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Evaluating the Distributive effects of Economic Misery index in Selected Islamic Countries (FMOLS approach)

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Abstract

Income inequality is one of the undesirable phenomena of social life and most of the countries in the world have kept it their main goal to reduce Income inequality. This study is based on the economic impact of the doom index on the distribution of income using data from selected Islamic countries (Afghanistan, Albania, Egypt, Indonesia, Iran, Malaysia, Pakistan, Turkey, Bangladesh, Kazakhstan, Moldova and Uganda) from 2010 to 2018, using panel data approach for variables EViews model is used. This study explains the significant effect of misery index with a coefficient of (0.057) on the Gini coefficient and shows that with a one percent increase in the misery index can increase Gini coefficient by 0.057 percent and increases the class gap in societies. It also shows that Labor productivity with a coefficient of 0.01 has a significant negative effect on the Gini coefficient, which explains the 0.01% decrease in income distribution inequality due to a 1% increase in labor productivity. Therefore, in addition to controlling inflation and unemployment, improving human resource skills, economic policymakers should use incentive mechanisms to develop exports and the effectiveness of governments to reduce the class gap in their societies.

Keywords: Misery index, Income distribution, Gini coefficient, Selected Islamic countries

Introduction

Income inequality is one of the undesirable phenomena of social life, and all human societies and countries of the world have put reducing income inequality at the top of their goals. Injustice of income distribution and economic inequality in a society causes crime, felony, robbery, poverty and social unrest and disrupts the stability of a society

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and is one of the influential factors in political instability and even civil wars in a country or society are due to inequalities in the distribution of income. (Roberto, 2015, p. 5).

Given that misery index and income inequality is a social phenomenon, governments should study these indicators carefully and after examining and identifying the factors affecting them, they should take the necessary measures to control them. In order to achieve a fair distribution of income in a country, it is necessary to know the current state of welfare and income distribution in a country. In order to improve the welfare of individuals in society and the fair distribution of income, it is necessary to study inequality indicators and the factors affecting it from the misery index. The sum of monetary and fiscal policies of governments are crystallized in important economic indicators such as inflation and unemployment, and one of the main goals of countries is to control these macroeconomic indicators. The main purpose of this article is to analyze the effect of economic misery index on income distribution in selected Islamic countries and the question is what effect does misery index have on income distribution? Do the fiscal policies of the elected Islamic governments have an effect on reducing their income inequality?

In this study, the effect of economic misery index on income distribution using panel data by generalized least square method in EViews from twelve selected Islamic countries (Afghanistan, Albania, Egypt, Indonesia, Iran, Malaysia, Pakistan, Turkey, Bangladesh, Kazakhstan, Maldives and Uganda) in the period 2010 to 2018 is analyzed. In this article, after explaining the theoretical foundations and research background, tests and models are used to analyze the data and then conclusion and some policy suggestions are recommended.

Theoretical foundations and research background

The misery index is one of the economic indicators Introduced by the American economist Arthur O'Kan in the 1970s. The misery index is prepared from the sum of two important economic indicators (inflation rate and unemployment rate) as a normal line combination (Elham Alizadeh, 2015, p. 10).

$$\text{Omi} = \pi + u$$

In 2020, Robert Barrow, in a critique of Okan's theory, stated that the Okan misery index only reflects the rate of inflation and unemployment in different periods, and by adding the GDP growth rate and the nominal interest rate to the Okan misery index, he introduced his misery index and stated that with the addition of GDP growth rate and nominal interest rate, we will get a better picture of the economic situation of a country in different periods and the model of misery index that he stated is as follows (Amin Kochi, 2018, p. 118).

Real GDP growth rate - nominal interest rate + unemployment rate + inflation rate = Barrow misery index

$$\text{Bmi2} = \pi + u + i - y$$

Where "π" is the annual inflation rate, "u" is the general unemployment rate, "y" is the annual GDP growth rate and "I" is the nominal interest rate.

In 2007, Welch conducted a study on the factors influencing the life satisfaction of European citizens and stated that life satisfaction is closely related to economic growth, unemployment, inflation and economic stability, and interest rates or inflation rates can represent economic stability. And each of them as much as unemployment and economic growth affect people's satisfaction

with life and the misery index is modified as follows (Welch, 2007, pp. 1-6).

Real GDP growth rate - nominal interest rate + unemployment rate = Welsh misery index

In 2008, Castin Hughes said that falling house prices were a sign of recession and economic inefficiency, and that people were dissatisfied with the declining rate of housing. And by adding the growth rate of housing prices in the Okan index, he introduced the generalized misery index (Amin Kochi, 2018, p. 119).

Okan stated that the misery index is one of the combined economic indicators that is prepared from the combination of two important economic indicators, namely unemployment rate and inflation rate, as a normal linear combination (Moradi, 2014, p. 23).

Inflation (the upward trend of prices) is one of the main problems of developing and less developed countries in today's world, and the effects of inflation in the present era are not limited to the economic structure and macroeconomic variables. Rather, the effects of inflation today are on all political and social dimensions of a society and a country.

The relationship between inflation and the lives of individuals in the society is so complex that one of the indicators for measuring the economic and political stability of a society and a country is the inflation rate (Tavakoli et al., 2015, p. 5).

Unemployment is one of the major problems in developing and less developed countries, and unemployment refers to a person who does not have a job and has actively sought and worked for at least 4 hours to find a job, but no job has been found by him (Dur Nabush, Fisher, 2001), And the more the unemployment rate and a high number of active workers unemployed in a society are , the income inequality increases and the poverty and misery of a society increases and many people are forced to live without a job and in an unfavorable situation. Conversely, if there is an unemployment rate in a society is reduced and the demand for labor increases and many active people in the society get jobs, in that welfare society the income inequality is reduced and poverty and misery disappear and there will be a direct relationship between the unemployment rate and Income inequality (Taheri, 2013, p. 13).

Inflation and unemployment are one of the major economic problems of today's governments, and the impact of these two indicators are high. The sum of these two indicators is called the misery index. Inflation indicates the chaotic and inefficient economic situation in a society, which imposes costs on the people by reducing the value of high financial assets, and overload unemployed people appear in society who have no share in the production of goods and services in society. In addition, unemployment causes misery in a society, in a society where unemployment is high, problems such as: addiction, robbery, kidnapping, moral corruption and all kinds of corruptions occur. And in general, the social, cultural, political and economic situation of a society is disrupted. The problems and difficulties caused by the index of misery (inflation and unemployment rate) in a society increases that much, that the social, political, cultural and economic situation of a society is affected, and consequently the researchers and policy makers through different policies try to reduce the misery index (inflation and unemployment rate) (Alizadeh, 2015, p. 20).

Income distribution and income inequality index in a society indicate the dispersion and difference in income of different segments of society and expresses how much

there is justice in the distribution of income in a society and a country, and economically it indicates that how economically active that person is, or a person with income and a household and a consumer, The lower the income inequality in a society, the greater the welfare of that society and the closer it is to justice, and if there is greater inequality in a society, the people of that society will not enjoy stability and prosperity, but will be in a state of disorder (Ahmad Akhavi, 2008, p. 32).

Cousins (1995) was one of the first to investigate the factors affecting income distribution. In his study on the impact of economic growth on income distribution, he states that countries on the path to development have inequality in the income increases in the beginning and then their income inequalities gradually equalize and gradually decreases. This hypothesis has been tested in different countries and this theory does not apply in all developing countries, it is applicable and adoptable in some western countries. (Mehr Ara & Mohammadian, 2014, p. 86).

Galli and Wonderhon (2001) conducted their studies on the effect of inflation on income distribution. The results show that the effect of inflation on income inequality depends on the inflation rate and if the inflation rate is high, reducing the inflation rate has a positive effect on the fair income distribution and reduces income inequality, but if the inflation rate is low and further decreases it has negative effects on fair income distribution and income inequality.

Schultz (1969) in his research concluded that unemployment and inflation are variables affecting income inequality that by increasing unemployment rate income inequality also increases, but increase in inflation rate reduces income inequality.

Blender and Isaki later (1978) studied the effects of these variables on the distribution of income inequality and found that rising unemployment rate increases individual income inequality and increase in inflation rate reduces income inequality.

Gustafon and Johansson (1999) examined the relationship between unemployment and income distribution. The results showed that income from work is one of the most important factors in increasing the income of poor groups and households, and their research showed that unemployment has negative and destructive effects on poor groups and families (Ibid: 88).

But Boss (1982) and Cutler and Kaiz (1991) found in their study that inflation has no statistically significant effect on income inequality, only emphasizing that rising unemployment has an effect on income inequality. Romer et al. (1998) divided the effect of inflation on income in the short and long term, stating that in the short run, rising inflation is associated with decrease in unemployment, and that rising inflation may benefit the poor in the short run. And in the long run, inflation cannot reduce unemployment.

Bühler (2001) also thought that inflation has significant impact on income inequality, and that reducing inflation from a very high level was effective in reducing income inequality. Thus, according to Lodge (2004), the relationship between inflation and income inequality is not a clear perspective.

Taheri (2013) has analyzed the relationship between misery index and income inequality in income from 1974-2011 in Iran using his self-explanatory model method with the interrupted explanation. The result shows that increasing the rate of misery increases the inequality of income distribution in Iran.

Moradi has analyzed the relationship between government size and misery index in the Iranian economy in 2014 using the vector model of self-regression. The result of his study shows a positive relationship between government size and the misery index in the Iranian economy.

Alizadeh Kashkoohi has analyzed the effect of macroeconomic variables on the misery index in the Iranian economy between 1992-2013 in the summer of 2015 using the vector model of self-regression. The results of his studies indicate that of the macroeconomic variables, the Gini coefficient has the greatest effect on the misery index, followed by per capita income and economic growth respectively, but in the long run, the effect of these two variables decreases. And it diminishes and reaches the stable model.

Nili and Farahbakhsh (1998) in their article entitled "The relationship between economic growth and income distribution" examines the effects of four variables of economic growth rate, unemployment rate (logarithm, inflation rate and virtual variable for the Gini coefficient for time series data from 1968-1996. The results showed that the Gini coefficient has a negative relationship with economic growth and a positive relationship with the unemployment rate and the logarithm of the inflation rate.

Abu Nouri (1997) in an article entitled "The effect of macroeconomic indicators on income distribution in Iran" using time series data for the years 1991-2011 found the factors causing inequality at the macro level. The results show that an increase in the ratio of employment and labor productivity reduces the level of inequality. On the other hand, government spending per household, inflation, the share of personal income from GDP, and total tax revenue on each household's income over a period of time have had an effect on increasing the level of inequality.

Schultz (1969) in his paper entitled "Income and Cyclical Trends and Income Distribution in the United States" Using a linear model from 1944-1965, examined the effect of wholesale inflation, real income growth and the unemployment rate on Rory focus on income.

Blinder and Isaki (1978) examined the effects of inflation and unemployment on income distribution in the United States from 1947 to 1974 in an econometric study. They summarized the distribution of income in few steps. The results of their study suggest that unemployment has increased inequality in the distribution of personal income. In contrast, inflation has had a decreasing effect on income distribution inequality.

Blank and Blinder (1986), in their article "Macroeconomics, Income Distribution, and Poverty," examine the effects of macroeconomic indicators on income distribution and poverty using US time series data from 1948 to 1983. They came to a conclusion that Unemployment has an increasing effect and inflation has a decreasing effect on income distribution inequality. But rising inflation has pushed up the poverty rate. In fact, although inflation has reduced income inequality, it has had an increasing effect on poverty.

Hopkins (2004) in an article entitled "Factors determining income inequality: Bayesian approach to pattern uncertainty" using panel data to examine the factors determining inequality in 16 OECD member countries). According to the results of this study, the number of years of higher education, the variable affecting the Gini coefficient was not known. But the number of years of elementary education can affect the distribution of income. An increase in the share of trade in the economy, when per capita income increases, increases inequality at an increasing rate, and an increase in credit markets increases inequality, because instead of creating opportunities for the poor, it helps the rich more.

Innovations of this article

The analysis of the distributive effects of economic misery index in selected Islamic countries in applied studies has not been done so far, which will be addressed in this study, similarly, the analysis of the effect of economic misery index on the distribution of income inequality with the panel-gls method among Islamic countries is one of the innovations of this article.

Research method and introduction of model

This research is a library study and a descriptive analytical research and is considered as an applied goal. The required data and information were collected between the years (2010-2018) for twelve selected Islamic countries (Afghanistan, Albania, Egypt, Indonesia, Iran, Malaysia, Pakistan, Turkey, Bangladesh, Kazakhstan, Maldives and Uganda). This information is obtained from reputable sites such as the World Bank, the International Labor Organization (ILO) website, the United Nations Conference on Trade and Development (UNCTAD) website, etc. And then it is processed by EViews program using Panel Data econometric model. In this research, the considered indicators include; Gini coefficient as a dependent variable and misery index as main independent variables and variables such as productivity of labor force (POLF), ratio of government construction expenditures to GDP, current GDP The ratio of exports to GDP and the ratio of foreign direct investment to GDP (FDI / GDP) are considered as auxiliary explanatory variables in the model. In the present study, due to the type of data studied, the panel data method through fully modified least squares has been used and the research model according to the model of Okan (1974) and Wang et al. (2019) misery index, including several Auxiliary variables are estimated as follows:

Lngini = β1lnmisery - β2Lnpolf - β3lng/GDP + β4 Lnfdi/gdp – β5 Lnex/GDP - β5 Lncgdp

Table 1: ***Research variables and its symbols***

Dependent variable: GDP per capita					
symbol	Variable name (logarithm)	Symbol	Variable name (logarithm)	symbol	Variable name (logarithm)
Gini	Gini coefficient	Misery	Misery index	Polf	Labor productivity
g/gdp	Proportion of government expenditures from GDP	Cgdp	Current GDP	Ex/gdp	Export ratio of GDP
fdi/GDP	Ratio of foreign direct investment to GDP				

Definition of research variables

Misery index and Gini coefficient are explained in detail in the basics of research and here it is no longer necessary to provide re-explanations. Only statistical data related to these variables are presented in this section and other variables used in specifying the model. Needs explanation, briefly explained.

Table 2:

the countries years	Uganda	Maldives	Kazakhstan	Bangladesh	Turkey	Pakistan	Malaysia	Iran	Indonesia	Egypt	Albania	Afghanistan	
Misery index	9.2	40.7	25.3	10.5	17.6	11.5	١٠,٥	٢٩,٤	٢٠,٨	١٨,٨	١٨,٥	١٥,٢	2011
Gini coef-ficient	٠,٤٣	٠,٣٢	٠,٢٨	٠,٣٢	٠,٣٨	٠,٢٩	٠,٤٥	٠,٣٨	٠,٣٦	٠,٣٠	٠,٣٠	٠,٣٠	
Misery index	١٢,٩	١٤,٨	٢٥,٩	١١,٥	١٦,٩	٢٠,٤	٨,٤	٣٦,١	١٢,٦	٢٣,٥	١٥,٧	٢٨	2011
Gini coef-ficient	٠,٤٢	٠,٣٠	٠,٢٨	٠,٣٢	٠,٤٠	٠,٣٠	٠,٤٤	٠,٣٧	٠,٣٩	٠,٢٩	٠,٢٩	٠,٣١	
Misery index	٧,٣	١٣	١٠	١٢,٢	١٥,٥	٧,٦	٤	٣٦,٦	٨,٢	٣٢	١٤,٤	١٨,٨	2012
Gini coef-ficient	٠,٤١	٠,٢٩	٠,٢٨	٠,٣٢	٠,٤٠	٠,٣٠	٠,٤٢	٠,٣٨	٠,٤٠	٠,٢٨	٠,٢٩	٠,٣١	
Misery index	٥,٤	٩	١٤,٦	١١,٦	١٥	٩,٩	٣,٢	٤٦	٩,٣	٢١,٨	١٦,١	١٦,٣	2013
Gini coef-ficient	٠,٤١	٠,٢٨	٠,٢٧	٠,٣٢	٠,٤٠	٠,٣٠	٠,٤١	٠,٣٧	٠,٤٠	٠,٢٩	٠,٣٢	٠,٢٨	
Misery index	٦,٩	١٠,٢	١٠,٨	١٠	١٧,٢	٩,٢	٥,٣	٢١,٤	٩,٤	٢٤,٣	١٩	١٢	2014
Gini coef-ficient	٠,٤٠	٠,٢٦	٠,٢٧	٠,٣٢	٠,٤١	٠,٣١	٠,٤٠	٠,٣٨	٠,٣٩	٠,٣٠	٠,٣٥	٠,٢٩	
Misery index	٧	١٣,٢	٦,٧	١٠,٢	١٨	٧,٦	٤,٣	١١,٥	٨,٤	٢٢,٩	١٧,٦	١٣,٨	2015
Gini coef-ficient	٠,٤١	٠,٢٧	٠,٢٦	٠,٣٢	٠,٤٣	٠,٣٣	٠,٤١	٠,٣٩	٠,٤٠	٠,٣١	٠,٣٣	٠,٣٠	
Misery index	٦,٦	٩,٨	١٨,٥	١١	١٨,٩	٤,١	٥	١٤	٦,٧	١٨,٦	١٤,٥	٩,١	2016
Gini coef-ficient	٠,٤٣	٠,٢٦	٠,٢٧	٠,٣٢	٠,٤٢	٠,٣٥	٠,٤١	٠,٤٠	٠,٣٨	٠,٣١	٠,٣٤	٠,٣١	
Misery index	٦,٢	١٠,٣	١٦,١	١٠,٦	٢١,٨	٧,٩	٧,١	٢٤,٣	٨,٥	٣٤,٦	١٥,٢	١٣,٥	2017
Gini coef-ficient	٠,٤١	٠,٢٦	٠,٢٧	٠,٣٢	٠,٤١	٠,٣٧	٠,٤٢	٠,٤١	٠,٣٨	٠,٣١	٠,٣٣	٠,٣٢	
Misery index	٦,٣	٦,١	١٤	٩,٨	٢٧,٣	٦,٥	٤	٤٤,٩	٨,٣	٣٣	١٣,٦	١٣,١	2018
٠,٣٨ Gini coefficient		٠,٢٥	٠,٢٧	٠,٣٣	٠,٤٢	٠,٣٦	٠,٤٣	٠,٤٠	٠,٣٨	٠,٣٢	٠,٣٣	٠,٢٩	

Source: World Bank

Gross Domestic Product: Gross domestic product is one of the measures in the economy. GDP is the sum of the value of goods and services all in a given period of time that is produced in a country. Complete goods and services are goods and services that are at the end of the production chain as final goods and services and are not used to produce goods and provide other services. (Homayounifar et al., 2016, p. 50).

Labor productivity: Productivity is the ratio of the production of goods and services or a set of goods and services (output) to one

or more data (inputs) effective in the production of those goods and services. Stephen P. Stephen P. Robbins sees productivity as a community of effectiveness and efficiency. Therefore, in order to achieve productivity, efficient and effective performance is considered necessary. An organization is considered effective when it can satisfy the client with its efficient and effective performance. As it is obvious, productivity includes a combination of effectiveness and efficiency (Shokrchizadeh and Ismaili, 2015, p. 4).

Explanation of the data panel model

In the present study, due to the type of data, the panel data method is used. Panel data is a collection of data that includes several sections and a time period. The section can represent individuals, groups, companies, industries, countries, etc. In general, it displays the number of sections with N. The time period can also be day, week, season, year, etc. Consider the length of the time period with T, thus showing the observations of the variables X and Y with Xit and Yit that the cross section contains i = 1,2, 3…, N and the time includes t = 1,2, 3…, T is (Syria, 2018, pp. 776-775). Combined data provides a very good environment for the development of estimation methods and theoretical results, and enables researchers to use cross-sectional and time-series data to study problems that can be studied in environments where there can't be just cross-sectional data or time series data. (Baltagi, 2005, p. 117). similarly, in the data panel model, variables are measured both between sections of the statistical population (N) and over time (different periods T). To establish the base model for panel data, it is assumed that the number of sections is equal to N, the length of the period is equal to T, and the number of explanatory variables is equal to K, in which case the panel data model can be explained as follows:

$$Y_{it} = \alpha_i + \beta_1 X_{1it} + \beta_2 X_{2it} + \cdots + \beta_k X_{kit} + U_{it} \quad (1)$$

By expanding the variables for different periods, we will have:

$$Y = X\bar{\beta} + i_{NT^a} + \bar{U} \quad (2)$$

$$Y = (X \vdots i_{NT}) \left[\frac{\bar{\beta}}{\alpha}\right] + \bar{U} \rightarrow Y^* = X^*\beta^* + \bar{U} \quad (3)$$

In Equation (1), 'I' denotes segments, individuals, households, firms, countries, and the like, and 't' denotes time. In this model K, is an explanatory variable (excluding the width of the origin) in Xi. Depending on what state it takes; There are three cases: First, if there is no difference between the sections, then the average of all sections enters the model, and in this case, the ordinary least squares method will provide efficient estimates and compatibility. Second, if there is a difference between different sections, the difference between sections (countries, firms and households, etc.) is shown in which they are assumed to be constant over time. This method is called the fixed effects method. Third, if the difference between the sections is assumed to be random and not constant over time, another method called the random effects method is used to estimate the model (Baltagi, 2005, p. 119).

Research findings

Before discussing the results and findings of the research, a brief description of the descriptive statistics related to the mean, median, maximum, minimum, standard deviation and number of observations in the form of a table, as well as the required tests such as mana test, Data to avoid specifying the false model, the

existence of a long-term relationship between the dependent variable and explanatory variables before estimating the model is discussed.

Descriptive statistics

Given that all the information used in this study is quantitative, in the first step, descriptive statistics are used to analyze the data. The purpose of this section is to introduce the characteristics of the studied variable among the statistical population by displaying the initial statistical data; To understand what principles are used for the analysis of the study. Because this knowledge will help the researcher in generalizing the results and analyzing the relationships between the basic variables of the research (Amir Khanlou 2017, p. 47).

Table (2) shows the descriptive statistics related to the mean, median, maximum, minimum, standard deviation and the number of observations of the variables studied in this study during the years 2010 to 2018.

Table 3: ***Descriptive statistics of research variables***

Description	Lngini	Lnmisery	Lnpolf	Lng/gdp	Lnfdi/gdp	Lnex/gdp	Lncgdp
Mean	-1.0724	2.619493	4.082449	-2.197937	-4.128016	0.360226	25.500
Median	-1.1086	2.704196	4.229545	-2.193897	-3.974182	0.210365	26.086
Maximum	-0.7962	3.805298	5.629382	-1.217396	-2.301521	5.82312	27.855
Minimum	-1.3586	1.189207	2.407211	-3.113149	-16.1181	0.054541	22.665
Std. Dev.	0.15795	0.580034	0.998835	0.391056	1.49923	0.750799	1.5646
observation	۱۰۸	۱۰۸	۱۰۸	۱۰۸	۱۰۸	۱۰۸	۱۰۸

Source: Research Calculations

Unit root test

In order to analyze and evaluate the significance of variables, unit root test is used (Gujarati, 2019: 917). This paper analyzes the significance of all variables for ease of operation except the disruption of the unit root test, and based on the panel unit root tests of Levin, Lin and Chou; Im, Pesaran and Shin; Phillips and Peron and Dickey-Fuller tests evaluated the significance of the variables. In all these tests, hypothesis zero indicates anonymity that if rejected, the meaning of variables is accepted.

Table 4: ***Unit Root Test***

Method	Statistic	Prob.	cross sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t	-2.38043	0.0086	12	72
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-1.09	0.1379	12	72
ADF - Fisher Chi-square	33.6469	0.0911	12	72
PP - Fisher Chi-square	76.8812	0.0000	12	84

Source: Research Calculations

Since in this study the number of sections (selected Islamic countries) is more than time series (years studied); Therefore, the Levin, Lin, and Chou collective unit root test is used, and the individual tests of Im, Pesaran and shin; Phillips, Peron, and Dickey-Fuller tests are not usable, although in this study, the Phillips-Peron, Dickey-Fuller tests each confirmed the data with 100% and 91% probability, respectively. As can be seen in the table above, by examining the calculated statistical values and the probability of its acceptance, it is observed that based on Levy, Lin and Chou test, the null hypothesis based on the anonymity of variable data is rejected and the opposite hypothesis is based on the significance data is accepted. similarly, to analyze and evaluate the long-run equilibrium relationship between the dependent variable and the explanatory variables, the co-integration test is tested to prevent false regression specification. In this research, among the tests used for the co-integration test, the Cao test has been used.

Co-integration test

Given that panel data may also be unstable, so its integration and testing in this type of data is also very important. Like static tests, co-integration tests in panel data are more robust than co-integration tests for individual cross-sectional units. Because these tests can be used even in situations where the time period is short and the sample size is small. To perform the co-integration test of panel data, Pedroni (2004) and Cao (1999) after estimating the long-run relationship between variables, Dickey-Fuller statistics are used for the co-integration test (Noferesti, 2013, p. 76).

$$\mathrm{DF}\rho = \frac{\sqrt{NT}(\rho\hat{} - 1) + 3\sqrt{N}}{\sqrt{10.2}} \quad \mathrm{DFp} = \sqrt{1.25t_{\rho}} + \sqrt{1.875N}$$

In the above relation ρ, the long-term error regression coefficient on the interruption of the errors obtained from the model estimation by the combined method (eit) is (e^it = ρe^_ (it-1) + μi). N in DFt and DFp statistics indicates the number of sections and Tp is the standard t value of the high relation coefficient. The extracted statistics both have a standard normal distribution with a mean of zero and a variance of one. Hypothesis zero indicates the lack of co-integration between variables and all cross-sectional units and the opposite hypothesis indicates the existence of co-integration between variables (Rezazadeh, 2017: 36). The results of the Cao co-integration test are given in Table (5).

Table 5: ***Cao co-integration test***

Test	t-Statistic	Prob.
ADF	-1.3433	0.0896

Source: Research Calculations

According to Table (3), it is observed that according to the ADF statistic and its probability (less than 0.01), the existence of co-integration in the model is accepted. That is, the (H0) hypothesis of the model that there is no co-integration is rejected and it can be claimed that there is a long-run relationship between the dependent variable and the independent variables.

Chao test

Sometimes we face with data that contains both time series and cross-sectional data. Such a set of data is commonly called a data panel. In estimating the panel data model, we face two general situations. The first case is that the width of the origin is the same for all sections, which is known as the integrated model, and the second case, the width of the origin is different for all sec-

tions, which is called the panel data model. To identify these two conditions, a test called Chow (F-Limer) is used (Faqhih Majidi, 2014, p. 197). Therefore, F-Limer test is used to choose between combined regression methods and fixed effects regression. The results of the Chow test are shown in Table (6).

Table 6*: Chow or F-Limer test*

Effects Test	Statistic	d.f.	Prob.
Cross-section F	151.9489	(11,90)	0.0000

Source: Research Calculations

As can be seen in Table (6), the null hypothesis that the data are integrated is rejected and the use of panel data method to specify the model is accepted.

Haussmann Test

After determining the Chow test, the data panel method should be used to estimate the model. To determine the type of panel data model (fixed effects model or random effects model), the Hausmann test is used. The Hausmann test is based on the presence or absence of a relationship between the estimated regression error model and the independent variables. If this relationship exists, the model will have a fixed effect and if this relationship does not exist, the model will have a random effect. Hypothesis H0 indicates that there is no relationship between independent variables and estimated error model and Hypothesis H1 indicates the existence of a relationship (Moqbeli, 2017, p. 60). The hypotheses of the Hausmann test are as follows.

$$H_0 : E(\varepsilon_{it} / X_{it}) = 0$$
$$H_0 : E(\varepsilon_{it} / X_{it}) \neq 0$$

The implication of Hypothesis Zero is that Ui is independent of Xit (the random effect model). This test is defined as follows.

$$m = \hat{q}_1^{/} \left[\text{var}(\hat{q}_1) \right]^{-1} \hat{q}_1$$

Assuming H0, this statistic has a distribution with k degrees of freedom, where k is the number of explanatory variables or numbers. If the value obtained (m) was more than, the hypothesis H0, i.e., random effect, is rejected and the assumption of fixed effect is accepted (Moqbeli, 2017, p. 60). After performing the Hausman test, the appropriate model can be selected.

Table 7: *Hussmann test result*

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	20.9914	6	0.0018

Source: Research Calculation

As can be seen in Table (7), since the statistic value of probability of the Hausmann test (0.0018), so it can be said that the fixed effects method should be used to specify the model.

Model estimation and analysis

According to the tests performed, to estimate the relationship between Gini coefficient as a dependent variable and misery index along with labor productivity, the ratio of

government construction expenditures to GDP, the ratio of foreign direct investment to GDP, the ratio of exports from GDP and GDP per capita as explanatory variables, the model is presented as follows. The results of this estimate for selected Islamic countries from 2010 to 2018 using EViews software are given in Table (8).

Table 8*: Results of model estimation by fixed effects method*

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.70653	0.19423	-3.63762	0.0005
LNMISERY	0.057455	0.008171	7.03184	0.0000
LNPOLF	-0.01358	0.004398	-3.08742	0.0027
LNGPGDP	-0.11341	0.025691	-4.41431	0.0000
LNFDIPGDP	0.004425	0.001685	2.625897	0.0102
LNEXPGDP	-0.00269	0.000619	-4.33955	0.0000
LNGDP__CUR_US$	-0.0271	0.005479	-4.94641	0.0000
R^2	0.972839			
F-statistic	189.6235			
Prob (F-statistic)	0.0000			

Source: Research Calculations

Lngini = 0.05lnmisery – 0.01Lnpolf – 0.11lng/gdp + 0.004Lnfdi/gdp – 0.002 Lnex/gdp – 0.02 Lncgdp

According to the research results seen in Table (8), the coefficients of all variables of the model are significant and, most importantly, the coefficient of the main independent variables of the model (misery index) is positive and significant. Which shows that these variables have a positive effect on increasing inequality of social classes. As can be seen, the misery index coefficient is (0.05), which explains the 0.05 percent increase in the Gini coefficient for one percent increase in this variable. Auxiliary explanatory variables used in specifying the model of this paper, such as labor productivity, the ratio of government construction expenditures to GDP, the ratio of foreign direct investment to GDP, the ratio of exports to GDP and GDP per capita also have significant impact. Labor productivity with a coefficient of 0.01 has a significant negative effect on the Gini coefficient, which explains the 0.01% decrease in income distribution inequality due to a 1% increase in labor productivity. The ratio of government construction expenditures to GDP also explains the significant negative effect on the Gini coefficient and shows that for one percent increase in this variable, income inequality decreases by 0.11 percent. The ratio of foreign direct investment to GDP shows a significant positive effect on the Gini coefficient, which explains the 0.004% increase in income inequality due to a 1% increase in foreign direct investment. Exports and current GDP also show a significant negative effect on the Gini coefficient and show that income inequality decreases by 0.002% and 0.02% for one percent increase in these variables, respectively. The value of the coefficient of determination is obtained in this model (0.97), which shows that approximately 97% of the changes of the dependent variable (Gini coefficient of countries) are explained by the variables in the model; That is, the model has good explanatory power. The significance of the whole model was also confirmed by F test.

Conclusion and Recommendation

This study aims to explain the effect of misery index on income distribution using statistical data of selected Islamic countries (Afghanistan, Albania, Egypt, Indonesia, Iran, Malaysia, Pakistan, Turkey, Bangladesh, Kazakhstan, Maldives and Uganda) from 2010- 2018, using panel data approach, EViews software has been used for variables. According to the result of the unit root test, the significance of the data of the variables used in the model has been confirmed. The Cao co-integration test also explains the long-term relationship between the dependent variable and the explanatory variables. Chao and Hausmann test were also tested to use the model type, which according to the results of these tests, the specification of the model with fixed effects was accepted.

The results obtained from the description of the model performed by the panel method indicate that the misery index has a significant positive effect on income inequality. As can be seen, the misery index coefficient is (0.05), which explains the 0.05 percent increase in the Gini coefficient for one percent increase in this variable. Auxiliary explanatory variables used in specifying the model of this paper, such as labor productivity, the ratio of government construction expenditures to GDP, the ratio of foreign direct investment to GDP, the ratio of exports to GDP and GDP per capita also have a significant impact. Labor productivity with a coefficient of 0.01 has a significant negative effect on the Gini coefficient, which explains the 0.01% decrease in income distribution inequality due to a 1% increase in labor productivity. The ratio of government construction expenditures to GDP also explains the significant negative effect on the Gini coefficient and shows that for one percent increase in this variable, income inequality decreases by 0.11 percent. The ratio of foreign direct investment to GDP shows a significant positive effect on the Gini coefficient, which explains the 0.004% increase in income inequality due to a 1% increase in foreign direct investment, which is a small effect. The positive impact of foreign direct investment on income inequality may be due to the fact that foreign direct investment benefits a small number in the short term. Exports and current GDP also show a significant negative effect on the Gini coefficient and show that income inequality decreases by 0.002% and 0.02% for one percent increase in these variables, respectively.

The satisfaction of the people with regard to the advancement of the political, economic and social aims of the States is a fundamental principle; therefore, satisfying the people and sections of society is one of the main goals of countries. Because majority of society is made up of low-income deciles, government officials must constantly implement policies and mechanisms that lead to a reduction in the misery index. Also, according to the results of the present research model, the following policy recommendations can be proposed:

1. Serious, fundamental and continuous measures to reduce inflation and unemployment by efficient and effective mechanisms to reduce misery in society;

2. Determining the necessary mechanisms to continue the role of the government, developing the country's production infrastructure and creating the necessary incentives to attract private sector investment in order to increase quality export goods that can compete with foreign goods in foreign markets;

3. Designing appropriate training mechanisms in order to increase the knowledge and job skills of employees to increase labor productivity.

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