate, the actual variable of measurement, and income distribution. It is evident that a one-unit increase in the price level of investment per head leads to decline in income distribution, thus creating a fairer income distribution. Increase in the human capital leads to decline in income distribution, making it fairer. The real interest rate has not been significant upon income distribution.

For developed countries, the model presents 5 pct of significant correlation between income distribution variable and real interest rate, and human capital. A one-unit increase in real interest rate will lead to 0.13 of increase in the income distribution variable. Increase in income distribution variable means deterioration in the income distribution equality. A one-unit increase in human capital leads to 1.08 decline in income distribution variable. This means that increase in human capital leads to a better income distribution. No significant correlation is detected between income distribution variable and price level of investment per head.

6. Conclusion

Qualitative observations have always identified the negative correlation between interest and income distribution in different phases of history. However, modern economics holds that interest is an indispensable instrument of economic activities and thus it cannot be removed from such transactions. The correlation between interest and income distribution has become a popular issue of inquiry after attempts to measure many relevant parameters. In the post-1980s era, the decline in real interest rates has been accompanied by worsened income inequality, leading to the emergence of studies specifically focused on this area. In an attempt to make a contribution to this emerging literature, this study reviews nine developed and five developing countries for a period of 2003-2013 by testing actual variables, real interest rates, and two control variables. Random effects model is used for this purpose. Both models present 5 pct of significance. For the developing countries, where the price level of investment per head variable is dependent variable, a 5 pct of significant correlation is established. The model further identifies 10 pct of significant correlation between income distribution and human capital and confirms that change in the price level of investment per head at 5 pct of significance level leads to decline in income distribution,

thus making the income distribution more equal. At 10 pct level, increase in the human capital leads to decline in income distribution and thus, to a better income distribution. No significant correlation is identified between real interest rate and income distribution variable. For developed countries, a 5 pct of significant correlation is found between income distribution and real interest rate, and human capital. Increase in the real interest rate leads to increase in income distribution and thus deteriorates income distribution. Increase in the human capital leads to decline in income distribution variable, thus making the income distribution more equal.

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